

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NJOY, LLC, NJOY HOLDINGS, INC.,
Petitioners,

v.

JUUL LABS, INC.,
Patent Owner

U.S. PATENT NO. RE49,114

DECLARATION OF JOSEPH C. MCALEXANDER III

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I, Joseph C. McAlexander ^{III}, hereby declare:

I. INTRODUCTION

1. I have been retained by Petitioners NJOY, LLC and NJOY Holdings, Inc. (collectively, “Petitioners” or “NJOY”) as an independent expert witness in the above-captioned *inter partes* review (“IPR”), in which NJOY has requested that the U.S. Patent and Trademark Office cancel as unpatentable claims 1, 5–7, 29–30, 36, 43–44, 76–77, 81, 86, 89, and 93 of U.S. Patent No. RE49,114 (“’114 Patent”).

2. I am being compensated on an hourly basis for my work on this case. I have received no additional compensation for my work on this case, and my compensation does not depend upon the contents of this declaration or the outcome of these proceedings.

3. This declaration sets forth my analyses and opinions based on my knowledge and experience and the materials I considered.

A. Qualifications and Compensation

4. I am a Registered Professional Engineer (#79454) and the President of McAlexander Sound, Inc. I hold a Bachelor of Science degree in Electrical Engineering from North Carolina State University. I am a member of a number of professional organizations, including the Institute of Electrical and Electronics Engineers, Inc. (IEEE) and the National Society of Professional Engineers. I have been associated with the integrated circuit and electronics industry as a designer and

consultant for the past fifty one (51) years. I am a named inventor on thirty one (31) U.S. patents and a number of foreign patents, including patents directed to current sensors, motion sensors, timing and voltage/current control, signal generation and detection, and conditional response circuits.

5. My skills and experience are in areas of circuit design and analysis, device fabrication and assembly, testing, marketing, control system design and analysis, manufacturing operations, and respective areas of quality, reliability, and defect/failure analysis. Specifically, I have:

designed and managed development, testing, and evaluation of devices including Dynamic Random Access Memories (DRAMs), Static Random Access Memories (SRAMs), Charge Coupled Devices (CCDs), Shift Registers (SRs), and functional circuits including I/O buffers for address and data, decoders, clocks, sense amplifiers, fault tolerant, parallel-to-serial data paths for video applications, level shifters, converters, pumps, and logic, as well as wireless communication systems and MEMs applications;

managed operations including engineering, training, and quality assurance for device fabrication, assembly, test, analysis, and reliability assessment, as well as manufacturing control, each of which involved both volatile and non-volatile memory;

performed testing, analysis, and control involving use of mechanical calibration and measuring equipment, including optical, scanning e-beam, IR, capacitive, and laser using phase contrast and Fast Fourier Transform (FFT) for High Aspect Ratio Inspection (HARI) applications; audio and video system design and installation;

taught courses in solid state device physics, integrated circuit design, integrated circuit fabrication, and statistical control;

provided expert services, investigating both process and design

technologies of various devices (microprocessor and controller, memory, programmable logic, card, tag, module, mixed signal, custom, and other), systems (PC and peripheral, computer, control, laser measurement, switch, architecture, software, and other), and consumer products (medical, TV, telephone, VCR, facsimile, copier, lighting, game, and other);

provided nuclear radiation hardness testing services for military and space clients;

managed the design and installation of audio sound and video systems for private and commercial enterprises.

6. I also have experience performing intellectual property valuation and patent portfolio work for companies. For example, when I worked at RMC Management, I conducted numerous patent portfolio valuations and negotiated licenses. Also, I was part of a consultant team with ST Microelectronics that performed patent portfolio valuations and negotiated licenses on behalf of ST Microelectronics.

7. Because of my background, training, and experience, I am qualified to provide the expert opinions regarding the technology described and claimed in the Asserted Patents. A more detailed account of my work experience and other qualifications is listed in my *Curriculum Vitae*, EX1004.

8. I am being compensated at the hourly rate of \$625.00. My compensation is not dependent on the substance of my statements in this Declaration.

B. Materials Considered

9. I reviewed all of the documents referenced in this declaration, including the following exhibits submitted with NJOY’s petition for *inter partes* review:

No.	Exhibit
1001	U.S. Patent No. RE49,114 (“’114 Patent”)
1002	U.S. Patent No. RE49,114 File History
1005	WIPO Publication No. WO 2011/065754 A2 (“Cho”)
1006	U.S. Patent Publication No. 2009/0283103 A1 (“Nielsen”)
1007	Canadian Patent No. 2 884 987 C (“Hon”)
1008	U.S. Patent Publication No. 2011/0011396 (“Fang”)
1009	U.S. Patent No. 6,155,268 (“Takeuchi”)
1010	U.S. Patent Publication No. 2014/0060554 (“Collett”)
1011	Korean Utility Model No. KR 20-0453400 Y1 (“Yeom”)
1012	Korean Utility Model No. KR 20-0454110 Y1 (“Yoon”)
1013	U.S. Patent No. 2,057,353 (“Whittemore”)
1014	<i>Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof</i> , USITC Inv. No. 337-TA-1368, Amended Joint Claim Construction Chart (Dec. 22, 2023)
1015	<i>JUUL Labs, Inc. v. NJOY, LLC</i> , No. 23-cv-01204 (D. Ariz.), Docket Listing (retrieved Feb. 8, 2024)

10. In forming my opinions, I considered the documents listed above and my education, training, experience, and knowledge of the field encompassing the ’114 Patent.

II. RELEVANT LEGAL STANDARDS

11. I am not an attorney, so my understanding of patent law is based on explanations provided to me by counsel. The legal standards set forth below are based on the guidance provided by counsel, and I have applied these standards to my analysis.

A. Claim Construction

12. I understand that the numbered paragraphs at the end of a U.S. patent specification are the patent “claims” that define the metes and bounds of the alleged invention. I further understand that the ’114 Patent claims are what is being challenged in the present IPR proceeding.

13. I understand that, in this proceeding, the Board must determine the scope of the claims by giving the claims their ordinary and customary meaning in light of the specification, as the claims would be interpreted by one of ordinary skill in the art.

14. I understand that patent claims generally include a “transitional” term or phrase between the claim’s preamble and body, such as “consisting of,” “consisting essentially of,” and “comprising,” which vary in inclusiveness. I understand “consisting of” is closed, meaning the claim is limited to the elements following the transitional phrase and nothing else. I understand “consisting essentially of” is semi-closed, meaning the claim is limited to the elements following

the transitional phrase and other unrecited elements that do not materially affect the basic and novel characteristics of the claimed invention. I understand that “comprising” is open, meaning the claim is not limited to elements following the transitional phrase and can encompass other unrecited elements.

B. Invalidity

15. I understand that NJOY bears the burden of proving the challenged '114 Patent claims are invalid. I further understand that NJOY must prove this by a preponderance of the evidence, which means that invalidity must be shown to be more likely than not.

16. I understand that a claim may be invalid as anticipated by prior art. I was informed that prior art anticipates a claim when the prior art discloses each and every claim element.

17. I understand that a claim may be invalid as obvious when, as a whole, it would have been obvious to a Person of Ordinary Skill in the Art (“POSITA”) at the time of the alleged invention. Thus, I understand I must analyze obviousness from the perspective of a POSITA, and I further understand I must analyze obviousness based on four factual inquiries: (1) the scope and content of the prior art; (2) the differences between the claimed invention and the prior art; (3) the level of ordinary skill in the art; and (4) secondary considerations of nonobviousness. I have been instructed that I cannot rely on hindsight and that, instead, I should

consider what a POSITA had reason to pursue further and routine steps a POSITA would have taken, such as in response to known problems, situations, or obstacles.

18. I understand that the following non-exhaustive list of rationales may support a conclusion that a claim is obvious: combining prior art elements according to known methods to yield predictable results; simple substitution of one known element for another to obtain predictable results; use of a known technique to improve a similar device (method, or product) in the same way; applying a known technique to a known device (method, or product) ready for improvement to yield predictable results; choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success; and some teaching, suggestion, or motivation in the prior art that would have led a POSITA to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

19. I was informed that, in addition to explicit motivation, motivation to combine prior art references may be implicit, and may be found in the knowledge of a POSITA or in the nature of the problem to be solved. I understand that an implicit motivation to combine exists not only when a suggestion may be gleaned from the prior art as a whole, but when an “improvement” is technology-independent and the combination of references results in a product or process that is more desirable, for example because it is stronger, cheaper, cleaner, faster, lighter, smaller, more

durable, or more efficient. I further understand that motivation to combine references may be found in the nature of the problem to be solved where prior art references are directed to the same problem.

20. I understand that prior art may be relied on for its express disclosures and teachings. I also understand that prior art may be relied on as teaching features that are necessarily present in the prior art even if those specific features are not expressly or explicitly disclosed.

21. I understand that, before reaching any final conclusion on obviousness, I must consider objective indicia of nonobviousness, if any such indicia are offered. I was informed that I must consider these indicia to ensure that, for example, there were not unanticipated problems, obstacles, or hurdles that may seem easy to overcome in hindsight, but were not readily overcome before the challenged claims' priority date. I understand that these objective indicia are also known as "secondary considerations of nonobviousness" and may include long-felt but unmet needs and unexpected results, among others.

22. I also understand that any alleged evidence of secondary considerations of nonobviousness must relate to the scope of the challenged claims. I understand that, for any offered secondary considerations evidence to be given substantial weight, the proponent of that evidence must establish a "nexus," meaning a sufficient connection or tie, between that evidence and the "merits," meaning any novel

elements, of the claimed invention. Accordingly, I understand that if the offered secondary considerations evidence is the result of something other than the merits of the claim, there is no nexus to the claimed invention. I also understand that the Patent Owner bears the burden to prove a nexus exists.

23. I understand that secondary considerations do not overcome a strong showing of obviousness.

C. Priority Date

24. I understand that, for patent claims to be entitled to the priority date of an earlier application (*i.e.*, to benefit from the earlier application's filing date), the claims of the later patent must be fully supported by the earlier patent application's disclosures. I understand that, for the claims to be supported, the earlier application's disclosures must be sufficient to allow a person of ordinary skill in the art to reasonably conclude that the inventors were in possession of the claimed invention.

25. I understand that the application for the '114 Patent was filed on March 20, 2019 as a broadening reissue of U.S. Patent No. 9,596,887, which claimed priority back to U.S. Patent Application No. 13/157,024 filed June 28, 2011. For the purposes of my opinions, I considered the state of the art and the level of knowledge that a person of ordinary skill in the art would have possessed as of the earliest claimed priority date, June 28, 2011. Unless I state otherwise, whenever I explain a

principle or some technical subject matter that was known or understood, this refers to the knowledge or understanding of a person of ordinary skill in the art as of June 28, 2011.

26. I noted that although the '114 Patent's named inventor, Kyle D. Newton, submitted a confidential declaration in the ITC Investigation claiming an earlier invention date, the alleged corroborating evidence submitted therewith cannot support an earlier invention date because the alleged evidence is undated and unverifiable.

D. Person of Ordinary Skill in the Art ("POSITA")

27. I was asked to evaluate the '114 Patent from the perspective of a POSITA as of the '114 Patent's priority date. As I explained above, I evaluated the '114 Patent and formed my opinions based on the '114 Patent's earliest claimed priority date, June 28, 2011.

28. In my opinion, a POSITA relevant to the '114 Patent as of the priority date would have at least a B.S. degree in Mechanical Engineering, Electrical Engineering, Industrial Design, Product Design, or similar field, with at least two years of industry experience in one of these fields, and such POSITA would have been familiar with electrically powered vaporizing articles, their components or the underlying technologies.

29. Based on my education, training, and experience, it is my opinion that

I can accurately represent the views of a POSITA as of the '114 Patent's priority date for at least claims 1, 5–7, 29–30, 36, 43–44, 76–77, 80–81, 86, 89, and 93. Thus, I provide the opinions in this declaration using the viewpoint of a POSITA as of June 28, 2011.

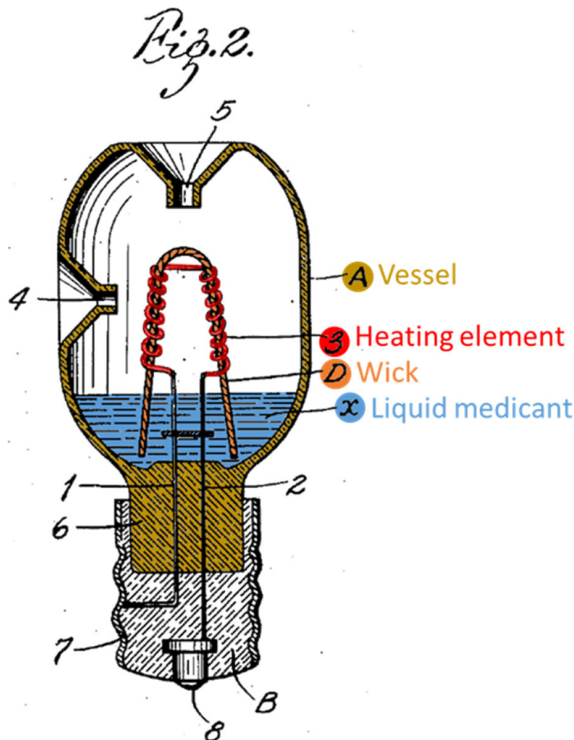
III. THE PRIOR ART

A. Technology Background

30. Although designs vary, a typical electronic cigarette (“e-cigarette”) comprises a container holding a vaporizable liquid, a capillary wick, an electrically-powered heating element, and a power source. In operation, the capillary wick transports the vaporizable liquid to the heating element, and the heating element is energized by the power source to vaporize the liquid.

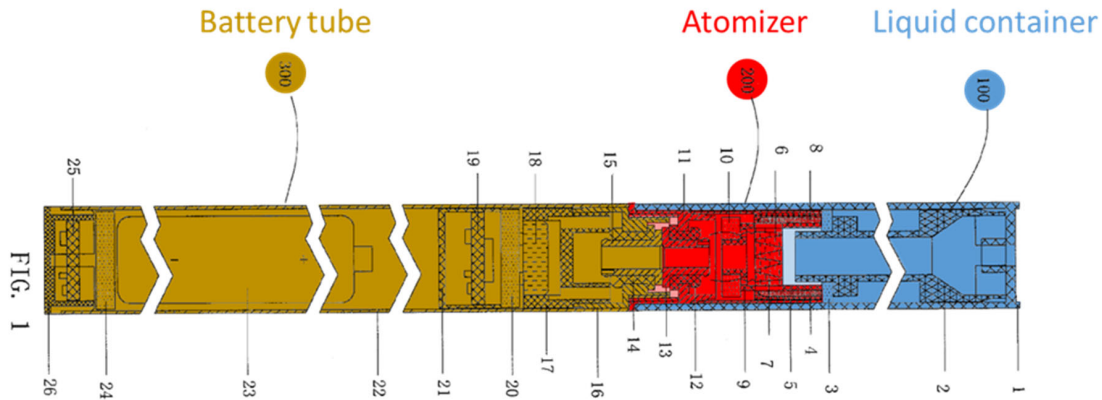
31. E-cigarettes with this typical design were well known and widely used long before the '114 Patent's earliest claimed priority date (June 28, 2011). For example, U.S. Patent No. 2,057,353 (“Whittemore”), issued on October 13, 1936, discloses a vaporizing device with “a hollow glass container adapted to hold a liquid medicament,” “a wick ... whereby said medicament will be carried by capillary action to a point where it will be vaporized by the heat from the filament,” “a filament or heating element ... energized by an electric current,” and “an electric battery cell.” EX1013 (Whittemore), 1:19–28, 1:53–2:8, 4:43–46. I annotated Whittemore Figure 2 below to highlight the container holding liquid medicant, wick,

and heating element in an embodiment of Whittemore.



EX1013 (Whittemore), Fig. 2 (annotated).

