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Paper 43
Entered: December 24, 2014

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CB DISTRIBUTORS, INC. and
DR DISTRIBUTORS, LLC,
Petitioner,

v.

FONTEM HOLDINGS 1 B.V.,
Patent Owner.

Case IPR2013-00387
Patent 8,156,944 B2

Before JACQUELINE WRIGHT BONILLA, BRIAN J. McNAMARA, and TRENTON A. WARD, *Administrative Patent Judges*.

BONILLA, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

CB Distributors, Inc. and DR Distributors, LLC (collectively, "Petitioner"), filed a Petition (Paper 1, "Pet.") to institute an *inter partes* review of claims 1–12, 15–26, and 33–41 of U.S. Patent No. 8,156,944 B2 (Ex. 1001) ("the '944 patent"). The previous Patent Owner, Ruyan Investment (Holdings) Limited,[1] did not file a preliminary response. We determined that the information presented in the Petition demonstrated that there was a reasonable likelihood that Petitioner would prevail in challenging claims 1–12, 15–26, and 33–38, but not claims 39–41, of the '944 patent, as unpatentable under 35 U.S.C. § 102 or § 103, or both. Pursuant to 35 U.S.C. § 314, we instituted this proceeding on December 30, 2013, to review whether claims 1–12, 15–26, and 33–38 are unpatentable on the following grounds.

Reference(s)	Basis	Claims Challenged
Liu (Ex. 1019)[2]	§ 102	1, 2, 5–8, 10, 33, 35, 37, and 38
Hon '494 (Exs. 1008/1009)[3] and Liu	§ 103	1–4, 8–12, 15–26, 33, 34, 36, and 38

Paper 7 ("Dec. to Inst."), 2, 26.

[1] During the course of this proceeding, Patent Owner filed an amended mandatory notice indicating that Fontem Holdings 1 B.V. became Patent Owner via an assignment executed on December 9, 2013. Paper 9, 2; Paper 11, 2.

[2] Liu, WO 2007/078273 A1, published July 12, 2007 (Ex. 1019).

[3] Hon, WO 2005/099494 A1, published Oct. 27, 2005 (Ex. 1008), English translation (Ex. 1009).

After institution of trial, the current Patent Owner, Fontem Holdings 1 B.V. ("Patent Owner"), filed a Patent Owner Response (Paper 19, "PO Resp."). Petitioner subsequently filed a Reply to the Response (Paper 29, "Pet. Reply"). An oral hearing was held on September 18, 2014. A transcript of the hearing has been entered into the record. Paper 42 ("Tr.").

We have statutory authority under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). Petitioner has shown by a preponderance of the evidence that claims 1–10, 12, 15–26, and 33–38 of the '944 patent are unpatentable. For the reasons discussed below, Petitioner has not shown that claim 11 is unpatentable.

B. Related Proceedings

Petitioner indicates that a third party, Fin Branding Group, LLC ("Fin"), requested *inter partes* reexamination of the '944 patent, i.e., reexamination proceeding 95/002,235. Pet. 1. In an Order entered July 24, 2013, the Board stayed that reexamination in view of this *inter partes* review. Paper 6.

Petitioner also indicates that Ruyan Investment (Holdings) Limited filed lawsuits asserting infringement of the '944 patent against ten different defendants in U.S. District Court for the Central District of California, including *Ruyan Investment (Holdings) Ltd. v. CB Distributors, Inc.*, No. CV12-5456, and *Ruyan Investment (Holdings) Ltd. v. Fin Branding Group, LLC*, No. CV12-5468. Pet. 1–2. The district court consolidated all ten cases for pre-trial purposes as *Ruyan Investment (Holdings) Ltd. v. Sottera, Inc.*, No. CV12-5454. *Id*. at 2. On February 25, 2013, the district court stayed all proceedings in light of the *inter partes* reexamination requested by Fin. *Id*.

C. The ’944 Patent (Ex. 1001)

The ’944 patent relates generally to an aerosol electronic cigarette that contains nicotine, but not tar, and “substitutes for cigarettes and helps the smokers to quit smoking.” Ex. 1001, 1:5–7, 57–60. Figure 1 of the ’944 patent is reproduced below.

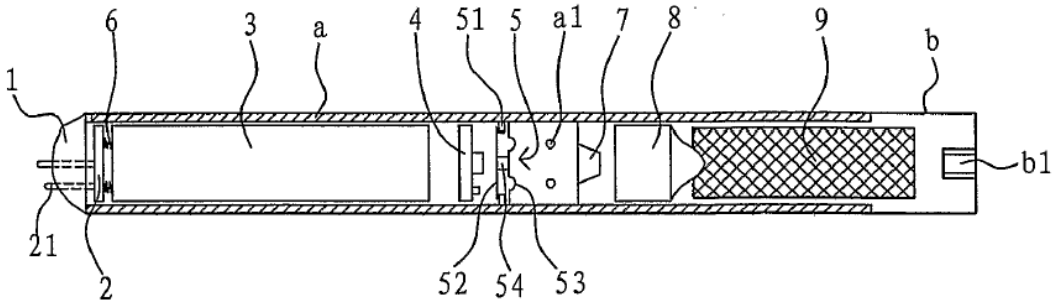
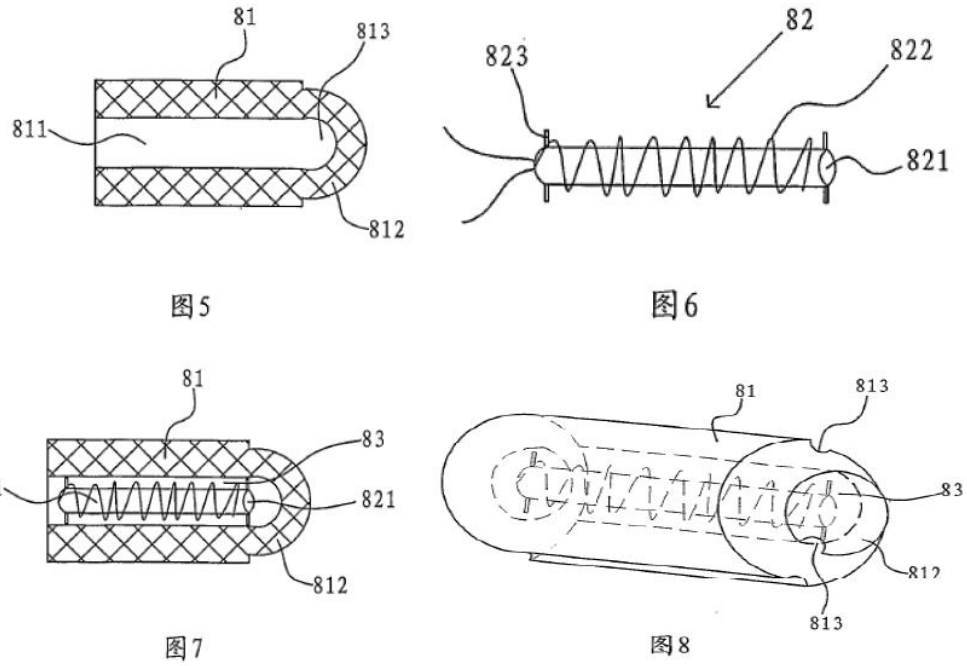


图1

Pet. 4; Ex. 1001, Fig. 1. Figure 1 depicts a side section view of an aerosol electronic cigarette comprising a battery assembly, an atomizer assembly, a cigarette bottle assembly, and shell a. Ex. 1001, 5:38–42, 1:62–65. The battery assembly includes battery 3, operating indicator 1, electronic circuit board 4, and airflow sensor 5. The atomizer assembly is atomizer 8. *Id*. at 6:13–15. The cigarette bottle assembly includes a perforated component for liquid storage 9 inside hollow cigarette holder shell b. *Id*. at 6:56–58.

Figures 5–8 of the ’944 patent are reproduced below.



Pet. 5; Ex. 1001, Figs. 5–8. Figure 5 depicts a side section view of porous component 81 and run-through atomizing chamber 811 of atomizer 8 (shown in Figure 1). Figure 6 depicts electric heating rod 82 of atomizer 8. Figure 7 depicts a side section of atomizer 8, including porous component 81, electric heating rod 82 (shown in Figure 6), and negative pressure cavity 83. Figure 8 depicts a cubic structure of atomizer 8. Ex. 1001, 4:44–55, 6:13–42.

Claims 1 and 10 of the ’944 patent are independent. Claims 2–9 depend, directly or indirectly, from claim 1, which is reproduced below:

1. An aerosol electronic cigarette, comprising:

a battery assembly, an atomizer assembly, a cigarette-solution storage area, and a hollow shell having a mouthpiece;

the battery assembly connects with the atomizer assembly, and both are located in the shell;

the cigarette solution storage area is located in one end of the shell adjacent to the mouthpiece, and fits with at least a portion of the said atomizer assembly inside it;

the shell has through-air-inlets;

the atomizer assembly includes an atomizer comprising an electric heating rod and a run-through atomizing chamber;

the electric heating rod comprises a cylinder and a heating element provided at the wall of the cylinder,

the electric heating rod is in the said atomizing chamber *and there is a negative pressure cavity in the atomizing chamber*.

Id. at 9:2–16 (emphases and indentation added).

Claims 11, 12, 15–26, and 33–38 depend, directly or indirectly, from claim 10, which is reproduced below:

10. An aerosol electronic cigarette, comprising:

a battery assembly, an atomizer assembly, a cigarette solution storage area, and a shell that is hollow and comprises a mouthpiece;

the said battery assembly connects with the said atomizer assembly, and both are located in the said shell;

the said cigarette solution storage area is located in one end of the shell proximal to the mouthpiece, and fits with at least a portion of the said atomizer assembly inside it;

the said shell has through-air-inlets;

the atomizer assembly is an atomizer, which includes a porous component and an electric heating rod;

wherein the electric heating rod comprises a cylinder and a heating element provided at the wall of the cylinder, *the said porous component has a run-through atomizing chamber*;

the electric heating rod is in the said atomizing chamber *and there is a negative pressure cavity in the atomizing chamber*.

Id. at 9:36–52 (emphases and indentation added).

II. ANALYSIS

For the challenged claims, Petitioner must prove unpatentability by a preponderance of the evidence. 35 U.S.C. § 316(e). We begin our analysis with claim construction.

A. Claim Construction

We construe claims in an unexpired patent by applying the broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). On the other hand, a "claim term will not receive its ordinary meaning if the patentee acted as his own lexicographer and clearly set forth a definition of the disputed claim term in either the specification or prosecution history." *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

1. "Run-through atomizing chamber"

Petitioner contends that "run-through atomizing chamber" in independent claims 1 and 10 means "a chamber having a flow in which atomization occurs along the length thereof," and does not require "that the input and output ends of the chamber be unblocked." Pet. 13–14. Patent Owner, on the other hand, contends that the phrase means "an atomizing chamber having an unblocked upstream end and a downstream end having an opening to allow air to flow freely through the chamber." PO Resp. 5–18. Patent Owner relies on a Declaration by Neil Sheehan (Ex. 2001) in support. *Id*. In its Reply, Petitioner relies on a Declaration by Samuel David Piper (Ex. 1022). Pet. Reply 4.

Patent Owner contends that a "key concept" in the '944 patent is air flow, where air flow resistance is not too high or too low. PO Resp. 5–6. In this capacity, Patent Owner refers to where the Specification discloses, in relation to a "second preferred embodiment," that "pore diameter of the restriction hole (101)" of "restriction component (10) . . . varies, for the purpose of airflow capacity control." Ex. 1001, 8:5–16, Fig. 10; PO Resp. 6, 13 (citing Ex. 2001 ¶ 17). Patent Owner also refers to where the Specification discloses "a clearance between the electric heating rod (82) and interior wall of the atomizing chamber (811)." Ex. 1001, 6:18–20; PO Resp. 6, 13 (citing Ex. 2001 ¶ 17). In addition, Patent Owner points to where the Specification describes that "air flow" sprays cigarette liquid from porous component (81) into negative pressure cavity (83) of the atomizing chamber in the form of fine drips, where electric heating rod (82) atomizes the drips. Ex. 1001, 7:25–46; PO Resp. 6, 13 (citing Ex. 2001 ¶ 17). As described in the Specification, after atomization, the drips "are suspended in the airflow to form gasoloid, which is discharged through the negative pressure cavity (83) and run-through hole (813), flows into the cigarette holder shell (b) of the cigarette bottle assembly, and is absorbed by the air channel (b1)." Ex. 1001, 7:32–39.

Patent Owner also points to disclosures in the Specification of "run-through atomizing chamber (811)," such as depicted in Figures 5, 7, 8, and 14–16. PO Resp. 7, 14. Patent Owner refers to where the Specification describes a "fourth preferred embodiment," depicted in in Figures 13–16. *Id.*; Ex. 1001, 8:32–45. In relation to this embodiment, the Specification describes that fixed plate (84) is separated from the run-through atomizing chamber, and, "[a]s a result, the *run-through hole* on one end of the atomizing chamber (811) *won't be blocked*, and the mist generated in the atomizing chamber (811) can be dispersed." Ex. 1001, 8:38–

45 (emphases added); PO Resp. 7 (emphases added also), 14 (citing Ex. 2001 ¶ 18). Patent Owner also discusses Figures 17 and 18 in the Specification, contending that "run-through hole" 821 is "a cylindrical through hole with open ends," where "air freely 'runs through' the run-through hole or the run-through atomizing chamber." PO Resp. 18.

Relying on the above-mentioned Figures and disclosures in the Specification, as well as Mr. Sheehan's Declaration, Patent Owner contends, as noted above, that the term "run-through atomizing chamber" requires an upstream end that is "unblocked," and a downstream end that has "an opening to allow air to flow freely through the chamber." *Id*. at 9–18.

As an initial matter, we note that independent claims 1 and 10 recite, in relevant part, an "atomizer comprising an electric heating rod and a run-through atomizing chamber," and that the "electric heating rod is in the said atomizing chamber and there is a negative pressure cavity in the atomizing chamber." Claims 1 and 10 do not recite "unblocked," "air flow," or "flow freely," nor do they recite any language in relation to either end of the run-through atomizing chamber.