32. By June 28, 2011, e-cigarettes often had modular designs that allowed efficient manufacturing and convenient replacement of key components. For example, U.S. Patent Publication No. 2011/0011396 (“Fang”), filed July 7, 2010 and published January 20, 2011, discloses an e-cigarette with separate battery, atomizer, and liquid container modules, which I highlighted in Fang Figure 1 below. EX1008 (Fang), ¶0012.



EX1008 (Fang), Fig. 1 (annotated).

33. These modular designs included features to integrate the modules, including, for example, threads or press-fit tolerances for coupling, wicks and wick apertures for supplying liquid, and chimneys for delivering vapor to adult consumers. See EX1008 (Fang), ¶¶0012–0018.

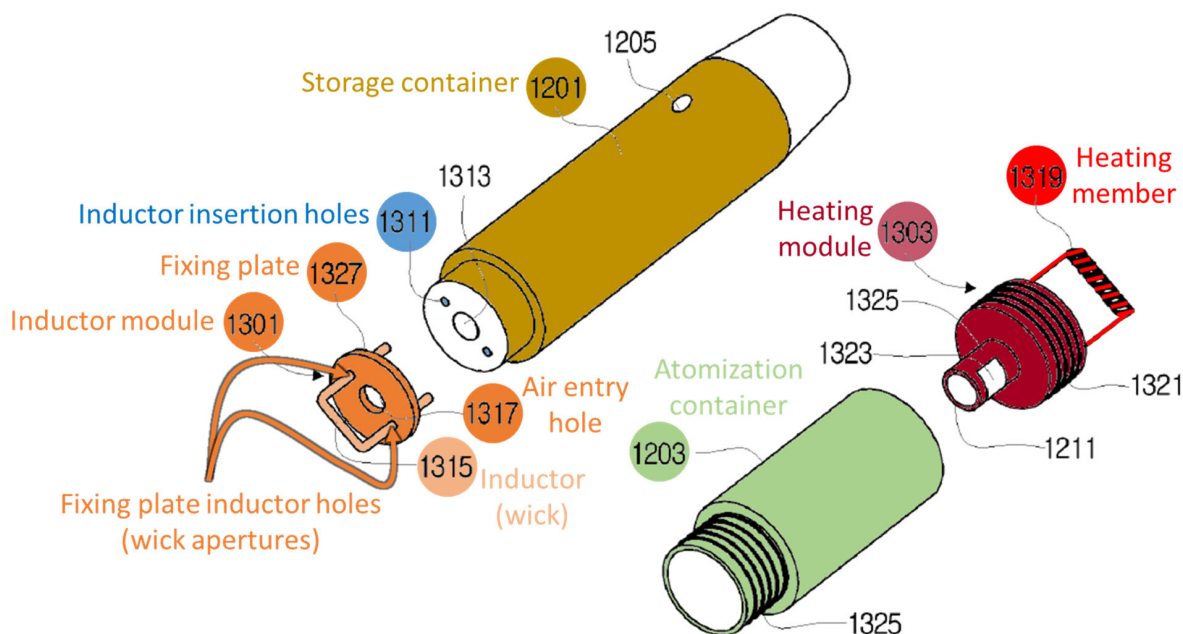
B. WIPO Publication No. WO 2011/065754 A2 (“Cho”)

34. Cho is the June 3, 2011 WIPO publication of international patent application PCT/KR2010/008367 filed November 24, 2010. Cho claims priority to two Korean patent applications, KR 10-2009-0114223 filed November 24, 2009 and KR 10-2010-0116571 filed November 23, 2010.

35. Cho discloses an e-cigarette with a cartridge and a power supply, which Cho calls a vaporization unit and a power operation unit, respectively. EX1005 (Cho), ¶33. Cho discloses various embodiments of both the vaporization unit and the power supply. See *id.*, ¶¶32, 50, 72, Figs. 1, 6–7.

36. Cho Figures 7 through 11 show an exemplary embodiment of

vaporization unit 1200. In this embodiment, the lower portion of the vaporization unit is a subassembly comprising an atomization container 1203, a heating module 1303, and an inductor module 1301. The heating module 1303 comprises a heating member 1319 connected to a metal base containing positive and negative electrodes, and the inductor module 1301 comprises an inductor 1315 with ends pressed through two holes in a fixing plate 1327. The upper portion of the vaporization unit is another subassembly comprising a storage container 1201, an air inhalation tube 1313, and a loading portion 1503. Cho Figure 8 shows an exploded view of many of these components.

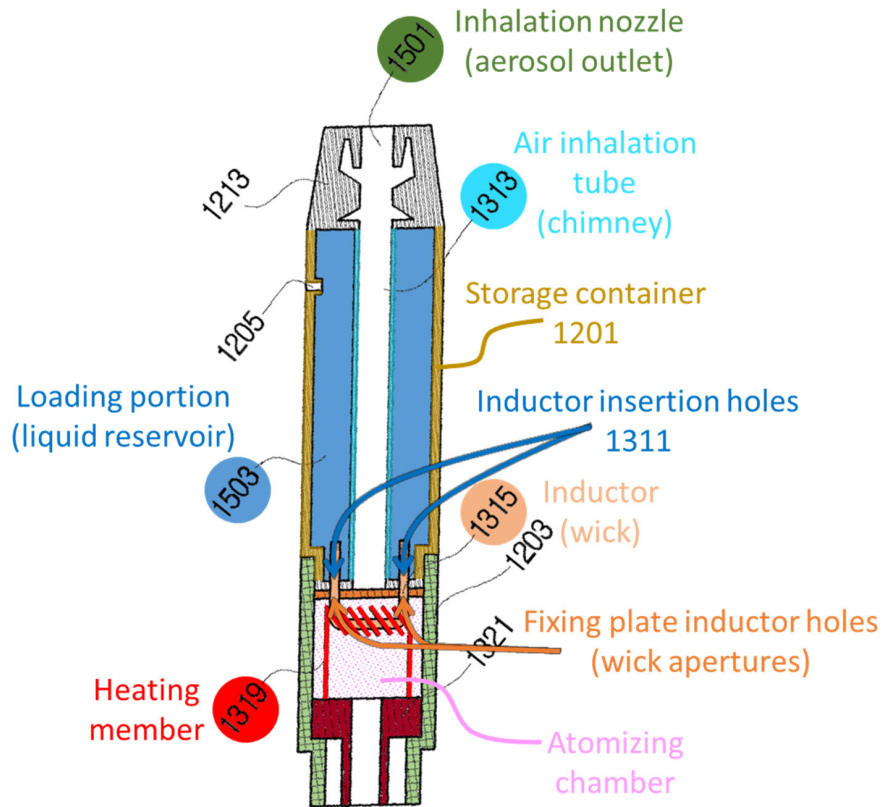


EX1005 (Cho), Fig. 8 (annotated).

37. The lower portion of the vaporization unit is sequentially assembled.

EX1005 (Cho), ¶86 (“The atomization container assembly is a state in which the

heating module 1303 and the inductor module 1301 are sequentially assembled ...”). First, the “inductor module 1301 is installed on the top of the heating module 1303.” *Id.*, ¶81; *see also id.*, Fig. 9. Second, the “heating module 1303 is fastened and fixed to the inside of the atomization container 1203.” *Id.*, ¶81; *see also id.* ¶82 (“The heating module 1303 has a coupling threaded portion 1321 fixed in electrical contact with the inner bottom surface of the atomization container 1203 ...”), ¶88 (“After the heating module 1303 and the inductor module 1301 configured as described above are assembled together, they are fastened into the atomization container 1203 through the coupling threaded portion 1321 of the heating module 1303.”). Third, “the inductor module 1301 is fixed or joined to the other opening of the atomization container 1203.” *Id.*, ¶83; *see also id.* ¶88 (“When the assembly of the heating module 1303 is completed, the fixing plate 1327 of the inductor module 1301 is fitted into a coupling protrusion (not shown).”). I annotated Cho Figure 11 below to show that the assembled lower portion creates an atomizing chamber containing heating member 1319 and inductor 1315.



EX1005 (Cho), Fig. 11 (annotated).

38. After the lower portion is assembled, it is combined with the upper portion to form the vaporization unit. The ends of inductor 1315 protruding from inductor module 1301 are pressed into two inductor insertion holes 1311 in storage container 1201. EX1005 (Cho), ¶88 (“... the lower end of the inductor 1315 extends by a predetermined length to be inserted into the inductor insertion holes 1311 of the storage container 1201.”), ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311 ...”). And the storage container 1201 is fastened to the atomization container 1203. EX1005 (Cho), ¶80 (“In addition, the storage container 1201 and

the atomization container 1203 cannot be fastened by screwing due to their structure, and therefore may be formed into a fastening structure by an interference fit or an elastic protrusion.”). I annotated Cho Figures 8 and 11 above to highlight inductor 1315, inductor insertion holes 1311, storage container 1201, and atomization container 1203.

C. U.S. Patent Publication No. 2009/0283103 A1 (“Nielsen”)

39. Nielsen is the November 19, 2009 publication of U.S. Application No. 12/465,551. Nielsen claims priority to U.S. Provisional Application No. 61/052,691 filed May 13, 2008.

40. Nielsen discloses various embodiments of e-cigarettes and e-cigarette docking stations. EX1006 (Nielsen), ¶¶0010–0020, Figs. 1A–5. Figures 1F and 2 show two exemplary e-cigarette embodiments, which Nielsen calls electronic vaporizing devices or “EVDs.” *See id.*, ¶¶0005–0007.

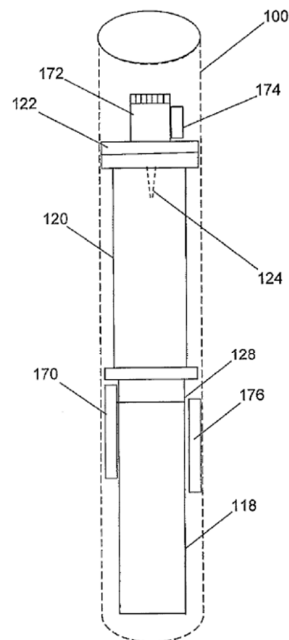


FIG. 1F

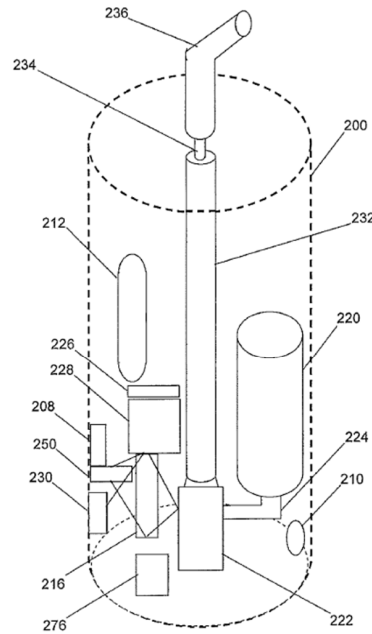


FIG. 2

EX1006 (Nielsen), Figs. 1F, 2.

41. The EVDs comprise core features required to generate vapor, and they may further comprise convenience-focused features. Core EVD features include, for example:

“an AC/DC charger connected to an AC electrical plug receptacle for charging a main battery that powers the EVD cylindrical canister; a sealed cartridge chamber containing a liquid; a wicking system that penetrates the sealed cartridge chamber and facilitates the flow of the liquid to a vaporizer; wherein the vaporizer converts the liquid into a vapor that is outputted into a vapor tube that is joined to a straw that is external to the cylindrical canister[.]”

EX1006 (Nielsen), ¶0006.

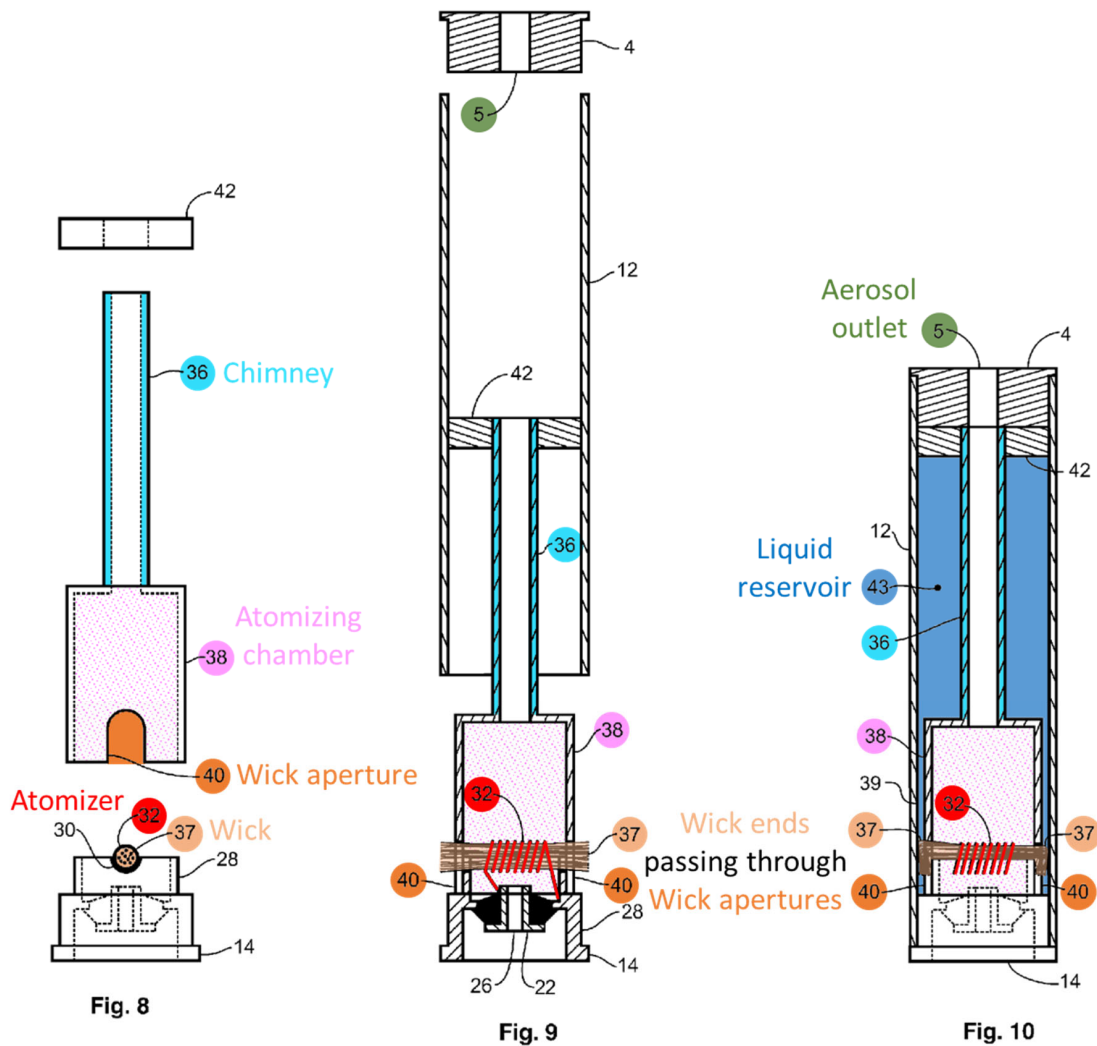
42. The convenience-focused features comprise several microprocessor-based functions, including, for example: monitoring EVD use time and cartridge

liquid consumption and levels; and providing tactile, audio, or visual feedback to users based on consumption, battery status, or other EVD operating features. *See* EX1006 (Nielsen), ¶0027. The EVDs may also comprise “a viewing-window to enable a user to visually monitor the level of fluid in the liquid cartridge.” *Id.*

IV. THE '114 PATENT

A. Overview

43. The '114 Patent is directed to an e-cigarette comprising a cartridge coupled to a power supply portion. *See* EX1001 ('114 Patent), 4:54–5:25, 6:66–7:27. The cartridge comprises an atomizer 32 and a wick 37 in an atomizing chamber 38. *Id.*, 6:26–8:3. The atomizing chamber 38 has an air inlet, an atomizer outlet, and two wick apertures 40. *Id.* The ends of wick 37 pass through the two wick apertures 40 into a liquid reservoir 43, which is sealably separated from the atomizing chamber 38. *Id.* The atomizer outlet is coupled to an aerosol outlet 5, and a chimney 36 forms part of the path therebetween. *Id.* I annotated '114 Patent Figures 8 through 10 to highlight these features.



EX1001 ('114 Patent), Figs. 8–10 (annotated).

B. Prosecution History

44. The '114 Patent application was filed March 20, 2019 as a broadening reissue of U.S. Patent No. 9,596,887 ("'887 Patent"). The '887 Patent application was filed March 19, 2014 and is a continuation of U.S. Patent Application No. 13/955,153 filed July 31, 2013, which is a continuation of U.S. Patent Application No. 13/157,024 filed June 28, 2011.

45. The '114 Patent issued June 28, 2022 with 195 claims. The examiner reasoned that challenged claims 1, 43, and 44 (and their dependent claims) were allowable over the prior art because:

the prior art of record fails to teach that the atomizing chamber comprises a first wick aperture and a second wick aperture each forming an opening between the atomizing chamber and the liquid reservoir and a wick having a first wick end extending out of the atomizing chamber through the first wick aperture into the liquid reservoir and a second wick end extending out of the atomizing chamber through the second wick aperture into the liquid reservoir.

EX1002.0961-.0962.

C. Claim Interpretation

46. I understand that the Patent Owner and VMR Products LLC initiated an investigation before the International Trade Commission that is currently pending as *Certain Vaporizer Devices, Cartridges Used Therewith, and Components Thereof*, USITC Inv. No. 337-TA-1368 (“ITC Investigation”). I further understand that in the ITC Investigation, the parties exchanged proposed constructions of certain '114 Patent terms, those terms were briefed and argued before the administrative law judge (ALJ), but to date the ALJ has not issued a claim construction order. The terms and the parties' proposed constructions are:

Term	Petitioners	Patent Owner
“wick” (claims 1, 43, 44)	fibrous bundle	plain and ordinary meaning, <i>e.g.</i> , any material through which the liquid may be drawn via capillary

Term	Petitioners	Patent Owner
		action
“wick aperture” (claims 1, 43, 44)	an opening that provides clearance for the wick to pass through	plain and ordinary meaning, <i>e.g.</i> , an opening that allows the wick to access liquid
“a wick in contact with the [atomization] liquid in the liquid reservoir through said first wick aperture and said second wick aperture” (claims 1, 43, 44)	fibrous bundle that passes through the first wick aperture and second wick aperture to contact the [atomization] liquid in the liquid reservoir	plain and ordinary meaning, <i>e.g.</i> , a wick in contact with the liquid in the liquid reservoir by way of said first wick aperture and said second wick aperture
“sealably separated” (claim 1)	separated by a barrier to prevent flooding while also allowing liquid to pass from the liquid reservoir to the atomizing chamber by capillary action of the wick	

47. In my opinion, the prior art anticipates the challenged claims under both Patent Owner’s and Petitioners’ interpretations.

V. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. Ground 1: Claims 1, 5–7, 29–30, 36, 43–44, 76–77, 81, 86, 89, and 93 of the ’114 Patent Are Anticipated by WO 2011/065754 A2 (“Cho”)

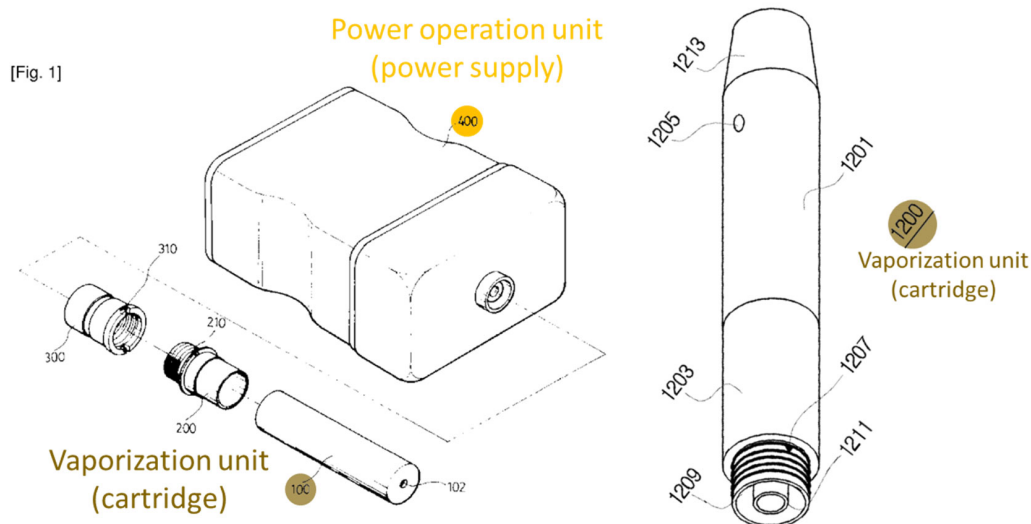
48. In my opinion, Cho anticipates claims 1, 5–7, 29–30, 36, 43–44, 76–77, 81, 86, 89, and 93 of the ’114 Patent. My detailed reasons are provided below.

1. Claim 1

a. [1.A] An electronic cigarette cartridge apparatus, comprising:

49. In my opinion, to the extent the preamble is limiting, Cho discloses an electronic cigarette cartridge apparatus.

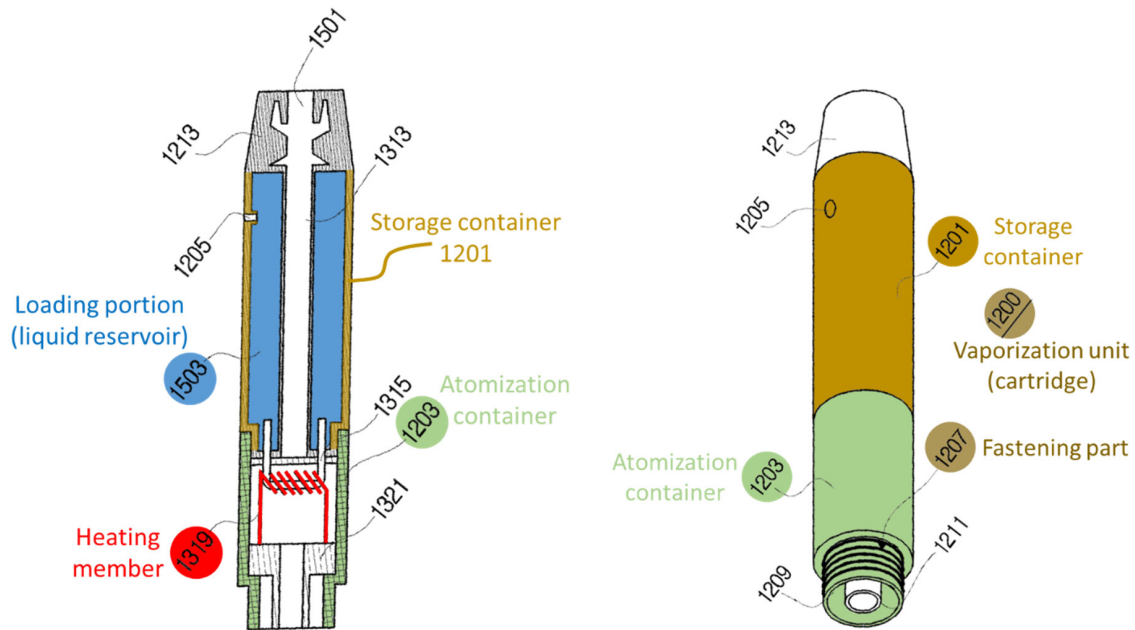
50. Cho discloses an electronic cigarette comprising a vaporization unit (cartridge apparatus) coupled to a power operation unit (power supply). *See* EX1005 (Cho), ¶¶1, 9, 50, 79. Cho discloses two vaporization unit embodiments, 100 and 1200, and two power operation unit embodiments, 400 and 400', and sub-embodiments of each. *See id.* For convenience, I primarily refer to vaporization unit 1200 (shown below in Cho Figure 7, right) and power operation unit 400 (shown below in Cho Figure 1, left).



EX1005 (Cho), Figs. 1 and 7 (annotated).

51. Cho discloses vaporization unit 1200 is an electronic cigarette cartridge apparatus that stores a liquid mixed composition in loading portion 1503 of storage container 1201, and the liquid mixed composition is vaporized in atomization

container 1203 by a heating member 1319. EX1005 (Cho), ¶9 (“Another object of the present invention is to provide a device for vaporisation and inhalation capable of presenting a replacement structure through which sanitary management of a cartridge containing a composition is possible.”); ¶73 (“As shown in the figure, an inhalation contact 1213 for inhaling the mixed composition ... is provided in the vaporisation unit 1200 on the inhalation nozzle side having a cylindrical structure, and a fastening part 1207, which is fastened with a first connection body ..., is formed at the end, and between the fastening part 1207 and the inhalation contact 1213, a storage container 1201 in which a predetermined filling space is secured so that the mixed composition can be filled in a liquid state and an atomization container 1203 for vaporizing the mixed composition by direct or indirect heating through a predetermined heating member after inducing the mixed composition of the storage container 1201 using capillarity are disposed.”). I annotated Cho Figures 11 and 7 below to show these features.



EX1005 (Cho), Figs. 11 and 7 (annotated).

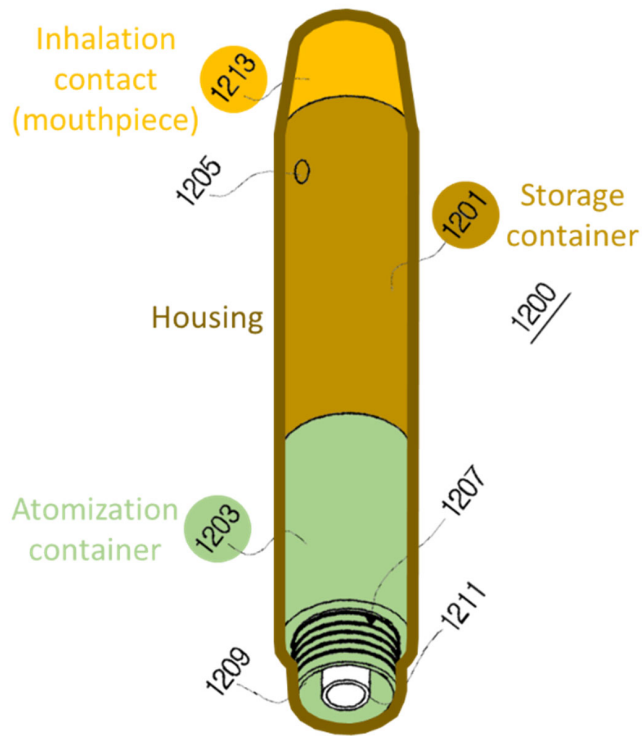
52. Cho further discloses vaporization unit 1200 is replaceable via threaded fastening part 1207 which mechanically couples vaporization unit 1200 to power operation unit 400 via intermediate threaded connection bodies 200 and 300. *See, e.g.,* EX1005 (Cho), ¶78 (“The fastening part 1207 is provided with a hollow threaded portion for fastening with the first connection body ...”), ¶79 (“... vapourisation unit 1200 of the inhalation nozzle side is fastened to the first connection body using the fastening part 1207, the first connection body is fastened to the second connection body, and the second connection body is connected to the power operation unit.”).

b. **[1.B] a housing having a mouthpiece with an aerosol outlet;**

53. In my opinion, Cho discloses this limitation.

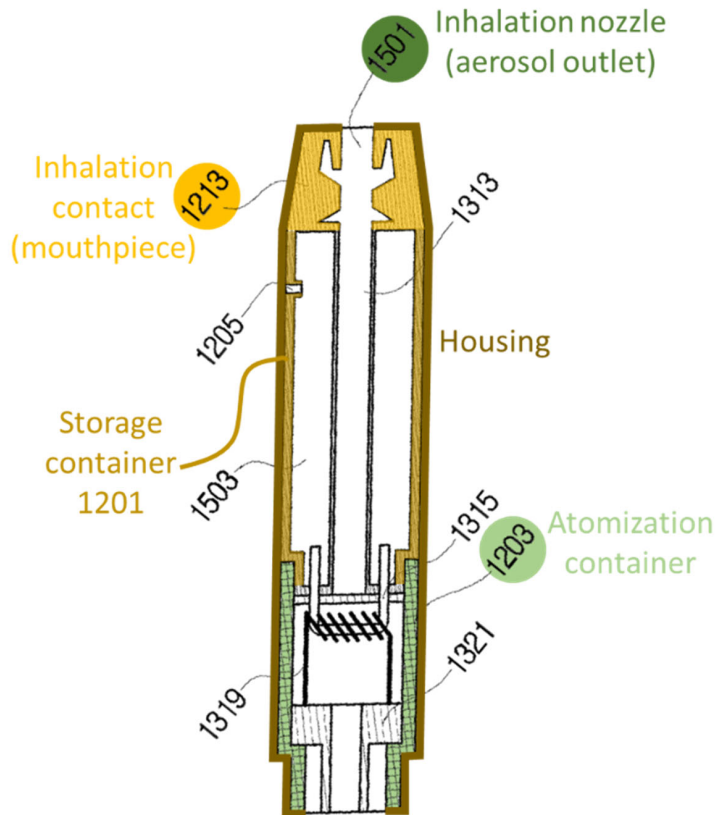
54. Cho discloses vaporization unit 1200 (cartridge apparatus) has a housing with an inhalation contact 1213 (mouthpiece) that includes an inhalation nozzle 1501 (aerosol outlet) for inhaling a vaporized substance.

55. The housing comprises the exterior surface of vaporization unit 1200, which includes storage container 1201, atomization container 1203, and inhalation contact 1213. EX1005 (Cho), ¶73 (“... an inhalation contact 1213 for inhaling the mixed composition through body contact is provided in the vaporisation unit 1200 on the inhalation nozzle side having a cylindrical structure, and a fastening part 1207 ... is formed at the end, and between the fastening part 1207 and the inhalation contact 1213, a storage container 1201 ... and an atomization container 1203 ... are disposed.”). I annotated Cho Figure 7 below to show the housing of vaporization unit 1200.



EX1005 (Cho), Fig. 7 (annotated).

56. The inhalation contact 1213 (mouthpiece) includes an inhalation nozzle 1501 (aerosol outlet), which is in fluid communication with air inhalation tube 1313. EX1005 (Cho), ¶89 (“... the air inhalation tube 1313 communicates with an inhalation nozzle 1501 of the inhalation contact 1213.”).



EX1005 (Cho), Fig. 11 (annotated).