As discussed in our Decision to Institute, we interpret a "run-through atomizing chamber" in the challenged claims to be a chamber inside an atomizer, where that chamber is defined by an interior wall of a component in the atomizer creating the chamber, e.g., the interior wall of cylindrical porous component 81, as shown in Figures 5 and 7 of the '944 patent. Dec. to Inst. 8

We agree with Patent Owner that the Specification indicates that, during operation of the aerosol electronic cigarette, air flows into a negative-pressure cavity in the run-through atomizing chamber of the atomizer, which acts to bring liquid into the atomizing chamber, and therefore, in proximity of the electric heating element inside the atomizing chamber, so that atomization of the liquid

occurs. Ex. 1001, 7:22–39. Along those lines, as also discussed in our Decision to Institute, although the Specification does not define "run-through" expressly, we read claims 1 and 10, in view of the Specification, to indicate that this term means that the atomizing chamber runs through (i.e., inside and along the length of) the atomizer and its electric heating rod, and atomization occurs along (i.e., runs through) the length of the chamber. Dec. to Inst. 8.

We decline, however, to read limitations that are not recited into the claims. While we read claims in view of the Specification, we do not read limitations from embodiments in the Specification into the claims. *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir 2014) (citing *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 904 (Fed. Cir. 2004)). Our reviewing court "has expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment." *Hill-Rom Servs.*, 755 F.3d at 1371–72 (quoting *Liebel-Flarsheim*, 358 F.3d at 906).

In most relevant part in relation to Patent Owner's contentions, the Specification of the '944 patent uses the term "blocked" once, where it states, in relation to a "fourth preferred embodiment" (shown in Figures 13–16), that "the run-through hole on one end of [run-through] atomizing chamber (811) won't be blocked." Ex. 1001, 8:32–45. Such disclosure is insufficient in light of other disclosures in the Specification, as well as the claim language itself, for us to interpret "run-through atomizing chamber" as narrowly as Patent Owner suggests.

Moreover, it is not clear from the Specification whether any described embodiment includes an atomizer with a run-through atomizing chamber having an "unblocked" end, as distinct from another "end having an opening to allow air to flow freely through the chamber," as asserted by Patent Owner. PO Resp. 5–11.

Neither the Specification, nor Patent Owner, adequately explains how or if an "unblocked" end differs from another end "an opening to allow air to flow freely through the chamber." *See* Pet. Reply 3–4.

We conclude that the broadest reasonable interpretation of "run-through atomizing chamber," in light of the Specification, does not require an "unblocked" upstream end and a downstream end "having an opening to allow air to flow freely through the chamber," as Patent Owner contends. PO Resp. 5, 11. Instead, the claims and Specification consistently indicate that "run-through atomizing chamber" means that the atomizing chamber runs through, i.e., inside and along the length of, the atomizer and its electric heating rod, and atomization occurs along (i.e., runs through), the length of the chamber. Dec. to Inst. 8. As long as the structure of the run-through atomizing chamber allows liquid to come into the chamber such that atomization occurs along the length of the chamber, it does not matter if either end of the chamber is unblocked, blocked in some way, and/or allows air to "flow freely."

2. "Porous component"

Independent claim 10 recites an atomizer that "includes a porous component." Claim 11, which depends from claim 10, recites, *inter alia*, that "a restriction component is detachably set on one end of the said porous component." Claim 20, which also depends from claim 10, recites that the "porous component is made of foamed nickel, stainless steel fiber felt, polymer or ceramics."

As described in the '944 patent Specification, an example of the recited porous component is porous component 81, shown in Figures 5, 7, and 8 (reproduced above). Pet. 5; Ex. 1001, Figs. 5, 7, 8. The Specification describes that "porous component (81) is made of foamed nickel, stainless steel fiber felt, macromolecular polymer foam or foamed ceramics, providing the remarkable

capabilities in liquid absorption and diffusion, and the ability to absorb the liquid stored in the cigarette bottle assembly." Ex. 1001, 6:30–34. The Specification also states that porous component 81 "absorbs the cigarette liquid from the perforated component for liquid storage (9)." *Id*. at 7:3–7. The Specification further describes that "[a]fter atomization, the big-diameter fine drips are re-absorbed by the porous component (81) under the action of vortex." *Id*. at 7:32–37.

In our Decision to Institute, we interpreted a "porous component" to be a component of the atomizer assembly in the electronic cigarette that includes pores and is permeable to liquid, such as cigarette solution from the cigarette solution storage area. Dec. to Inst. 11. Patent Owner disagrees with that claim construction, and proposes a more narrow interpretation. PO Resp. 25–26. Patent Owner contends that "porous component" refers to "a component of the atomizer assembly that is full of pores or interstices into which liquid or gas is absorbed or defused." *Id*. at 26.

More specifically, citing Mr. Sheehan's Declaration, and two dictionary definitions attached to his Declaration as Exhibits B and C, Patent Owner contends that the ordinary meaning of "porous" includes "'admitting the passage of gas or liquid through pores or interstices' or 'containing minute interstices through which water, air, etc. may pass.'" PO Resp. 26 (citing Ex. 2001 ¶ 29, Exs. B, C). According to Patent Owner, the "addition of a few holes to an otherwise solid component does not transform it into a 'porous component.'" *Id*.

At least one dictionary definition provided by Patent Owner mirrors the dictionary definition cited in our Decision to Institute. Dec. to Inst. 11 (citing Random House Webster's College Dictionary 1051 (1995) (defining "porous" as "permeable by water, air, etc." or "full of pores")). Exhibit B attached to Mr. Sheehan's Declaration provides several definitions for "porous" as presented in the

Free Online Dictionary (http://www.thefreedictionary.com/porous). That dictionary defines "porous" to mean, among other definitions, "having pores," "[a]dmitting the passage of gas or liquid through pores or interstices," or "permeable to water, air, or other fluids." Ex. 2001, Ex. B. The other dictionary cited by Mr. Sheehan provides definitions for "porous" that include "containing minute interstices through which water, air, etc., may pass." *Id*. at Ex. C (providing an on-line Oxford English Dictionary).

While both dictionaries define "porous" to include the definition of "full of pores," both dictionaries also include less limiting definitions. *Id*. at Exs. B, C. We do not agree with Patent Owner or Mr. Sheehan that the broadest reasonable construction of "porous" is limited to "full of pores or interstices into which liquid or gas is absorbed or defused." PO Resp. 26; Ex. 2001 ¶ 29. Rather, as discussed in our Decision to Institute, we interpret "porous," consistent with its ordinary meaning and how it is used the Specification, to refer to a component that includes pores and is permeable to liquid, i.e., admits passage of air or liquid through pores or interstices. Dec. to Inst. 11. A component that includes such pores has the ability to "absorb" liquid in the pores, consistent with disclosures in the Specification, regardless of whether the porous component has a few pores or is full of pores, such as in the case of a foam. Ex. 1001, 6:30–34; 7:3–7.

3. Other Claim Terms Construed in the Decision to Institute

In our Decision to Institute, we construed other phrases in the challenged claims—namely, "negative pressure cavity in the atomizing chamber" and "cigarette solution storage area," as recited in independent claims 1 and 10. Dec. to Inst. 8–10. Patent Owner does not propose alternative claim constructions for those phrases in its Patent Owner Response, nor did Petitioner challenge our constructions in its Reply. We discern no reason to alter our claim constructions

for this Final Written Decision. For convenience, our claim constructions for those phrases are reproduced in the table below.

Claims	Claim Phrase	Claim Construction
1 and 10	"negative pressure cavity in the atomizing chamber"	"a cavity within the run-through atomizing chamber of the atomizer, where pressure inside that cavity is negative compared to pressure outside the cavity" "For example, pressure inside the negative pressure cavity is negative compared to pressure outside the atomizer assembly, within the recited shell of the electronic cigarette."
1 and 10	"cigarette solution storage area" that "fits with at least a portion of the said atomizer assembly inside it"	"at least a part of an atomizer, such as a protuberance on a component of an atomizer, is located inside the cigarette solution storage area, which is capable of storing a cigarette solution, such as one comprising nicotine"

Dec. to Inst. 8–10.

B. Anticipation by Liu

Petitioner contends that Liu anticipates claims 1, 2, 5–8, 10, 33, 35, 37, and 38. Pet. 11, 18–29. With respect to the alleged ground of unpatentability based on anticipation by Liu, we have reviewed the Petition, the Patent Owner Response, and Petitioner's Reply, as well as relevant evidence discussed in each of those papers.

1. Liu (Ex. 1019)

Liu relates generally to a no-tar electronic smoking utensil. Ex. 1019, 1:6–7. Figures 1–6 in Liu illustrate an embodiment described in this reference. Figures 1–6 are reproduced below.

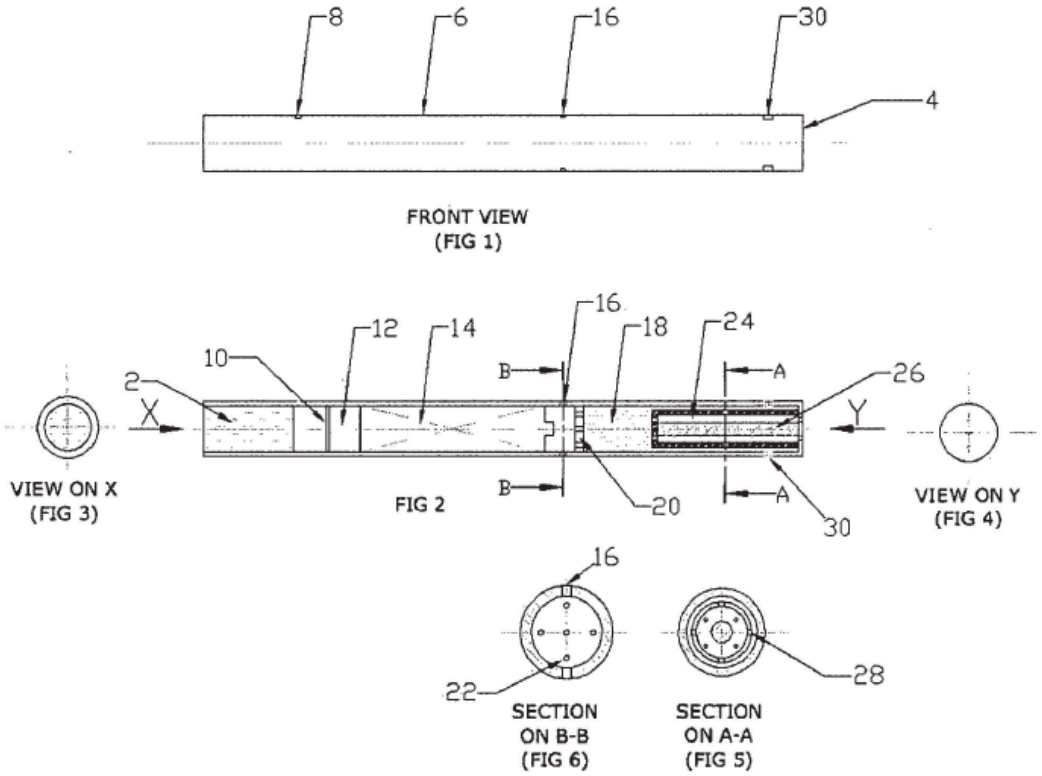


Figure 1 in Liu depicts a side view of a "simulated cigarette," including outer casing 6. *Id*. at 4:15–16, 5:14–15. Figures 2–6 present different sectional viewpoints of the simulated cigarette of Figure 1. *Id*. at 4:18–31. Figure 3 depicts a tip end view, looking in the direction of arrow X in Figure 2. Figure 4 depicts mouthpiece end 4 (as shown in Figure 1), looking at the direction of arrow Y in Figure 2. Figures 5 and 6 are cross-sectional end views taken along the lines AA and BB of Figure 2, respectively. As depicted in Figures 2 and 6, the simulated cigarette comprises battery chamber 12 including a plurality of apertures 16, and cylinder liquid container 18 separated from the battery chamber by dividing wall 20 that comprises a plurality of apertures 22. *Id*. at 5:31–6:7. Liquid container 18 "is formed of porous inorganic material," which "facilitates the distribution and the mixing of the air and liquid mixture." *Id*. at 6:11–14.

As shown in Figures 2 and 5 of Liu, the simulated cigarette also comprises cylindrical vapouriser heater assembly housing 24 ("heater housing 24"), which is "mounted within a central bore provided in the mouthpiece end of the liquid container 18." *Id*. at 6:16–18. Heater housing 24 houses heater wire 26 spirally wound on a central ceramic insulating rod. *Id*. at 6:18–19. As described in Liu, "walls of the heater housing 24 are provided with a plurality of apertures 28 to permit entry of the liquid/air from the liquid container 18 into the heater housing 24." *Id*. at 6:20–22.

Liu describes that as "the user draws on the cigarette mouthpiece, air is drawn into the battery chamber [12], into the liquid container [18] to mix with the liquid mixture, and into the heater assembly [24]," and the "resulting vapour is drawn into the mouth of the user." *Id*. at 7:16–19. Liu further describes that "in use, suction on the mouthpiece by the user causes air to be drawn through the porous container for liquid [18], over the heated vapouriser, into the mouthpiece and into the mouth of the user." *Id*. at 4:6–8, 9:21–24.