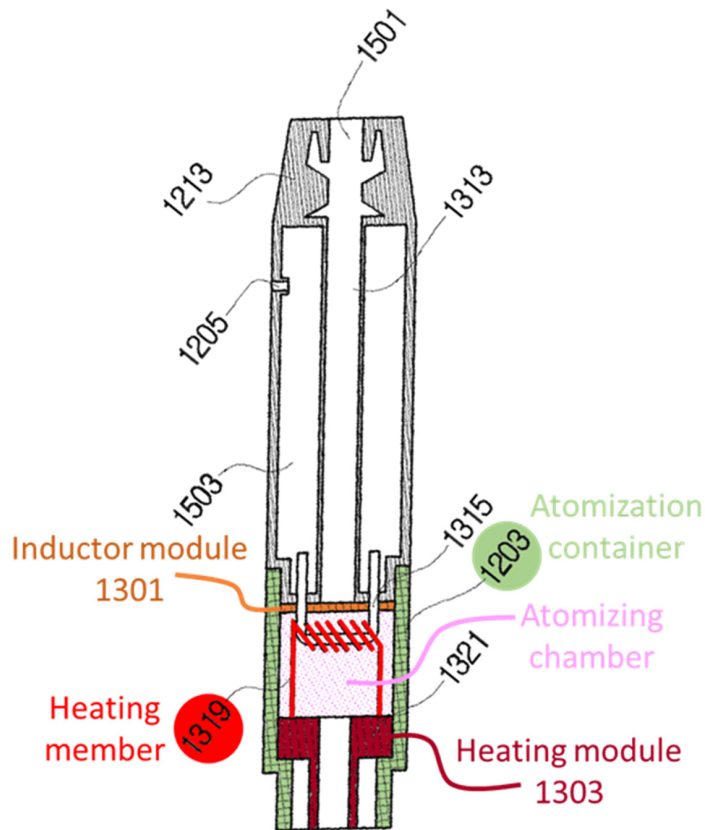
57. Liquid mixed composition from storage container 1201 is vaporized in atomization container 1203, and the resulting aerosol travels through air inhalation tube 1313 and exits through inhalation nozzle 1501 in inhalation contact 1213. EX1005 (Cho), ¶77 (“... the atomization container 1203 vaporizes the mixed composition induced from the storage container 1201 using a heating member ...”), ¶81 (“The air inhalation tube 1313 is in communication with the inhalation contact 1213, and air pressure is transferred to the first connection body through the air inhalation tube 1313 during the user’s inhalation process.”).

c. **[1.C] an atomizer disposed within an atomizing chamber, and**

58. In my opinion, Cho discloses this limitation.

59. Cho discloses a heating member 1319 (atomizer) disposed within an atomizing chamber.

60. Cho discloses an atomizing chamber created within the bounds of atomization container 1203, heating module 1303, and inductor module 1301. EX1005 (Cho), ¶73 (“... an atomization container 1203 for vaporizing the mixed composition by direct or indirect heating through a predetermined heating member ...”). Atomization container 1203 is a hollow cylindrical structure with open ends. *Id.*, ¶82 (“... the atomization container 1203 having a hollow structure with both ends open ...”). Heating module 1303 is fixed to one end of atomization container 1203, and inductor module 1301 is fixed to the opposite end of atomization container 1203. *Id.*, ¶82 (“The heating module 1303 has a coupling threaded portion 1321 fixed in electrical contact with the inner bottom surface of the atomization container 1203 ...”), ¶83 (“Meanwhile, the inductor module 1301 is fixed or joined to the other opening of the atomization container 1203 ...”). I annotated Cho Figure 11 below to show the atomizing chamber formed by these components.



EX1005 (Cho), Fig. 11 (annotated).

61. Cho discloses heating member 1319, which is an atomizer. *See* EX1005 (Cho), ¶77 (“... the heating member is a filament-type heating element made of a composite such as a nickel alloy or a rare earth element ...”); EX1001 (’114 Patent), 6:27–28 (“The atomizer 32 is a coiled nickel-chromium heater through which the wick 37 passes.”).

62. Cho explains that heating member 1319 (atomizer), which is part of heating module 1303, is installed inside atomization container 1203. EX1005 (Cho), ¶83 (“... the heating member 1319 of the heating module 1303 ...”), ¶81 (“A heating module 1303 is fastened and fixed to the inside of the atomization container 1203,

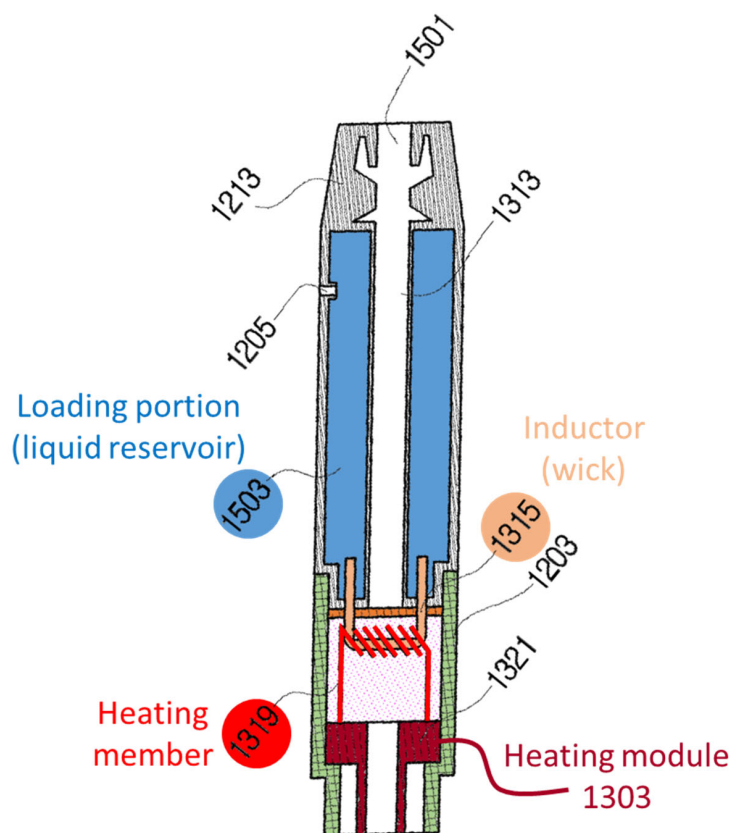
and an inductor module 1301 is installed on the top of the heating module 1303.”).

d. **[1.D] [the atomizer] operable to selectively generate an aerosol of a liquid in response to electric current flowing therethrough;**

63. In my opinion, Cho discloses this limitation.

64. Cho discloses heating member 1319 (atomizer) is operable to selectively generate an aerosol of a liquid mixed composition in response to electric current flowing therethrough.

65. Cho discloses liquid mixed composition is added to loading portion 1503. EX1005 (Cho), ¶89 (“... the loading portion 1503 is loaded with the mixed composition through the liquid introduction valve 1205.”). The liquid is transferred by inductor 1315 from loading portion 1503 to the heating member 1319 by capillary action. *Id.* (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”). I annotated Cho Figure 11 below to show these components.



EX1005 (Cho), Fig. 11 (annotated).

66. Cho discloses that when a consumer inhales (i.e., selectively), a pressure switch closes and power is applied to heating member 1319, causing electric current to flow therethrough. EX1005 (Cho), ¶79 (“The power supplied from the power operating unit is connected to the electrode 1209 via the second connection body and the first connection body, and interlocks with the inhalation port 1211 of the fastening part 1207 or the first connection body. The air pressure inhaled through the inhalation port 1211 induces a switching operation of the first connection body, and thus is controlled so that power is supplied to the electrode 1209 during the user’s inhalation process.”), ¶14 (“... a heating module including a

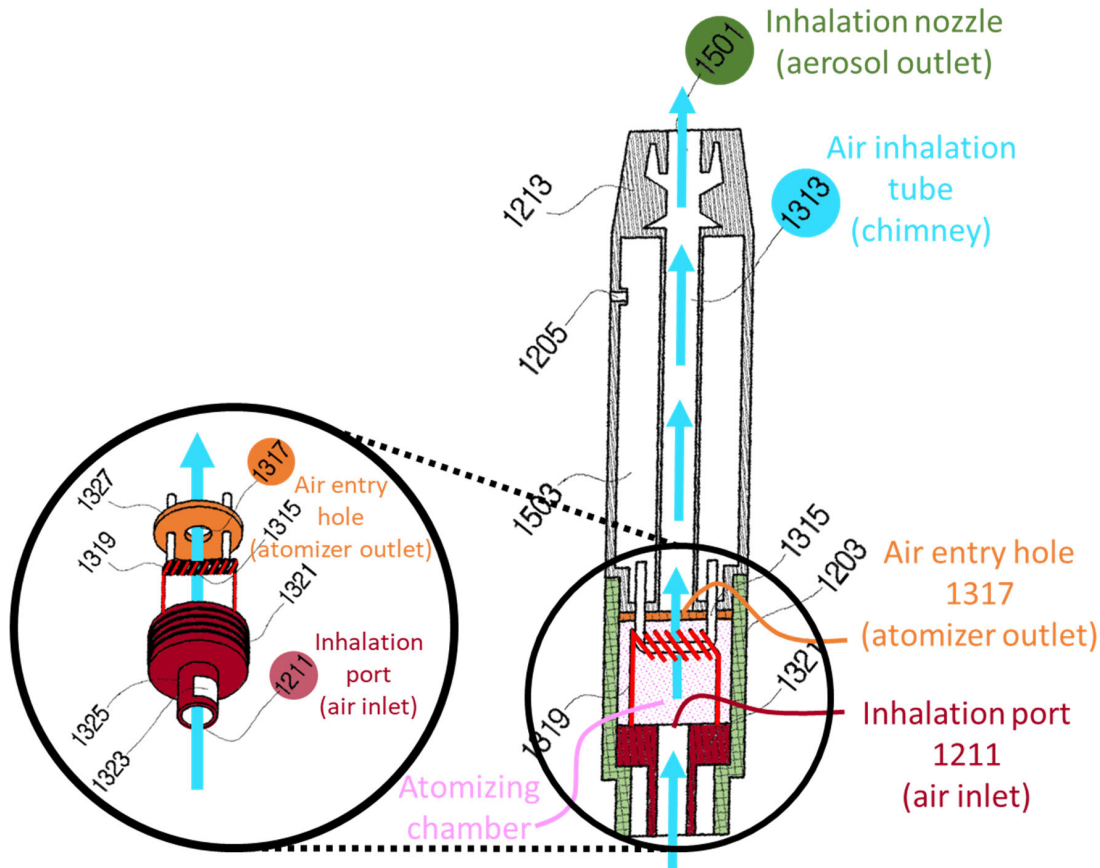
heating member controlled by the switching means and the power supply means.”), ¶82 (“The heating module 1303 has a coupling threaded portion 1321 fixed in electrical contact with the inner bottom surface of the atomization container 1203 having a hollow structure with both ends open, and a + electrode 1323, which protrudes to one end of the atomization container 1203, and has electrical contact with the heating member 1319, is formed on one side of the coupling threaded portion 1321 and has the inhalation port 1211 communicating with the air inhalation tube 1313. The heating module 1303 is also implemented with a metal material, and the body forms a - electrode 1325 and is in contact with the atomization container 1203.”).

67. In response to the current flow, heating member 1319 heats and vaporizes the mixed composition in the inductor 1315. EX1005 (Cho), ¶3 (“... a heating member that generates heat so that the liquid in the liquid accommodating member is vaporized.”), ¶84 (“Thus, the heating member 1319 vaporizes the mixed composition introduced through the inductor 1315.”), ¶77 (“... the atomization container 1203 vaporizes the mixed composition induced from the storage container 1201 using a heating member, the heating member is a filament-type heating element ...”).

e. **[1.E] said atomizing chamber having an air inlet, an atomizer outlet coupled to said aerosol outlet,**

68. In my opinion, Cho discloses this limitation.

69. Cho discloses the atomizing chamber has an inhalation port 1211 (air inlet) and an air entry hole 1317 (atomizer outlet) coupled to the inhalation nozzle 1501 (aerosol outlet) via air inhalation tube 1313. I annotated Cho Figures 9 and 11 below to highlight these features.



EX1005 (Cho), Figs. 9 and 11 (annotated).

70. As I discussed for limitation [1.C] above, Cho discloses an atomizing chamber formed by atomization container 1203, heating module 1303, and inductor module 1301. Air enters the atomizing chamber through inhalation port 1211 (air inlet) on the end of the atomizing chamber formed by heating module 1303. EX1005

(Cho), ¶78 (“... an inhalation port 1211 is provided so that the amount of air inhaled by the inhalation contact 1213 communicates with the first connection body and the second connection body not described.”), ¶82 (“... a + electrode 1323 ... has the inhalation port 1211 communicating with the air inhalation tube 1313.”).

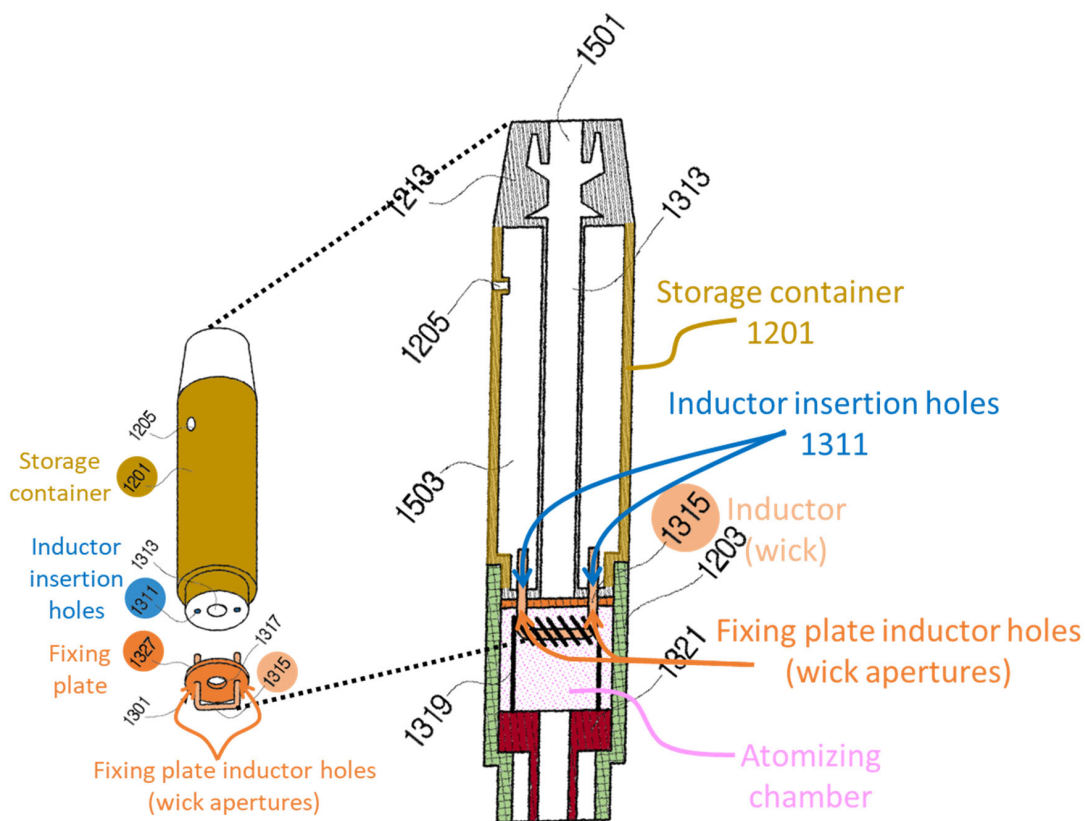
71. Air exits the atomizing chamber through air entry hole 1317 (atomizer outlet) on the end of the atomizing chamber formed by inductor module 1301. EX1005 (Cho), ¶83 (“Meanwhile, the inductor module 1301 is fixed or joined to the other opening of the atomization container 1203 and forms a fixing plate 1327 provided with an air entry hole 1317 communicating with the air inhalation tube 1313 ...”). The air entry hole 1317 (atomizer outlet) is coupled to inhalation nozzle 1501 (aerosol outlet) through air inhalation tube 1313. *Id.*, ¶83 (“... fixing plate 1327 provided with an air entry hole 1317 communicating with the air inhalation tube 1313 ...”), ¶89 (“... the air inhalation tube 1313 communicates with an inhalation nozzle 1501 of the inhalation contact 1213.”).

f. **[1.F] [the atomizing chamber further having] a first wick aperture, and a second wick aperture;**

72. I understand that construction is pending for the term “wick aperture” recited in this limitation. I further understand that Complainants propose “wick aperture” means “an opening that allows the wick to access a liquid” whereas Respondents and Staff propose “wick aperture” means “an opening that provides clearance for the wick to pass through.” In my opinion, Cho discloses this limitation

under all proposed constructions of “wick aperture.”

73. Cho discloses the atomizing chamber has first and second inductor holes (first wick aperture and second wick aperture). The first and second inductor holes provide clearance for the ends of inductor 1315 (wick) to pass through, and they allow inductor 1315 (wick) to access the liquid in loading portion 1503 (liquid reservoir) of storage container 1201. Thus, Cho meets this limitation under Complainants’, Respondents’, and Staff’s interpretations. I annotated Cho Figures 8 and 11 below to highlight the wick apertures and other relevant components.



EX1005 (Cho), Figs. 8 and 11 (annotated).

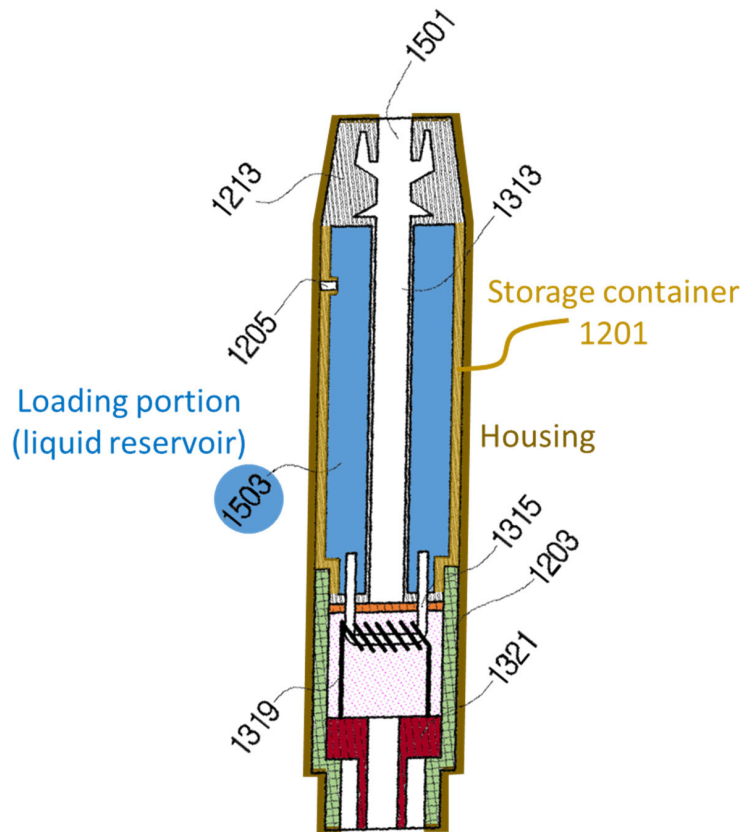
74. As I discussed for limitation [1.C] above, Cho discloses an atomizing

chamber formed by atomization container 1203, heating module 1303, and inductor module 1301. Cho discloses the ends of inductor 1315 (wick) pass through the first and second holes in the inductor module's fixing plate 1327, and also through insertion holes 1311 in storage container 1201, to provide capillary access to the liquid mixed composition in storage container 1201. EX1005 (Cho), ¶83 (“... an inductor 1315 fixedly installed to correspond to the inductor insertion holes 1311 is formed at one end of the fixing plate 1327, and the inductor 1315 is made of a material for inducing the mixed composition loaded in the storage container 1201 by capillarity.”), ¶88 (“... the upper end of the inductor 1315 is wound by the heating member 1319, and the lower end of the inductor 1315 extends by a predetermined length to be inserted into the inductor insertion holes 1311 of the storage container 1201.”).

g. **[1.G] a liquid reservoir disposed within said housing and**

75. In my opinion, Cho discloses this limitation.

76. Cho discloses loading portion 1503 (liquid reservoir) is disposed within said housing. I annotated Cho Figure 11 below to highlight these elements.



EX1005 (Cho), Fig. 11.

77. Cho discloses that loading portion 1503 is partially defined between the interior of storage container 1201 and air inhalation tube 1313 and is filled through liquid introduction valve 1205. EX1005 (Cho), ¶89 (“Accordingly, the storage container 1201 has a loading portion 1503 as the remaining space except for the air inhalation tube 1313, and the loading portion 1503 is loaded with the mixed composition through the liquid introduction valve 1205.”).

h. [1.H] [the liquid reservoir] sealably separated from said atomizing chamber; and

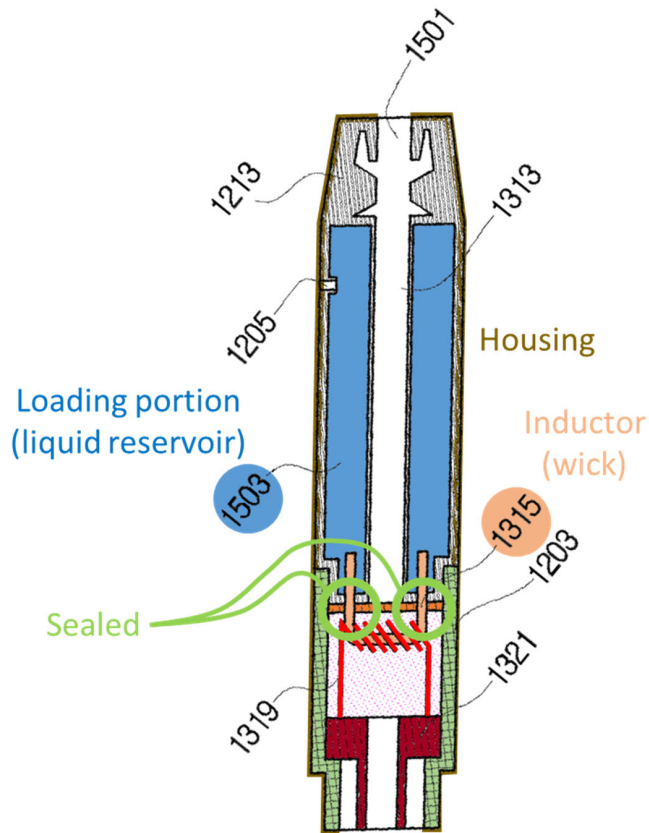
78. I understand that construction is pending for the term “sealably

separated” in this limitation. I further understand that Complainants, Respondents, and Staff agree and propose that “sealably separated” means “separated by a barrier to prevent flooding while also allowing liquid to pass from the liquid reservoir to the atomizing chamber by capillary action of the wick.” In my opinion, Cho discloses this limitation under the proposed construction of “sealably separated.”

79. Cho discloses that loading portion 1503 (liquid reservoir) is separated from the atomizing chamber by the bottom wall of storage container 1201 and the inductor module 1301. An inductor 1315 (wick) is installed into the holes in the inductor module’s fixing plate 1327 and the insertion holes 1311 in the storage container 1201. Because this configuration prevents flooding while allowing liquid to pass from the loading portion 1503 (liquid reservoir) to the atomizing chamber via capillary action of inductor 1315 (wick), Cho meets this limitation under Complainants’, Respondents’, and Staff’s interpretation.

80. Cho recognizes that it is important to prevent leakage from the loading portion 1503 (liquid reservoir) into the atomizing chamber. *See* EX1005 (Cho), ¶¶90–91. To seal the loading portion 1503 (liquid reservoir) from the atomizing chamber, the ends of inductor 1315 are pressed into the storage container’s inductor insertion holes 1311, which greatly reduces the ability of liquid to freely flow or flood from the loading portion 1503 (liquid reservoir) into the atomizing chamber. EX1005 (Cho), ¶89 (“... inductor 1315 pressed-in and installed through the inductor

insertion hole 1311 ...”). I annotated Cho Figure 11 below to show the sealable separation provided by this configuration.



EX1005 (Cho), Fig. 11.

81. Cho discloses several different means to ensure that loading portion 1503 (liquid reservoir) remains sealed from the atomizing chamber. For example, Cho recommends adding fiber material to loading portion 1503 (liquid reservoir) to prevent leaks. EX1005 (Cho), ¶90 (“Therefore, by accommodating the fiber material inside the loading portion 1503, the leakage of the mixed composition can be prevented.”). Cho also teaches embodiments where the inductor 1315 is adhered to inductor insertion holes 1311 to prevent leaks. *Id.*, ¶91 (“... considering the

possibility of leakage of the mixed composition, ... the end of the inductor 1315 may be brought into close contact with or adhered to the inductor insertion hole 1311.”), ¶92 (“... the inductor 1315 is bonded to the outer periphery of the communication groove by using silicon.”). Cho also discusses an embodiment where the inductor 1315 has a larger diameter and is pressure-fit into the inductor insertion holes 1311 to prevent leaks. *Id.*, ¶92 (“Alternatively, after designing the diameter of the inductor 1315 to be larger than that of the communication groove, by pressurizing and installing the inductor 1315 into the communication groove, the mixed composition leaked out through the communication groove is absorbed into the inductor 1315.”).

82. I note that although Cho discloses that the liquid reservoir and the atomizing chamber are separated by a barrier to prevent liquid from freely flowing or flooding into the atomizing chamber, as I explain below for limitation [1.K], Cho discloses that liquid may pass from the reservoir into the atomizing chamber by capillarity of the inductor 1315 (wick). EX1005 (Cho), ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”).

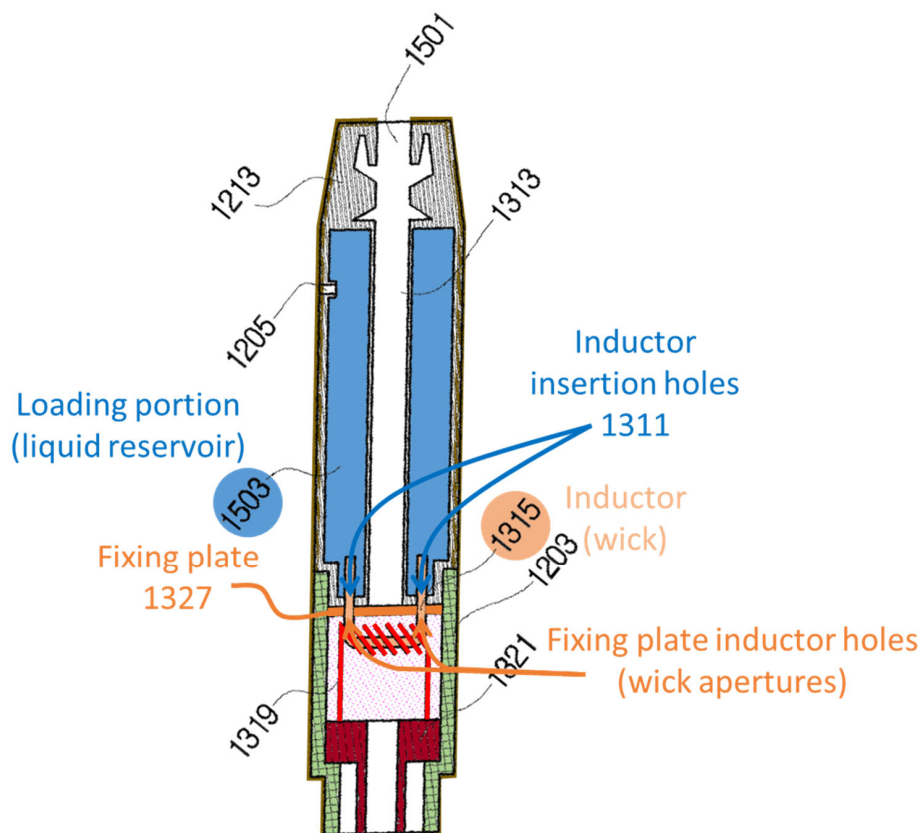
- i. **[1.I] a wick in contact with the liquid in the liquid reservoir through said first wick aperture and said second wick aperture,**

83. I understand that two pending constructions apply to this limitation. First, I understand that Complainants propose the term “wick” means “any material through which liquid may be drawn via capillary action” whereas Respondents and Staff propose “wick” means “fibrous bundle.” Second, I understand that the parties have proposed constructions of this entire limitation—“a wick in contact with the liquid in the liquid reservoir through said first wick aperture and said second wick aperture.” Complainants propose that this limitation means “a wick in contact with the liquid in the liquid reservoir by way of said first wick aperture and said second wick aperture.” Respondents propose that this limitation means “fibrous bundle that passes through the first wick aperture and second wick aperture to contact the liquid in the liquid reservoir.” Staff proposes that this limitation means “fibrous bundle that contacts liquid by passing through the first wick aperture and second wick aperture and into the liquid reservoir.” In my opinion, Cho discloses this limitation under all proposed constructions of the term “wick” and this limitation.

84. Regarding the term “wick,” Cho discloses that inductor 1315 draws liquid by capillarity, so inductor 1315 is a wick under Complainants’ interpretation. EX1005 (Cho), ¶89 (“... the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”). Cho further discloses that inductor 1315 is a fibrous bundle, so inductor 1315 is also a wick under Respondents’ and Staff’s interpretation. EX1005 (Cho), ¶83 (“The inductor 1315

may be composed of a multi-layered foamed nickel mesh, a stainless fiber felt, a polymer foam, and a porous metal.”).

85. Regarding the entire limitation, as I discussed for limitation [1.C] above, Cho discloses that the ends of inductor 1315 (wick) are installed through the holes in fixing plate 1327 (first wick aperture and second wick aperture) and the insertion holes 1311 in storage container 1201 to contact the liquid mixed composition in loading portion 1503 (liquid reservoir). Thus, Cho meets this limitation under Complainants’, Respondents’, and Staff’s interpretations. I annotated Cho Figure 11 below to highlight the relevant components.



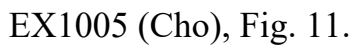
EX1005 (Cho), Fig. 11.

86. Cho discloses the ends of inductor 1315 (wick) pass through the first and second holes in fixing plate 1327, and also through insertion holes 1311 in storage container 1201, to provide capillary access to the liquid mixed composition in the loading portion 1503 of storage container 1201. EX1005 (Cho), ¶83 (“... an inductor 1315 fixedly installed to correspond to the inductor insertion holes 1311 is formed at one end of the fixing plate 1327, and the inductor 1315 is made of a material for inducing the mixed composition loaded in the storage container 1201 by capillarity.”). Cho explains that when inductor 1315 (wick) is installed into insertion holes 1311, the inductor contacts the liquid mixed composition in loading portion 1503 (liquid reservoir). *Id.*, ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311 ...”), ¶90 (“That is, the inductor 1315 directly contacts the mixed composition in the loading portion 1503 ...”).

j. **[1.J] the wick disposed between the liquid reservoir and the atomizer and**

87. In my opinion, Cho discloses this limitation.

88. Cho discloses inductor 1315 (wick) is disposed between loading portion 1503 (liquid reservoir) and heating member 1319 (atomizer). I annotated Cho Figure 11 below to show this configuration.



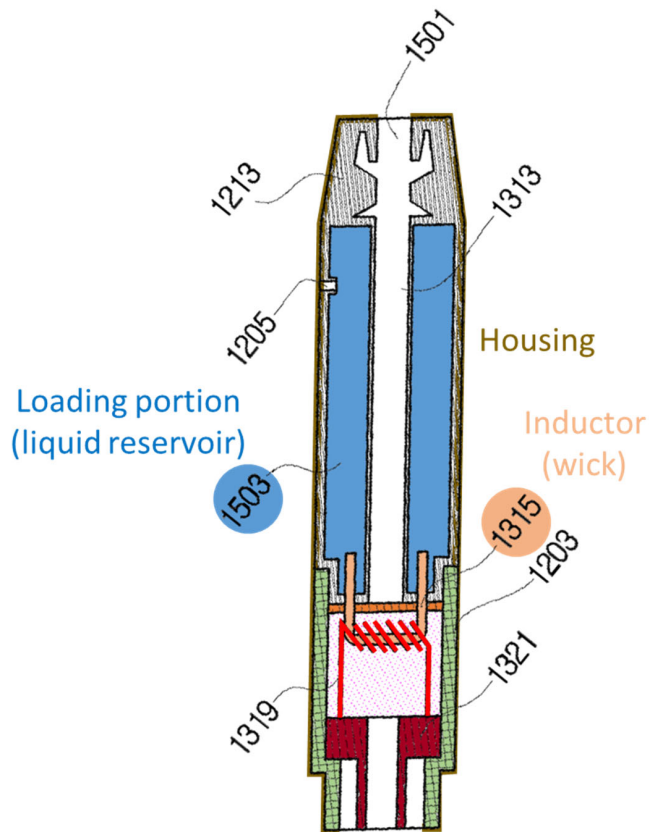
90. Cho further discloses the ends of inductor 1315 (wick) extend out of the atomizing chamber through the holes in fixing plate 1327 and pass through insertion holes 1311 in storage container 1201 into loading portion 1503 (liquid reservoir). EX1005 (Cho), ¶88 (“... the lower end of the inductor 1315 extends by

a predetermined length to be inserted into the inductor insertion holes 1311 of the storage container 1201.”), ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”).

k. **[1.K] [the wick] configured to transfer the liquid by capillarity from said liquid reservoir to said atomizer;**

91. In my opinion, Cho discloses this limitation.

92. Cho discloses inductor 1315 (wick) is configured to transfer the liquid by capillarity from loading portion 1503 (liquid reservoir) to heating member 1319 (atomizer). EX1005 (Cho), ¶83 (“... an inductor 1315 fixedly installed to correspond to the inductor insertion holes 1311 is formed at one end of the fixing plate 1327, and the inductor 1315 is made of a material for inducing the mixed composition loaded in the storage container 1201 by capillarity.”), ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”). I annotated Cho Figure 11 below to show the relevant components.