2. Claims 1 and 10

Petitioner contends that Liu anticipates independent claims 1 and 10, relying on discussion and claim charts in the Petition to point to disclosure in Liu for every element recited in those claims. Pet. 11, 18–29. For example, Petitioner points to disclosure in Liu as corresponding to certain elements in claims 1 and 10 as follows:

'944 patent claim element	Disclosure in Liu
"an atomizer assembly"	heater housing 24
"a cigarette solution storage area"	liquid container 18

’944 patent claim element	Disclosure in Liu
“an atomizer comprising an electric heating rod and a run-through atomizing chamber”	heater housing 24 includes electric heating rod (“heater wire 26 spirally wound on a central ceramic insulating rod”) located in a run-through atomizing chamber, where atomization occurs along the length of the chamber inside vapouriser assembly 24 (citing Ex. 1019, Figs. 2, 5, 6:20–22, 7:16–19)
“negative pressure cavity in the atomizing chamber”	“suction on the mouthpiece by the user causes air to be drawn through the porous container for liquid, over the heated vapouriser, into the mouthpiece and into the mouth of the user” (citing *id*. at Fig. 2, 4:6–9, 9:22–24)
“porous component” (claim 10)	walls of heater housing 24 “provided with a plurality of apertures 28 to permit entry of the liquid/air from the liquid container 18 into the heater housing 24” (citing *id*. at Fig. 5, 6:20–11)

Pet. 18–21, 24–26, 28.

As stated in Liu, a portion of liquid container 18 “is formed of a porous material to facilitate distribution of the liquid through the container, prior to being fed to the heater means.” Ex. 1019, 3:1–3. That liquid mixture may contain nicotine. *Id*. at 3:10–13. Thus, Liu discloses a cigarette solution storage area, i.e., “liquid container 18,” which stores a cigarette solution. Pet. 21. Liu also discloses that heater housing 24 houses an electric heating rod (i.e., “heater wire 26 spirally wound on a central ceramic insulating rod”), which is capable of vaporizing for inhalation, i.e., atomizing, cigarette solution. Ex. 1019, 6:16–22, 7:16–19; Pet. 20–21, 24. As shown in Figure 2 of Liu, heater housing 24 (an atomizer assembly) fits

inside liquid container 18 (a cigarette-solution storage area), as recited in the challenged independent claims. Ex. 1019, Fig. 2; Pet. 23, 27.

a. "Run-Through Atomizing Chamber"

Petitioner argues that Figure 2 of Liu depicts a "run-through atomizing chamber" as recited in independent claims 1 and 10, i.e., a chamber inside heater housing 24 that contains the heating rod, which runs along the length of heater housing 24. Pet. 20, 24, 26, 28; *see* table above.

Patent Owner contends that Liu does not disclose a "run-through atomizing chamber." PO Resp. 19–23. Patent Owner contends that Liu describes that the walls of heater housing 24 have apertures 28 to allow entry of liquid/air from liquid container 18 into heater housing 24. *Id*. at 19 (citing Ex. 2001 ¶ 21). Patent Owner also points to Figure 5 in Liu, and asserts that it "appears to show four small circles, but Liu fails to indicate what, if anything, these circles are intended to illustrate." *Id*. at 20 (presenting a marked-up and colored version of Fig. 5 in Liu, as prepared by Mr. Sheehan, Ex. 2001 ¶ 22); *see also* PO Resp. 22 (stating that "Liu does not say whether the liquid/air also enters into the heater housing 24 via the apparent four small circles shown in Fig. 5" (quoting Ex. 2001 ¶ 25)).

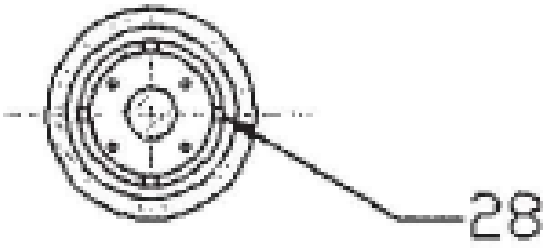
Citing Mr. Sheehan's testimony regarding Figure 5, Patent Owner asserts that "[e]ven if the small circles shown in Liu Fig. 5 were openings of some kind, Liu would suggest an atomizing chamber having an upstream end that is, at most, 3% open," as calculated based on measurements of components in Figure 5 by Mr. Sheehan. PO Resp. 21 (citing Ex. 2001 ¶ 23). In addition, Patent Owner contends that "Liu states only that liquid/air enters the heater housing 24 via apertures 28," and Liu suggests that "apertures 28 are very small." *Id*. at 22–23. Thus, according to Patent Owner, Liu does not disclose a "run-through atomizing chamber" as Patent Owner construes the phrase, i.e., "an atomizing chamber having an

atomizing chamber having an unblocked upstream end and a downstream end having an opening to allow air to flow freely through the chamber." *Id*. at 23.

As noted above, we do not construe a "run-through atomizing chamber" as narrowly as Patent Owner suggests. Rather, we consider whether Liu describes (i) an atomizing chamber that runs through, i.e., inside and along the length of, the atomizer and its electric heating rod, such that (ii) atomization occurs along (i.e., runs through), the length of the chamber. Petitioner has established by a preponderance of the evidence that Figure 2 of Liu depicts (i) an atomizing chamber inside heater housing 24 that runs through, i.e., inside and along the length of, heater housing 24 and its electric heating rod (i.e., rod and heater wire 26). Pet. 18–20, 24, 28 (citing Ex. 1019, Figs. 2, 5, 6:18–22, 7:16–19, 9:19–20).

Petitioner also establishes that Liu describes (ii) atomization occurring along the length of the chamber inside heater housing 24. Contrary to Patent Owner's assertion, it does not matter to our analysis that the upstream end of heater housing 24 in Liu is not "unblocked," and it does not matter whether apertures 28 are "small." Rather, we consider whether apertures in heater housing 24 in Liu allow liquid to come into the chamber such that atomization occurs along the length of the chamber, as required by claims 1 and 10.

Like Patent Owner, Petitioner points us to Figure 5 in Liu, which presents a cross-section along line A-A of the cigarette depicted in Figure 2. Ex. 1019, 4:27–28. More specifically, Figure 5 depicts a cross-section of heater housing 24, its chamber, and heating rod, as one would see it "looking down the barrel" of heater housing 24 toward the upstream (left-hand) end of heater housing 24, as shown in Figure 2. Tr. 38:24–39:15, 12:20–14:22. Figure 5 of Liu is reproduced below.



SECTION
ON A-A
(FIG 5)

As shown above, while Figure 5 of Liu designates only one aperture with "28," Figure 5 depicts multiple apertures in heater housing 24, i.e., at least four holes within the cylinder wall of heater housing 24 (one being designated with an arrow as "28"), as well as four additional holes in the back wall of the upstream end of heater housing 24. Ex. 1019, Figs. 2, 5; Pet. 18–19.