EX1005 (Cho), Fig. 11.

I. **[1.L] wherein said atomizer outlet and said aerosol outlet are coupled by a chimney.**

93. In my opinion, Cho discloses this limitation.

94. Cho discloses air entry hole 1317 (atomizer outlet) and inhalation nozzle 1501 (aerosol outlet) are coupled by air inhalation tube 1313 (chimney). I annotated Cho Figures 9 and 11 below to show these features.

outlet) to inhalation nozzle 1501 (aerosol outlet) and forms a chimney that allows vapor to flow from the atomizing chamber's air entry hole 1317 (atomizer outlet) through storage container 1201 (liquid reservoir) to inhalation nozzle 1501 (aerosol outlet). EX1005 (Cho), ¶81 ("The storage container 1201 has a hollow structure in which an air inhalation tube 1313 is buried in the center, ... The air inhalation tube 1313 is in communication with the inhalation contact 1213, and air pressure is transferred to the first connection body through the air inhalation tube 1313 during the user's inhalation process.").

2. Claim 5

a. [5.A] The apparatus of claim 1, wherein said chimney sealably passes through said liquid reservoir.

97. In my opinion, Cho discloses this limitation.

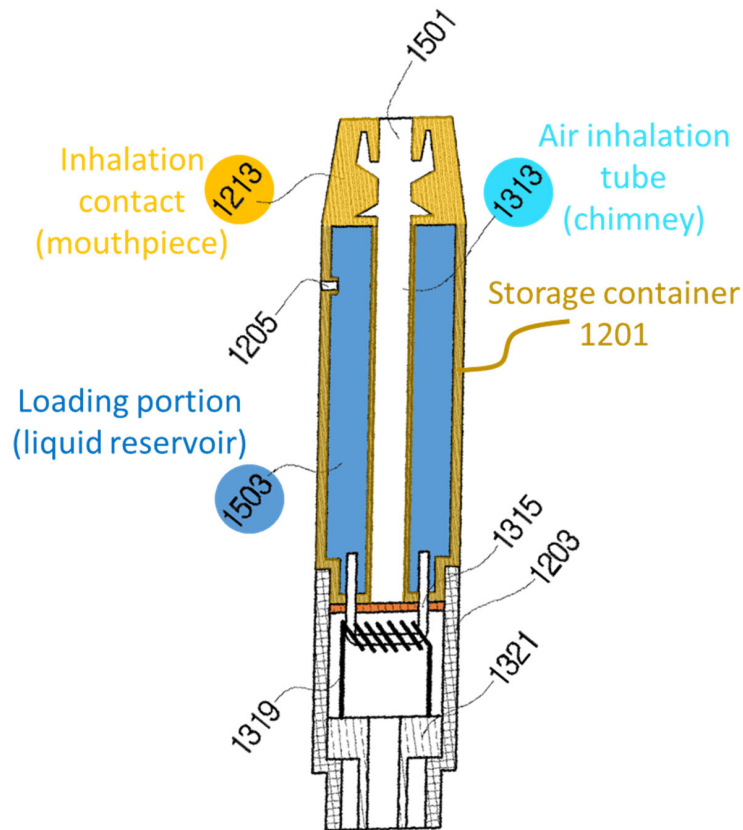
98. Cho discloses inhalation tube 1313 (chimney) sealably passes through loading portion 1503 (liquid reservoir).

99. As I discussed for limitation [1.L] above, Cho's air inhalation tube 1313 (chimney) forms a path between the atomizing chamber's air entry hole 1317 and the air inhalation contact's inhalation nozzle 1501. One end of inhalation tube 1313 mates to air entry hole 1317, and the opposite end connects to inhalation nozzle 1501.

100. Cho further discloses air inhalation tube 1313 (chimney) is formed in the center of storage container 1201. EX1005 (Cho), ¶81 ("The storage container

1201 has a hollow structure in which an air inhalation tube 1313 is buried in the center, and the air inhalation tube 1313 has an integrated communication structure therearound.”). The air inhalation tube 1313 (chimney) is surrounded by loading portion 1503 (liquid reservoir). *Id.*, ¶89 (“Accordingly, the storage container 1201 has a loading portion 1503 as the remaining space except for the air inhalation tube 1313, and the loading portion 1503 is loaded with the mixed composition through the liquid introduction valve 1205.”).

101. As I discussed for limitation [1.H] above, the surrounding loading portion 1503 (liquid reservoir) is sealed so that the liquid mixed composition does not leak out the loading portion. Thus, the inhalation tube 1313 (chimney) sealably passes through the loading portion 1503 (liquid reservoir), and the inhalation tube 1313 (chimney) forms a sealed path from the end that mates with the air entry hole 1317 (atomizer outlet) to the inhalation nozzle 1501 (aerosol outlet). I annotated Cho Figure 11 below to show these features.



EX1005 (Cho), Fig. 11.

3. Claim 6

- a. **[6.A] The apparatus of claim 1, wherein said atomizer is a resistive heating element.**

102. In my opinion, Cho discloses this limitation.

103. Cho discloses heating member 1319 (atomizer) is a resistive heating element.

104. Cho clarifies that heating member 1319 (atomizer) “is a filament-type heating element made of a composite such as a nickel alloy or a rare earth element.”

EX1005 (Cho), ¶77; *see also id.*, ¶39 (“A heating element 110 is provided on the

rear side of the support member 122. A heating wire may be preferably used as the heating element 110. The heating wire 110 may be made of, for example, a composite material such as a nickel alloy or a rare earth element.”); disclosures for claim element [1.D]. A “filament-type heating element” made of “nickel alloy or a rare earth element” is a commonly-used resistive heating element.

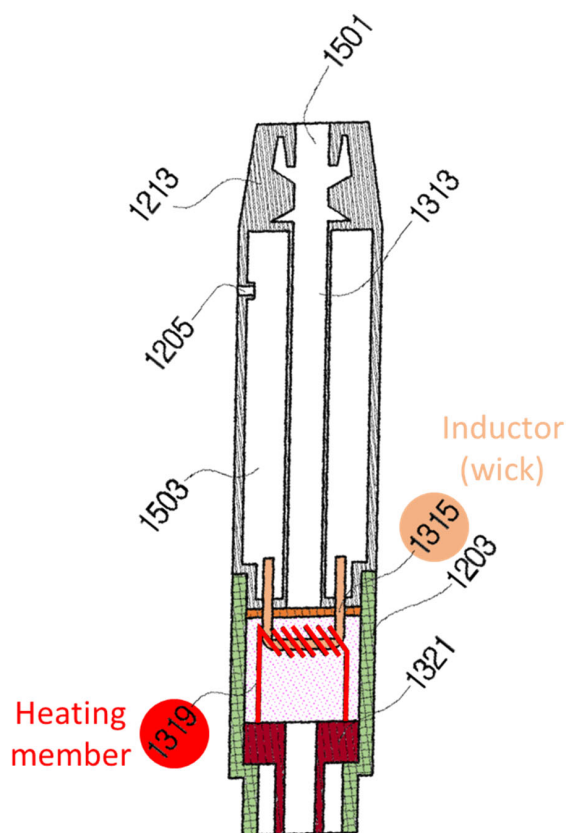
4. Claim 7

a. [7.A] The apparatus of claim 6, wherein said wick partially engages said resistive heating element.

105. In my opinion, Cho discloses this limitation.

106. Cho discloses inductor 1315 (wick) partially engages heating member 1319 (resistive heating element).

107. As I discussed for limitation [6.A] above, Cho’s heating member 1319 is a resistive heating element. Cho discloses that part of inductor 1315 (wick) is wrapped by heating member 1319 (resistive heating element). EX1005 (Cho), ¶84 (“... the heating member 1319 is a filament-type heating element, and the filament has a structure in which the inductor 1315 is closely wound.”), ¶88 (“... the upper end of the inductor 1315 is wound by the heating member 1319 ...”); *see also* disclosures for limitation [1.J]. I annotated Cho Figure 11 below to show this configuration.



EX1005 (Cho), Fig. 11.

108. The ends of inductor 1315 (wick) are pressed into insertion holes 1311 in loading portion 1503 (liquid reservoir) of storage container 1201, which allows inductor 1315 (wick) to transfer the mixed composition to heating element 1319 (resistive heating element) by capillary absorption. EX1005 (Cho), ¶89 (“The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”); *see also* disclosures for claim limitation [1.J].

5. Claim 29

a. **[29.A] The apparatus of claim 1, wherein the chimney is sealed to the atomizer outlet.**

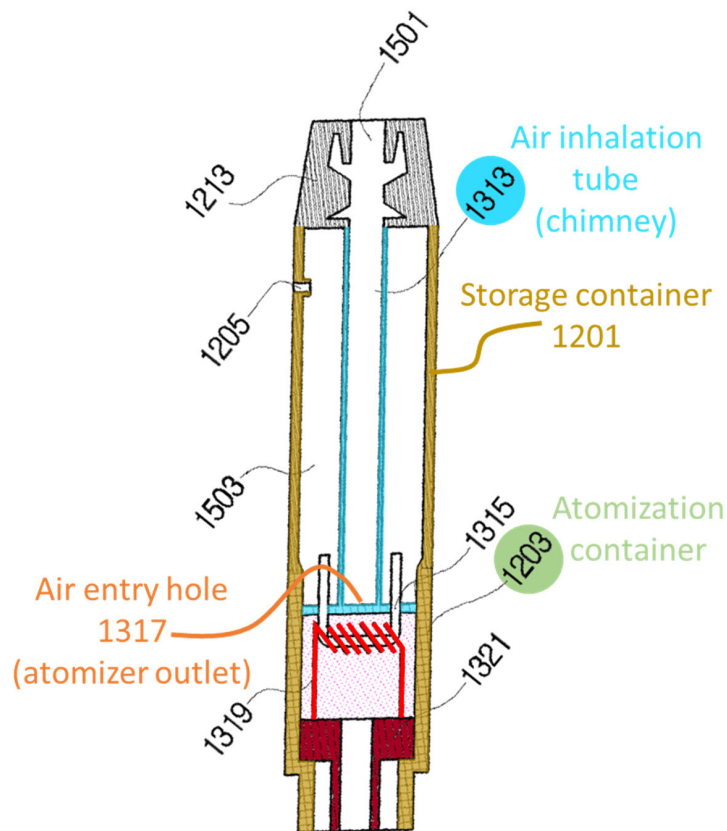
109. In my opinion, Cho discloses this limitation.

110. Cho discloses inhalation tube 1313 (chimney) is sealed to air entry hole 1317 (atomizer outlet).

111. As I discussed for limitations [1.L] and [5.A] above, Cho discloses air inhalation tube 1313 (chimney) passes through the center of storage container 1201 and is integrated into storage container 1201's structure. Cho also discloses fixing plate 1327, containing air entry hole 1317 (atomizer outlet), is fixed to an end of atomization container 1203, and the air entry hole 1317 (atomizer outlet) mates to air inhalation tube 1313 (chimney).

112. Cho further discloses an embodiment in which the storage container 1201 and atomization container 1203 are integrated into a single structure. EX1005 (Cho), ¶74 ("That is, in the embodiment of the present invention, the atomization container 1203 is presented, but this is to explain the atomization container and the storage container as a structure separated from each other as an embodiment, and when the atomization container and the storage container are molded into a mutually integrated structure, the shape of the atomization container itself becomes unnecessary."). In this integrated embodiment, the air entry hole 1317 (atomizer outlet) is sealed to air inhalation tube 1313 (chimney) because they are both part of the same single structure. *See id.*; ¶81 ("The storage container 1201 has a hollow

structure in which an air inhalation tube 1313 is buried in the center, and the air inhalation tube 1313 has an integrated communication structure therearound. Also, in the communication structure, a fluid insertion hole 1311 communicating with the outside is provided.”). I annotated Cho Figure 11 below to show this integrated embodiment.



EX1005 (Cho), Fig. 11 (integrated embodiment).

6. Claim 30

- a. [30.A] The apparatus of claim 1, wherein the apparatus comprises a sealed path from the atomizer outlet, through the chimney to the aerosol outlet.

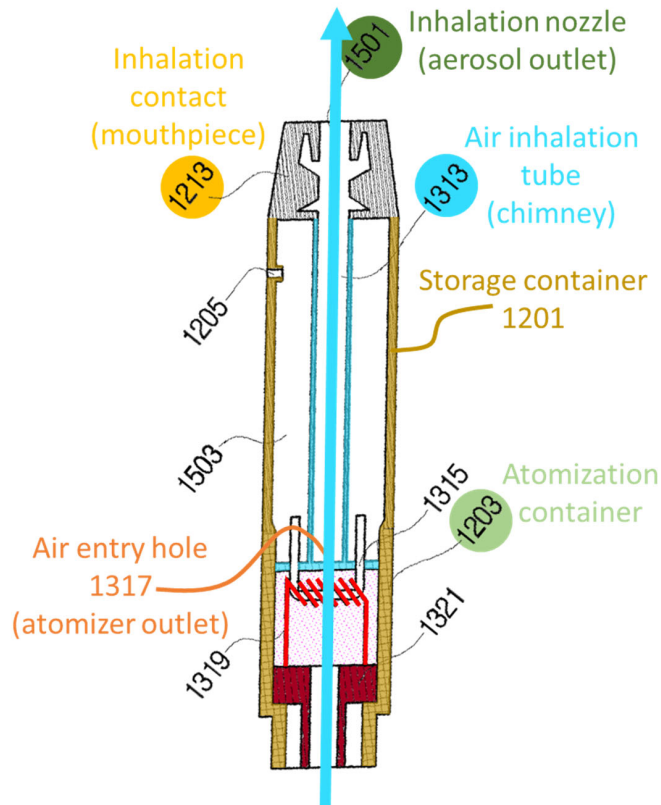
113. In my opinion, Cho discloses this limitation.

114. Cho discloses the apparatus comprises a sealed path from air entry hole 1317 (atomizer outlet), through inhalation tube 1313 (chimney) to inhalation nozzle 1501 (aerosol outlet).

115. As I discussed for limitation [29.A] above, Cho discloses the atomizing chamber's air entry hole 1317 (atomizer outlet) is sealed to an end of inhalation tube 1313 (chimney) by disclosing an embodiment whereby the storage container 1201 and atomization container 1203 are integrated into a single structure.

116. As I discussed for limitations [1.L] and [5.A] above, Cho discloses inhalation tube 1313 (chimney) forms a sealed path through loading portion 1503 (liquid reservoir) from the atomizing chamber's air entry hole 1317 (atomizer outlet) to the inhalation contact's inhalation nozzle 1501 (aerosol outlet).

117. Thus, Cho discloses a sealed path from air entry hole 1317 (atomizer outlet) through inhalation tube 1313 (chimney) to inhalation nozzle 1501 (aerosol outlet). I annotated Cho Figure 11 below to show these features.



EX1005 (Cho), Fig. 11 (integrated embodiment).

7. **Claim 36**

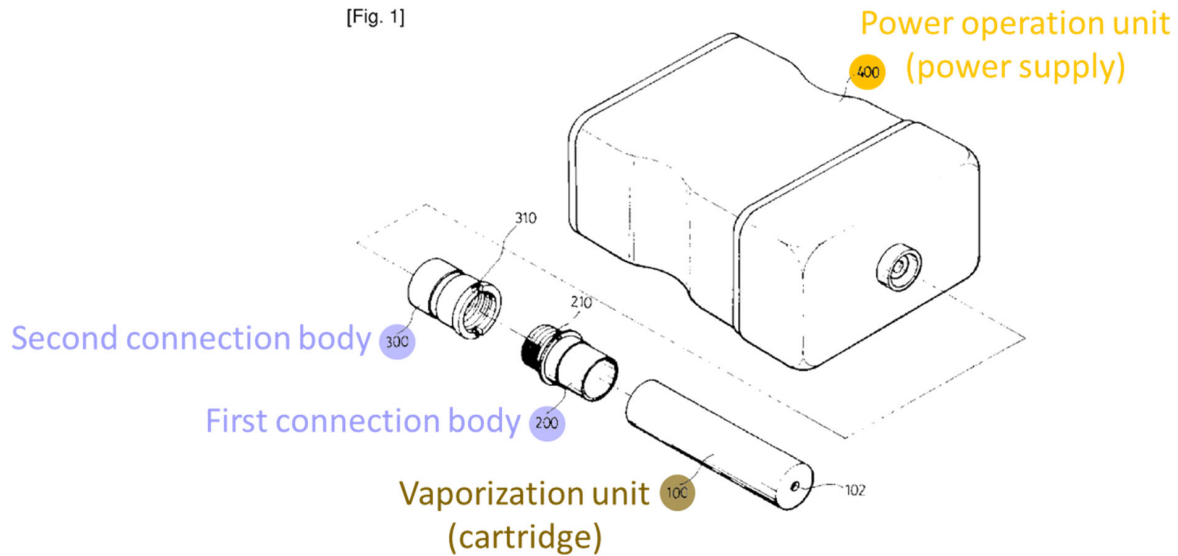
- a. **[36.A] The apparatus of claim 1, coupled to a power supply portion,**

118. In my opinion, Cho discloses this limitation.

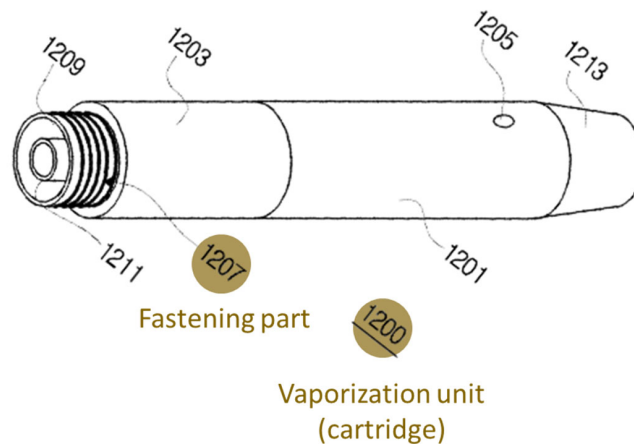
119. As I discussed for element [1.A] above, Cho discloses an electronic cigarette comprising a vaporization unit (cartridge apparatus) coupled to a power operation unit (power supply portion). *E.g.*, EX1005 (Cho), ¶33 (“Referring to FIG. 1, the vaporisation and inhalation device ... includes a vaporisation unit 100 ... and a power operation unit 400.”), ¶79 (“... vaporisation unit 1200 of the inhalation

nozzle side is fastened to the first connection body using the fastening part 1207, the first connection body is fastened to the second connection body, and the second connection body is connected to the power operation unit.”).

120. Cho discloses vaporization unit 1200 (cartridge apparatus) is mechanically coupled to power operation unit 400 (power supply portion) via threaded fastening part 1207 and intermediate threaded connection bodies 200 and 300. EX1005 (Cho), ¶78 (“The fastening part 1207 is provided with a hollow threaded portion for fastening with the first connection body ...”), ¶79 (“... vaporisation unit 1200 of the inhalation nozzle side is fastened to the first connection body using the fastening part 1207, the first connection body is fastened to the second connection body, and the second connection body is connected to the power operation unit.”), ¶9 (“Another object of the present invention is to provide a device for vaporisation and inhalation capable of presenting a replacement structure through which sanitary management of a cartridge containing a composition is possible.”), ¶3 (“The liquid vaporizing device according to this utility model document includes a case, a liquid accommodating member that is interchangeably inserted into the case and accommodates a substance to be vaporized in a liquid state therein, and a heating member that generates heat so that the liquid in the liquid accommodating member is vaporized.”). I annotated Cho Figures 1 and 7 below to highlight these elements.



EX1005 (Cho), Fig. 1.



EX1005 (Cho), Fig. 7.

121. Cho discloses fastening part 1207 and threaded connection bodies 200 and 300 also electrically couple vaporization unit 1200 (cartridge apparatus) with power operation unit 400 (power supply portion). EX1005 (Cho), ¶78 (“The fastening part 1207 may be made of a metal material, and thus the electrode 1209

may be set as a '+' terminal, and the fastening part 1207 may be set as a '-' terminal, and for convenience of manufacturing, the polarity of the terminal may be varied.”), ¶49 (“As shown in the figure, the connection conductor 301 is provided with a female screw thread 304 and a male screw thread 212 and connected to each other, the connection conductor 301 is connected to the negative electrode of the wire connected to the heating element 110 and the two central rod-shaped conductors 206 and 310 are connected to the positive electrode of the wire connected to the heating element 110. The connection conductor 301 and the central rod-shaped conductor 310 are electrically separated by an insulating material 306 located therebetween.”).

b. **[36.B] wherein the power supply portion comprises a pressure sensor configured to detect negative pressure within the power supply portion and energize the atomizer.**

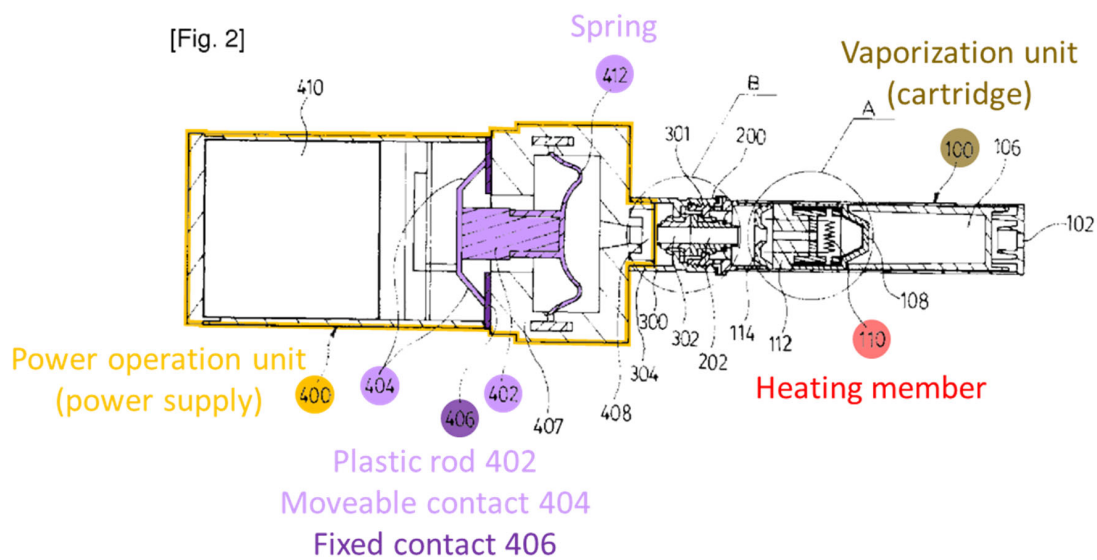
122. In my opinion, Cho discloses this limitation.

123. Cho discloses power operation unit 400 (power supply portion) comprises a pressure sensor configured to detect negative pressure within the power operation unit and energize heating member 1319 (atomizer).

124. Cho discloses “a switching means that operates in response to ... inhalation pressure.” EX1005 (Cho), ¶30. The switching means senses pressure via spring 412, which moves in response to negative pressure in the chamber and closes the attached moveable contact 404 with fixed contact 406. Cho clarifies that when a consumer inhales, “air is introduced through the air entry hole 210, the switch valve

214 is opened, and a negative pressure chamber 408 is formed between the right side of the spring 412 and a connection conductor 301 by the action of the air flow. Due to the action of the negative pressure, the spring 412 moves to the right in the drawing, and at the same time, the movable contact 404 connected to the plastic rod 402 moves in the lateral direction and electrically contacts the fixed contact 406.”

Id., ¶48. I annotated Cho Figure 2 below to highlight these components.



EX1005 (Cho), Fig. 2.

125. Cho further discloses the “heating member [1319 is] controlled by the switching means and the power supply means.” EX1005 (Cho), ¶14.

8. Claim 43

a. [43.A] A cartridge comprising:

126. As I discussed for limitation [1.A] above, to the extent the preamble is limiting, Cho discloses a cartridge.

b. [43.B] a cartridge housing;

127. As I discussed for limitation [1.B] above, the cartridge comprises a cartridge housing.

c. [43.C] a mouthpiece end comprising an aerosol outlet;

128. As I discussed for limitation [1.B] above, the cartridge comprises a mouthpiece end comprising an aerosol outlet.

d. [43.D] an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end,

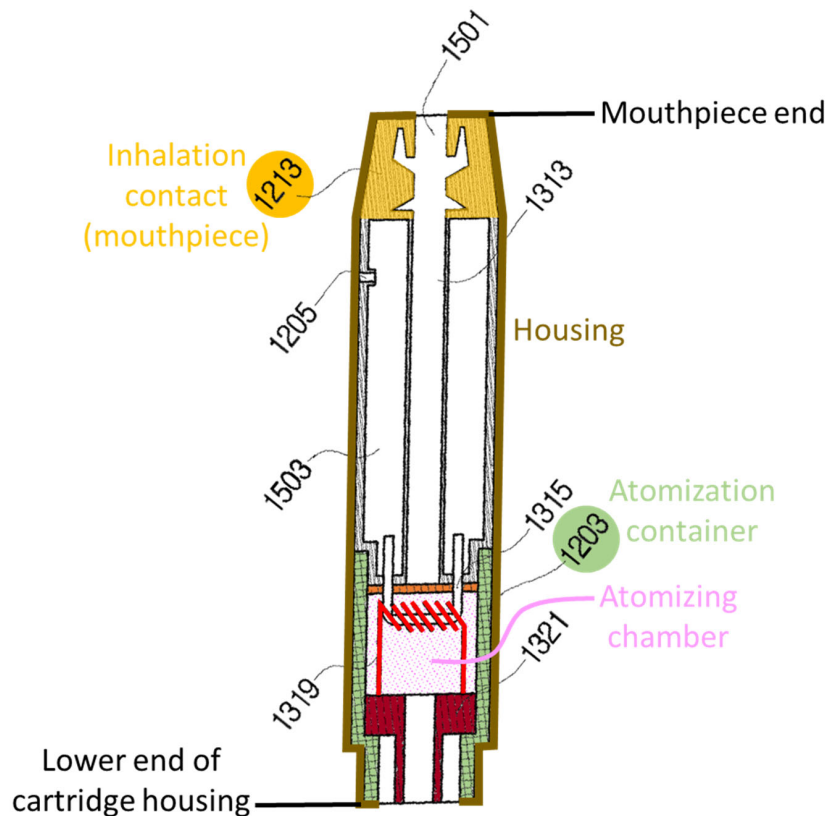
129. In my opinion, Cho discloses this limitation.

130. Cho discloses an atomizing chamber disposed within atomization container 1203 proximate a lower end of vaporization unit 1200 (cartridge) opposite the inhalation contact 1213 (mouthpiece end).

131. As I explained above for limitations [1.B] and [1.C], Cho discloses a cartridge housing comprising storage container 1201, atomization container 1203, and inhalation contact 1213 (mouthpiece) with an atomizing chamber formed inside atomizing container 1203.

132. Cho further discloses that atomization container 1203 is installed on the lower end below storage container 1201 and opposite the inhalation contact 1213 (mouthpiece). EX1005 (Cho), ¶73 (“... an inhalation contact 1213 for inhaling the mixed composition through body contact is provided in the vaporisation unit 1200 on the inhalation nozzle side having a cylindrical structure, and a fastening part 1207

... is formed at the end, and between the fastening part 1207 and the inhalation contact 1213, a storage container 1201 ... and an atomization container 1203 ... are disposed.”).



EX1005 (Cho), Fig. 11.

- e. **[43.E] the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet;**

133. As I discussed for limitation [1.E] above, the atomizing chamber comprises an atomizer outlet and an atomizing chamber air inlet.

- f. **[43.F] the atomizing chamber further comprising a first wick aperture and a second wick aperture;**

134. As I discussed for limitation [1.F] above, the atomizing chamber further

comprises a first wick aperture and a second wick aperture.

- g. **[43.G] a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber,**

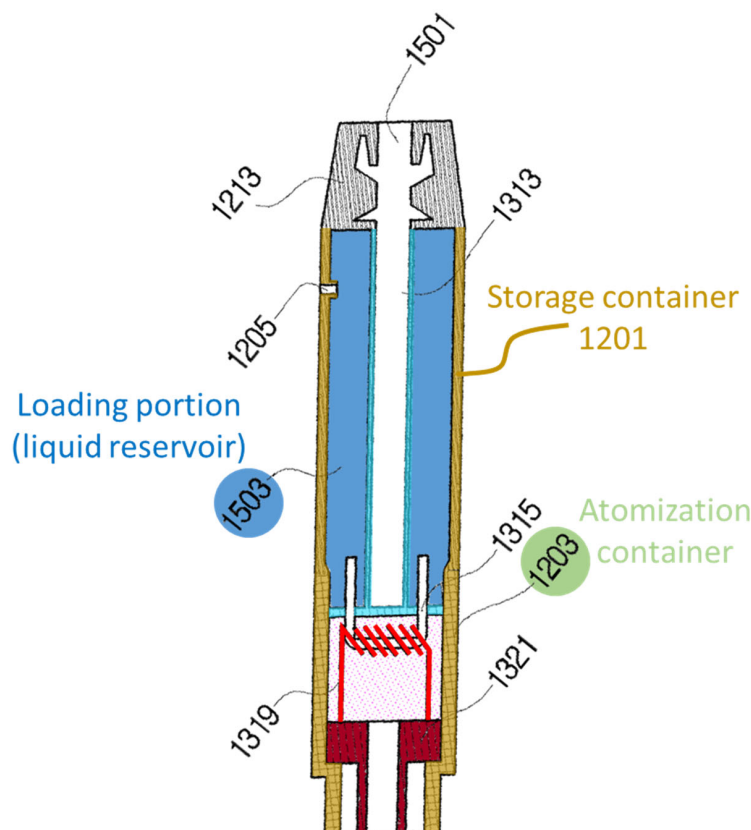
135. In my Opinion, Cho discloses this limitation.

136. Cho discloses a loading portion 1503 (liquid reservoir) at least partially defined by an interior of storage container 1201 and an exterior of the atomizing chamber.

137. Cho discloses liquid loading portion 1503 (liquid reservoir) is defined as the space inside the storage container 1201 but outside air inhalation tube 1313 (chimney). EX1005 (Cho), ¶89 (“Accordingly, the storage container 1201 has a loading portion 1503 as the remaining space except for the air inhalation tube 1313, and the loading portion 1503 is loaded with the mixed composition through the liquid introduction valve 1205.”).

138. Cho further discloses an embodiment wherein storage container 1201 and atomization container 1203 are integrated into a single structure. EX1005 (Cho), ¶74 (“That is, in the embodiment of the present invention, the atomization container 1203 is presented, but this is to explain the atomization container and the storage container as a structure separated from each other as an embodiment, and when the atomization container and the storage container are molded into a mutually integrated structure, the shape of the atomization container itself becomes

unnecessary.”). In this integrated embodiment, the exterior of the atomizing chamber further defines liquid loading portion 1503 because the exterior of the atomizing chamber is integrated with the air inhalation tube 1313 (chimney). *See id.*, ¶81 (“The storage container 1201 has a hollow structure in which an air inhalation tube 1313 is buried in the center, and the air inhalation tube 1313 has an integrated communication structure therearound. Also, in the communication structure, a fluid insertion hole 1311 communicating with the outside is provided.”). As shown in Cho Figure 11, the top exterior of the atomizing chamber forms the bottom of loading portion 1503 (liquid reservoir).