We determine that Figure 2 similarly indicates that apertures exist in the cylinder portion of heater housing 25, as well as in walls of the upstream and downstream ends of heater housing 24. Pet. 18–19; Pet. Reply 5–6 (citing Ex. 1022 ¶ 16). In that capacity, "walls of the heater housing 24 are provided with a plurality of apertures 28 to permit entry of the liquid/air from the liquid container 18 into the heater housing 24." Ex. 1019, 6:20–22; Pet. Reply 6–7. Based on depicted locations of those apertures, as well as Liu's description that "suction on the mouthpiece by the user causes air to be drawn through the porous container for liquid, over the heated vapouriser," we determine that Petitioner has shown by a preponderance of the evidence that Liu discloses a "run-through atomizing chamber" as recited in claims 1 and 10. Liu describes atomizing liquid along the

length of the chamber of heater housing 24, as the liquid/air mixture comes through apertures at the upstream end and cylinder walls of heater housing 24. *See also* Ex. 1019, 4:1–2 (describing that the liquid container communicates "with a heater vapouriser via a *series* of apertures," emphasis added); Pet. Reply 6–7.

b. "Negative Pressure Cavity"

We determine that Liu discloses a "negative pressure cavity in the atomizing chamber" where it describes that after a user draws on a cigarette mouthpiece, air goes into battery chamber 14, and "air in the battery chamber is sucked into the liquid container 18 through apertures 22 where it mixes with the liquid solution." Pet. 19 (citing Ex. 1019, 7:16–19). As noted by Petitioner, "air and liquid solution mixture is then drawn into the porous walls of the vapouriser heater assembly [24] which contain apertures 28." *Id*. (citing Ex. 1019, Fig. 5, 6:20–22, 7:16–19). We agree with Petitioner that the "flow of air through the cigarette indicates the space in between the heater housing 24 and the heating rod 26 forms a negative pressure cavity as the user inhales." *Id*.

As discussed above, we interpret the "negative pressure cavity" element as referring to a cavity within a run-through atomizing chamber of an atomizer, where pressure inside that cavity is negative compared to pressure outside the cavity. This cavity in Liu, as shown in Figure 2 of that reference, is located between the inner wall of heater housing 24 and heater wire 26. Pet. 25; Ex. 1019, Fig. 2. Petitioner points to disclosure in Liu stating that "suction on the mouthpiece by the user causes air to be drawn through the porous container for the liquid, over the heated vapouriser, into the mouthpiece and into the mouth of the user." Pet. 25, 28 (citing Ex 1019, Fig. 2, 4:6–9, 9:22–24).

Along these lines, we note that Liu describes that "the flow of fluids through the cigarette is caused solely or principally by the suction of the user." Ex. 1019,

2:24–26. In addition, as Petitioner points out, Liu discloses that "walls of the heater housing 24 are provided with a plurality of apertures 28 to permit entry of the liquid/air from the liquid container 18 into the heater housing 24." *Id*. at 6:20–22; Pet. 28.

Liu teaches that when a user inhales, liquid from container 18 moves into the atomizing chamber inside heater housing 24. *See, e.g.*, Ex. 1019, 7:16–19. Petitioner argues that negative pressure, via suction on the mouthpiece, necessarily exists inside heater housing 24 relative to pressure outside heater housing 24 in order for liquid to move in that direction. Pet. 25. While Liu does not disclose "negative pressure" expressly, by virtue of its discussion of suction and how liquid flows inside the cigarette, we determine that Liu discloses necessarily that pressure in the cavity between the inner wall of heater housing 24 and heater wire 26 is negative as compared to pressure existing inside liquid container 18.

c. "Porous Component"

In relation to independent claim 10, Petitioner contends that Liu describes that an "air and liquid solution mixture is [] drawn into the porous walls of the vapouriser heater assembly which contain apertures 28." Pet. 19 (citing Ex. 1019, Fig. 5, 6:20–22, 7:16–19). Thus, according to Petitioner, apertures 28 in the walls of heater housing 24 correspond to pores, and therefore "walls of heater housing 24" correspond to the "porous component" recited in claim 10. *Id*. at 28.

As noted above, we interpret "porous component" in claim 10 as a component that includes pores and is permeable to liquid, i.e., admits passage of air or liquid through pores or interstices, and therefore absorbs liquid in the pores. We do not limit this phrase, as Patent Owner suggests, to a component that is "full of pores or interstices into which liquid or gas is absorbed or defused." PO Resp. 25.

As noted above, as described in Liu, apertures (i.e., holes or pores) at the upstream and downstream ends, as well as cylinder walls of heater housing 24, permit passage of a liquid/air mixture through those apertures. *See also* Pet. 28 (explaining where Liu discloses a porous component in Figs. 2 and 5 (depicting a cross-section of Fig. 2)) (also citing Ex. 1019, 6:20–22, referring to a "plurality of apertures 28"). Thus, heater housing 24 of Liu corresponds to a "porous component" as recited in claim 10.

We are not persuaded by Patent Owner's contentions that Liu discloses only four holes in heater housing 24, nor its contentions based on its claim construction of "porous" as limited to a component that is "full of pores." PO Resp. 26–27. Patent Owner itself points us to a dictionary definition that defines "porous" as something that "admit[s] the passage of gas or liquid through pores or interstices," or as "having pores." Ex. 2001, Ex. B. Liu's disclosure of heater housing 24 having a "plurality of apertures" that "permit entry of the liquid/air . . . into the heating housing 24" meets that definition.

We conclude that Petitioner has demonstrated by a preponderance of the evidence that Liu anticipates independent claims 1 and 10.

3. Dependent Claims 2, 5–8, 33, 35, 37, and 38

Petitioner establishes by a preponderance of the evidence that Liu describes the claimed subject matter recited in dependent claims 2, 5–8, 33, 35, 37, and 38, as presented in the Petition. For example, Liu describes that the liquid in container 18 may contain nicotine, as recited in claims 2 and 38. Pet. 25, 29; Ex. 1019, 6:29–30. Liu also describes a "heater wire 26 spirally wound on a central ceramic insulating rod" that corresponds to a "coiled wire" that "extends along the length of" and "on the outer surface of," or "on the outside of," a cylinder, as recited in dependent claims 5–8, 33, 35, and 37. Pet. 26, 28–29; Ex. 1019, 6:18–19. We

conclude that Petitioner has demonstrated by a preponderance of the evidence that Liu anticipates dependent claims 2, 5–8, 33, 35, 37, and 38.

C. Obviousness over Hon '494 and Liu

Petitioner contends that claims 1–4, 8–12, 15–26, 33–34, 36, and 38 of the '944 patent would have been obvious over Hon '494 and Liu. Pet. 11, 36–47. We discuss Liu above.

1. Hon '494 (Ex. 1009)

Hon '494 relates to an aerosol electronic cigarette. Ex. 1009, 1:35–37. Figures 1 and 6 in Hon '494 are reproduced below.

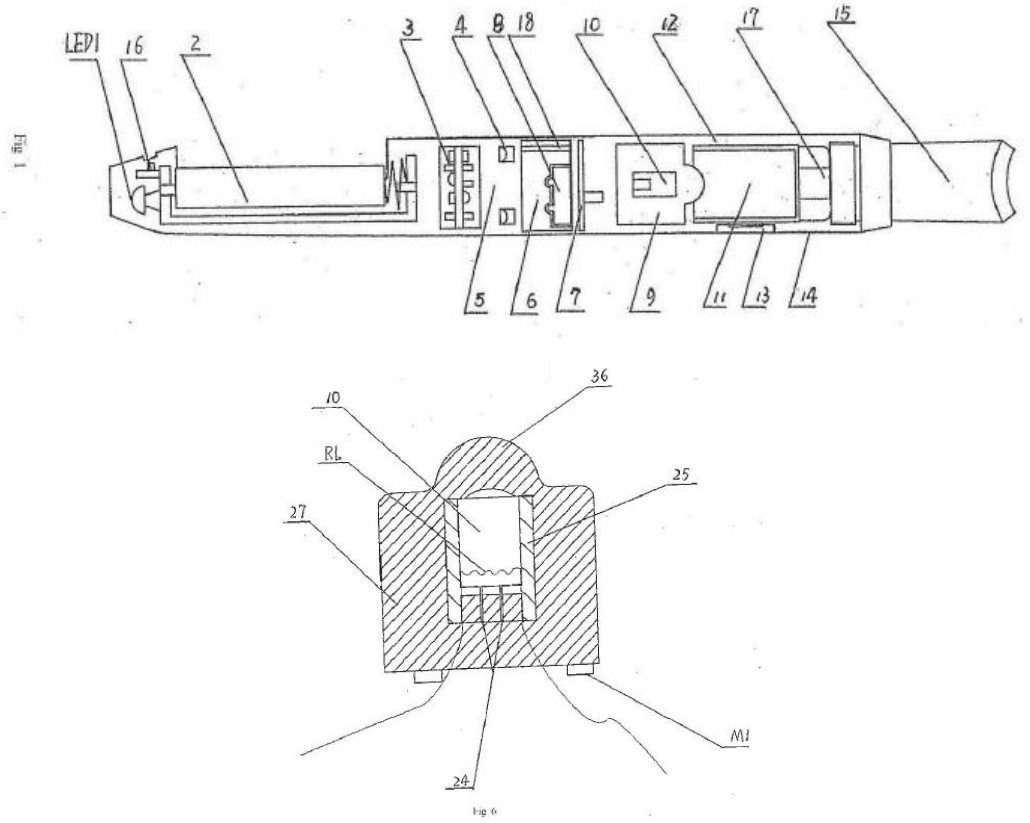


Figure 1 depicts the structure of an electronic cigarette, which includes air inlet 4, normal pressure cavity 5, sensor 6, negative pressure cavity 8, vapor-liquid separator 7, atomizer 9, liquid-supplying bottle 11, mouthpiece 15, and shell 14.

Ex. 1009, Fig. 1, 3:14–21. Figure 6 depicts a structural diagram of the atomizer, which includes atomization cavity 10, heating element RL, first piezoelectric element M1, atomization cavity wall 25, and porous body 27. *Id*. at 2:48, 3:26–29, 35–38.

As described in Hon '494, "solution storage porous body 28 in the liquid-supplying bottle 11 will be in contact with the bulge 36 on the atomizer 9, thereby achieving the capillary infiltration liquid-supplying." *Id*. at 4:31–33, 3:24–26, Figs. 1, 6, 11. Hon '494 further discloses that heating element RL "can be made of platinum wire, nickel chromium alloy or iron chromium aluminum alloy wire with rare earth element" and "can also be made into a sheet form." *Id*. at 3:27–29. Porous body 27 in atomizer 9 "can be made of foam nickel, stainless steel fiber felt, high molecular polymer foam and foam ceramic," and "atomization cavity wall 25 can be made of aluminum oxide or ceramic." *Id*. at 3:35–38, Fig. 6.

In addition, Hon '494 describes 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 and actuating signal," which causes the cigarette to go into operation. *Id*. at 4:11–14. Hon '494 teaches that air enters normal pressure cavity 5 through air inlet 4, goes through a hole in vapor-liquid separator 7, and flows into atomization cavity 10 of atomizer 9. *Id*. at 4:21–24. A "high speed stream passing through the ejection hold drives the nicotine solution in the porous body 27 to eject into the atomization cavity 10 in the form of droplet," where the nicotine solution is atomized by element M1 and further atomized by heating element RL. *Id*. at 4:24–27. After atomization, larger diameter droplets are reabsorbed by porous body 27, and smaller diameter droplets form aerosols,

which are sucked out via passage 12, gas vent 17 and mouthpiece 15. *Id*. at 4:28–31.

2. Claims 1 and 10

Petitioner contends that independent claims 1 and 10 would have been obvious over Hon '494 in view of Liu, relying on discussion and claim charts in the Petition. Pet. 11, 36–42. For example, Petitioner points to disclosure in Hon '494 as corresponding to certain elements recited in claims 1 and 10 as follows:

'944 patent claim element	Disclosure in Hon '494
"an atomizer assembly"	atomizer 9 with atomization cavity 10 and heating element RL
"a cigarette solution storage area" that "fits with at least a portion of the said atomizer assembly inside it"	liquid-supplying bottle 11 that fits with bulge 36 of atomizer 9 inside it
"porous component" (claim 10)	porous component 27

Pet. 37, 39–42.

Petitioner points to where Hon '494 discloses every element of each of claims 1 and 10, except that Petitioner recognizes that Hon '494 does not describe a run-through atomizing chamber or electric heating rod comprising a cylinder, and therefore, does not disclose a negative pressure cavity in that atomizing chamber, as required in claims 1 and 10. Pet. 40–42. Petitioner points to Liu for such disclosures, as discussed above. *Id*.

Petitioner contends that it "would have been obvious to employ a vapouriser assembly as disclosed by Liu (including the central rod extending lengthwise along the vapouriser with a spirally wound heater wire inside the vapouriser assembly) in

the electronic cigarette of Hon '494." *Id*. at 39. Petitioner contends that the "combination is simply applying a known technique (a run-through atomization chamber) to a known device (the electronic cigarette of Hon '494) to yield predictable results." *Id*.

Liu and Hon '494 describe similar electronic cigarettes. As Petitioner points out, similarly to Liu, Hon '494 discloses nearly all elements recited in each of claims 1 and 10. We also note that Hon '494 indicates that inhalation (smoking) by a user causes a "high speed stream," which leads to liquid ("nicotine solution") flowing from porous body 27 into atomization cavity 10 of atomizer 9. Ex. 1009, 4:11–27. Based on such teachings, we are persuaded that a "negative pressure cavity" exists in atomization cavity 10 in relation to pressure outside that cavity in the cigarette disclosed in Hon '494.

As acknowledged by Petitioner, however, atomizer 9 in Hon '494 uses a differently shaped heating element, located in a different place in atomizing chamber 10, as compared to the location of such elements in Liu's atomizer (heater housing 24). Thus, atomizer 9 (comprising porous body 27) in Hon '494 does not have a "run-through atomizing chamber" as construed above, because, for example, heating element RL does not run along the length of cavity 10, but rather is perpendicular to it. *See* Ex. 1009, Figs. 1, 6. Liu, on the other hand, discloses an atomizer assembly (heater housing 24) including a cylinder electric heating rod ("heater wire 26 spirally wound on a central ceramic insulating rod") that runs along a run-through atomizing chamber.

As discussed above, we are persuaded that Liu alone discloses every element recited in each of claims 1 and 10. Moreover, as stated in *KSR*, the "combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc.*, 550

U.S. 398, 416 (2007). We determine that Petitioner has established by a preponderance of the evidence that one would have had reason to substitute a cylinder electric heating rod (as taught in Liu) that runs along the length of atomizing chamber 10 for the heating element RL (as taught in Hon '494), because such a substitution appears to be merely a "predictable use of prior art elements according to their established functions." *KSR*, 550 U.S. at 417.

We conclude that Petitioner has demonstrated by a preponderance of the evidence that independent claims 1 and 10 would have been obvious over Hon '494 and Liu.

3. Dependent Claims 2–4, 8, 9, 12, 15–26, 33–34, 36, and 38

Petitioner establishes by a preponderance of the evidence that Hon '494 in view of Liu suggests the claimed subject matter recited in dependent claims 2–4, 8, 9, 12, 15–26, 33–34, 36, and 38. Pet. 41–47. For example, as Petitioner points out, Hon '494 discloses unscrewing mouthpiece 15 from shell 14, and removing liquid-supplying bottle 11 located in the shell. Pet. 41. Thus, as recited in challenged claims 3 and 4, Hon '494 teaches or suggests a shell that comprises first and second detachable sections, i.e., sections of shell 14 that detach from mouthpiece 15 and liquid-supplying bottle 11. *Id*. (citing Ex. 1009, 4:34–37). Along these lines, Hon '494 also discloses liquid-supplying bottle 11 containing nicotine solution, which corresponds to the cigarette-bottle assembly recited in challenged claim 9. *Id*.

Petitioner also points to where Hon '494 discloses rechargeable battery 2, LED 1 (an operating indicator), electronic circuit board 3, and air-flow sensor 6, which correspond to elements and how they connect together as recited in dependent claims 12 and 15–19. Pet. 42–45 (citing Ex. 1009, Figs. 1, 4, 10, Abstract, 1:15–16, 1:45–46, 2:4–9, 3:15–16, 3:21–24, 4:1–18, 4:21, 5:9–10); *see*

also Dec. to Inst. 21–22 (discussing claim 18). In relation to claim 20, Petitioner explains where Hon '494 discloses that porous body 27 in atomizer 9 "can be made of foam nickel, stainless steel fiber felt, high molecular polymer foam and foam ceramic." Ex. 1009, 3:35–38, Fig. 6; Pet. 45. In addition, Petitioner points to where Hon '494 discloses other elements recited in challenged claims 21–26, 34, and 36. Pet. 45–47.

Except in relation to the "porous component" recited in claims 10, 11 and 20, Patent Owner does not contend that Hon '494 does not disclose the above-mentioned claimed features. Rather, Patent Owner argues that one of ordinary skill in the art would not have been motivated to combine the elements of Hon '494 and Liu. PO Resp. 27–28. According to Patent Owner, the porous component in Hon '494 "is used in connection with moving liquid, not air and liquid, from the liquid storage towards a heating element," as disclosed in Liu. *Id.* at 27 (citing Ex. 2001 ¶ 31). Patent Owner contends that because, in Liu, "air and liquid are mixed before entering the heater housing 24, the reason for using a porous component is missing." *Id*. Patent Owner also contends that neither Hon '494 nor Liu disclose a "porous component" as recited in claim 10, as construed by Patent Owner, i.e., because that component "must be highly porous," but "not allow liquid from the liquid container 18 to pass through when the device is not in actual use." *Id*. at 27–28.

As discussed above, Petitioner establishes by a preponderance of the evidence that each of Liu and Hon '494 disclose a "porous component," as well as other elements recited in claim 10, with the exception of a "run-through atomizing chamber" not disclosed in Hon '494. Pet. 18–29, 39–47. Petitioner establishes by a preponderance of the evidence that one would have had reason to substitute one or more elements from one electronic cigarette for corresponding elements in the

other, because similarities of components and their use in the cigarettes of both references suggested that such substitutions would have been a "predictable use of prior art elements according to their established functions." *KSR*, 550 U.S. at 417. Thus, for example, one would have had reason to substitute a cylinder electric heating rod (as taught in Liu) that runs along the length of atomizing chamber 10 (in Hon '494), for heating element RL (as taught in Hon '494).

Patent Owner's contentions, as noted above, do not persuade us otherwise. For example, neither Patent Owner, nor Mr. Sheehan in his Declaration, cite any support for the contention that the porous component in Hon '494 "is used in connection with moving liquid, not air and liquid, from the liquid storage towards a heating element," nor do they explain adequately why moving liquid, versus liquid and air, would matter, in any event, to an ordinary artisan considering both references. PO Resp. 27–28; Ex. 2001 ¶ 31. Nor does Patent Owner explain, or cite evidence of, why a proposed modification might be "inoperable" as it pertains to similar electronic cigarettes comprising similar components. PO Resp. 28.

We conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–4, 8, 9, 12, 15–26, 33–34, 36, and 38 of the '944 patent would have been obvious over Hon '494 and Liu.

4. Dependent Claim 11

Claim 11, which depends from independent 10, recites "a restriction component" that "is detachably set on one end of the said porous component." Petitioner relies on Hon '494 as disclosing this element. Pet. 42 (citing Ex. 1009, Figs. 1, 2, 9, 3:38–40). Specifically, Petitioner contends that "Hon '494 discloses a 'through hole [that] is provided on the vapor-liquid separator 7, [which] can be made of plastic or silicon rubber,'" and that the "diameter of the through hole is less than the inner diameter of the atomizing chamber," as also required in claim

11. Petitioner does not, however, contend or point us to where Hon '494 discloses or suggests a restriction component "detachably set on one end" of the porous component.

We are persuaded by Patent Owner's position that "the vapor-liquid separator in Hon '494 is set on one end of the sensor and is spaced apart from the porous component of Hon '494." PO Resp. 29. In other words, Petitioner does not explain how a hole on vapor-liquid separator 7 can correspond to a restriction component "detachably set on one end" of porous component 27 in atomizer 9, which is located some space away from vapor-liquid separator 7, as depicted in Figure 1 of Hon '494.

Petitioner's contentions in its Reply that "the petition and the Board relied on Liu for the porous component" do not persuade us otherwise. Pet. Reply 15. As noted above, Petitioner relies on Hon '494, not Liu, as disclosing the restriction component recited in claim 11. Pet. 42. Moreover, Petitioner does not contend in its Petition (*id.*), nor explain in its Reply why, "it would have been obvious that the restriction component of Hon '494 (the 'vapor-liquid separator') would be placed on the porous component of Liu." Pet. Reply 15 (citing Dec. to Inst. 26, instituting a trial, not making "a final determination" on patentability).

Thus, Petitioner has not established by a preponderance of the evidence that claim 11 of the '944 patent would have been obvious over Hon '494 and Liu.

III. CONCLUSION

For the foregoing reasons, we conclude that Petitioner has demonstrated by a preponderance of the evidence that: (1) claims 1, 2, 5–8, 10, 33, 35, 37, and 38 of the '944 patent are unpatentable under 35 U.S.C. § 102 as anticipated by Liu; and (2) claims 1–4, 8–10, 12, 15–26, 33–34, 36, and 38 are unpatentable under

35 U.S.C. § 103(a) over the combination of Hon ’494 and Liu. We conclude, however, that Petitioner has not demonstrated by a preponderance of the evidence that claim 11 is unpatentable under 35 U.S.C. § 103(a) over the combination of Hon ’494 and Liu.

IV. ORDER

Accordingly, it is

ORDERED that claims 1–10, 12, 15–26, and 33–38 of the ’944 patent are *unpatentable*; and

FURTHER ORDERED that, because this is a Final Written Decision, the 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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