EX1005 (Cho), Fig. 11 (integrated embodiment).

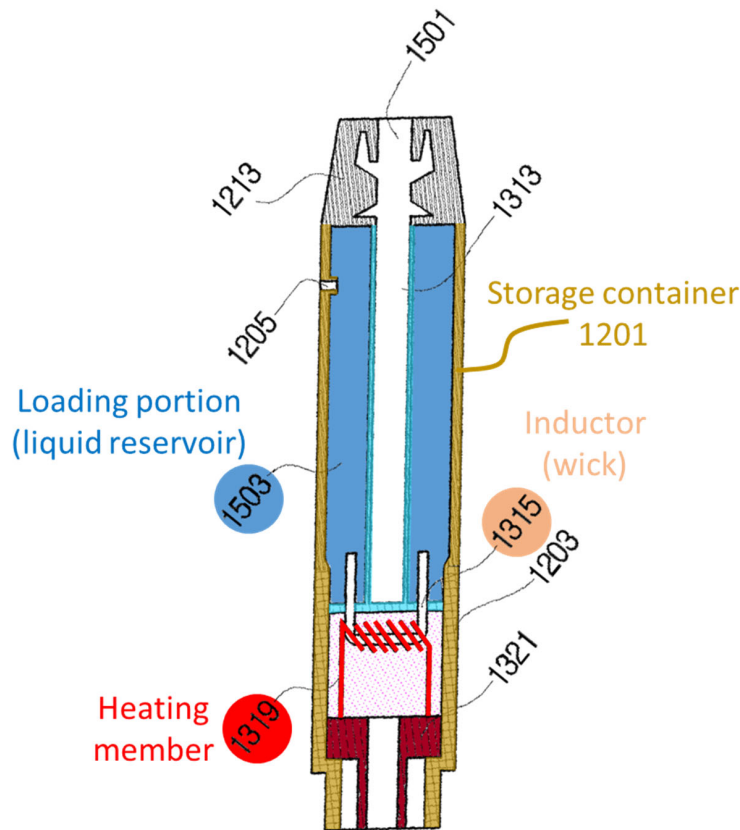
h. [43.H] the liquid reservoir configured to contain an atomization liquid;

139. In my opinion, Cho discloses this limitation.

140. Cho discloses the loading portion 1503 (liquid reservoir) is configured to contain an atomization liquid.

141. Cho discloses loading portion 1503 (liquid reservoir) is filled with a liquid mixed composition. EX1005 (Cho), ¶76 (“Meanwhile, the storage container 1201 has a liquid introduction valve 1205 and opens and closes the liquid introduction valve 1205 to load a predetermined mixed composition. Therefore, the user can selectively load a desired mixed composition using the liquid introduction valve 1205 ...”), ¶89 (“Accordingly, the storage container 1201 has a loading portion 1503 as the remaining space except for the air inhalation tube 1313, and the loading portion 1503 is loaded with the mixed composition through the liquid introduction valve 1205. The mixed composition comes into contact with one end of the inductor 1315 pressed-in and installed through the inductor insertion hole 1311, and the inductor 1315 adsorbs the mixed composition by capillarity and is heated by the heating member 1319.”).

142. The liquid mixed composition is vaporized by heating member 1319. EX1005 (Cho), ¶84 (“Thus, the heating member 1319 vaporizes the mixed composition introduced through the inductor 1315.”).



EX1005 (Cho), Fig. 11 (integrated embodiment).

- i. **[43.I] a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;**

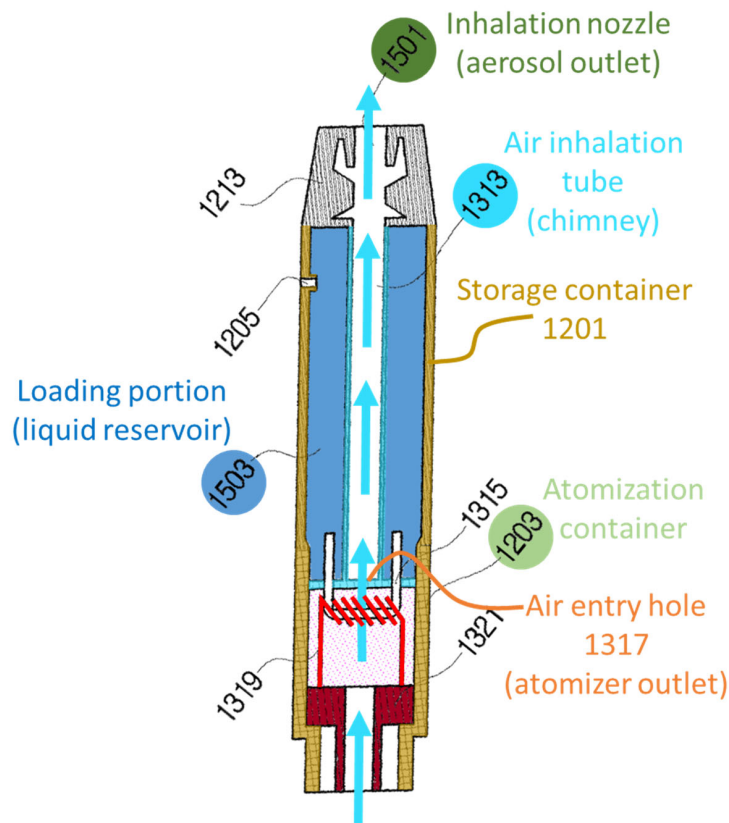
143. In my opinion, Cho discloses this limitation.

144. Cho discloses inhalation tube 1313 (chimney) forming at least part of an aerosol outlet path sealably passing through loading portion 1503 (liquid reservoir) between air entry hole 1317 (atomizer outlet) and inhalation nozzle 1501 (aerosol outlet).

145. As I discussed for limitation [1.L] above, Cho discloses air inhalation tube 1313 (chimney) forms a path that allows vapor to flow from the atomizing

chamber's air hole 1317 (atomizer outlet) through loading portion 1503 (liquid reservoir) to inhalation nozzle 1501 (aerosol outlet).

146. As I discussed for limitation [5.A] above, Cho further discloses air inhalation tube 1313 (chimney) sealably passes through loading portion 1503 (liquid reservoir) reservoir).



EX1005 (Cho), Fig. 11 (integrated embodiment).

j. **[43.J] an atomizer disposed within the atomizing chamber,**

147. As I discussed for limitation [1.C] above, the atomizer is disposed within the atomizing chamber.

- k. **[43.K] the atomizer comprising a resistive heating element; and**

148. As I discussed for limitation [6.A] above, the atomizer comprises a resistive heating element.

- l. **[43.L] a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture,**

149. As I discussed for limitation [1.I] above, the wick is in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture.

- m. **[43.M] the wick disposed between the liquid reservoir and the atomizer.**

150. As I discussed for limitation [1.J] above, the wick is disposed between the liquid reservoir and the atomizer.

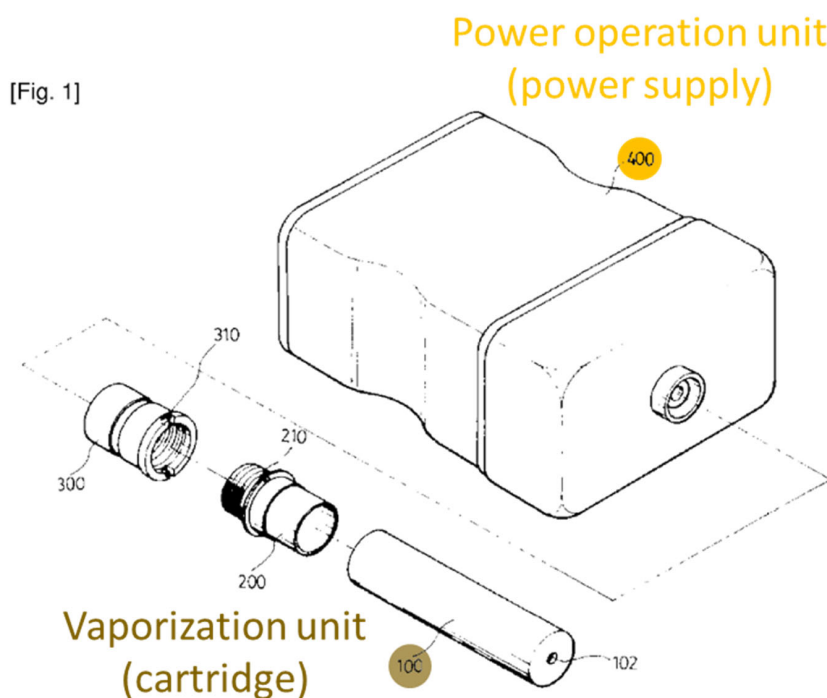
9. Claim 44

- a. **[44.A] An electronic cigarette comprising:**

151. In my opinion, to the extent the preamble is limiting, Cho discloses an electronic cigarette.

152. Cho discloses an electronic cigarette comprising a vaporization unit (cartridge apparatus), disclosed as embodiments 100 and 1200, and a power operation unit (power supply), disclosed as embodiments 400 and 400'. EX1005 (Cho), ¶1 ("The present invention relates to a device for vaporisation and inhalation ..."), ¶9 ("Another object of the present invention is to provide a device for

vaporization and inhalation capable of presenting a replacement structure through which sanitary management of a cartridge containing a composition is possible.”), ¶33 (“Referring to FIG. 1, the vaporisation and inhalation device ... includes a vaporisation unit 100 ... and a power operation unit 400.”). I annotated Cho Figure 1 below to show these components.



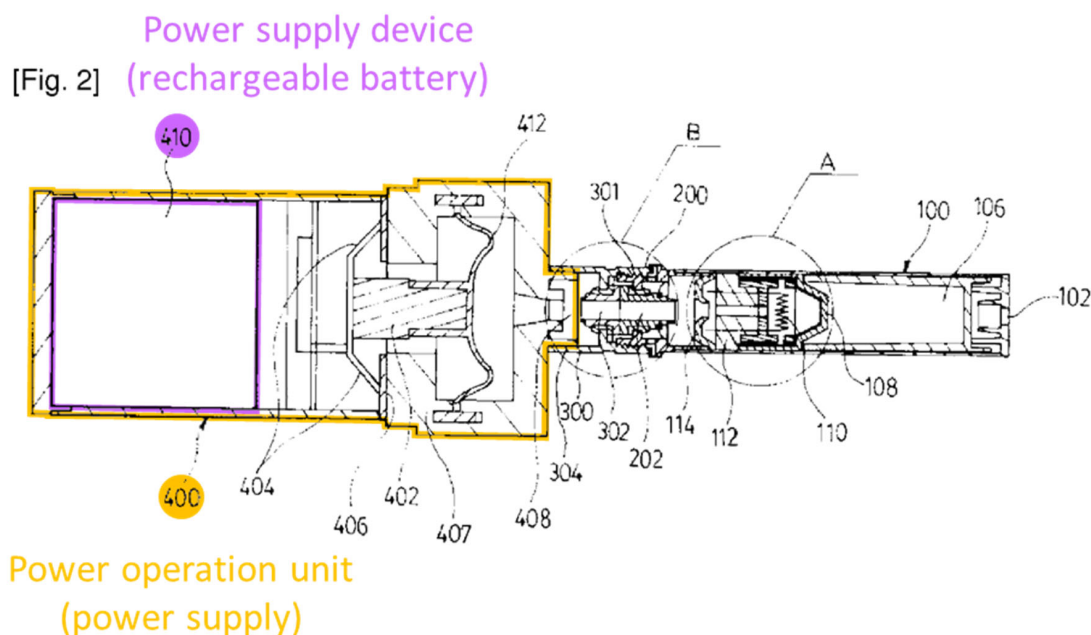
EX1005 (Cho), Fig. 1.

b. [44.B] a power supply portion comprising a rechargeable battery; and

153. In my opinion, Cho discloses this limitation.

154. Cho discloses power operation unit 400 (power supply portion)

comprising a rechargeable battery. EX1005 (Cho), ¶45 (“Referring to FIG. 2 together with FIG. 1, the power operation unit 400 includes a power supply device 410 such as a rechargeable battery and a switching means.”). I annotated Cho Figure 2 below to show these components.



EX1005 (Cho), Fig. 2.

c. **[44.C] a cartridge configured for separable attachment to the power supply portion; the cartridge comprising:**

155. As I discussed for limitation [1.A] above, the electronic cigarette is configured for separable attachment to the power supply portion.

d. **[44.D] a cartridge housing;**

156. As I discussed for limitation [1.B] above, the cartridge comprises a cartridge housing.

e. **[44.E] a mouthpiece end comprising an aerosol outlet;**

157. As I discussed for limitation [1.B] above, the mouthpiece end comprises an aerosol outlet.

f. **[44.F] an atomizing chamber disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end,**

158. As I discussed for limitation [43.D] above, the atomizing chamber is disposed within the cartridge housing proximate a lower end of the cartridge housing opposite the mouthpiece end.

g. **[44.G] the atomizing chamber comprising an atomizer outlet and an atomizing chamber air inlet;**

159. As I discussed for limitation [1.E] above, the atomizing chamber comprises an atomizer outlet and an atomizing chamber air inlet.

h. **[44.H] the atomizing chamber further comprising a first wick aperture and a second wick aperture;**

160. As I discussed for limitation [1.F] above, the atomizing chamber further comprises a first wick aperture and a second wick aperture.

i. **[44.I] a liquid reservoir at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber,**

161. As I discussed for limitation [43.G] above, liquid reservoir is at least partially defined by an interior of the cartridge housing and an exterior of the atomizing chamber.

- j. **[44.J] the liquid reservoir configured to contain an atomization liquid;**

162. As I discussed for limitation [43.H] above, the liquid reservoir is configured to contain an atomization liquid.

- k. **[44.K] a chimney forming at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet;**

163. As I discussed for limitation [43.I] above, the chimney forms at least part of an aerosol outlet path sealably passing through the reservoir between the atomizer outlet and the aerosol outlet.

- l. **[44.L] an atomizer disposed within the atomizing chamber,**

164. As I discussed for limitation [1.C] above, the atomizer is disposed within the atomizing chamber.

- m. **[44.M] the atomizer comprising a resistive heating element; and**

165. As I discussed for limitation [6.A] above, the atomizer comprises a resistive heating element.

- n. **[44.N] a wick in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture,**

166. As I discussed for limitation [1.I] above, the wick is in contact with the atomization liquid in the liquid reservoir through the first wick aperture and the second wick aperture.

- o. **[44.O] the wick disposed between the liquid reservoir and the atomizer.**

167. As I discussed for limitation [1.J] above, the wick is disposed between the liquid reservoir and the atomizer.

10. Claim 76

- a. **[76.A] The cartridge of claim 43, wherein the liquid reservoir is sealably separated from the atomizing chamber.**

168. As I discussed for limitation [1.H] above, the liquid reservoir is sealably separated from the atomizing chamber.

11. Claim 77

- a. **[77.A] The cartridge of claim 43, wherein the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.**

169. As I discussed for limitation [1.G] above, the liquid reservoir is partially defined between the interior of the cartridge housing and the chimney.

12. Claim 81

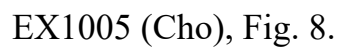
- a. **[81.A] The cartridge of claim 43, further comprising an atomizer assembly comprising the atomizer,**

170. In my opinion, Cho discloses this limitation.

171. Cho discloses heating module 1303 (atomizer assembly) comprising heating member 1319 (atomizer).

172. Cho discloses heating module 1303 (atomizer assembly) is an assembly comprising a threaded coupling portion 1321 and heating member 1319 (atomizer).

[Fig. 8]



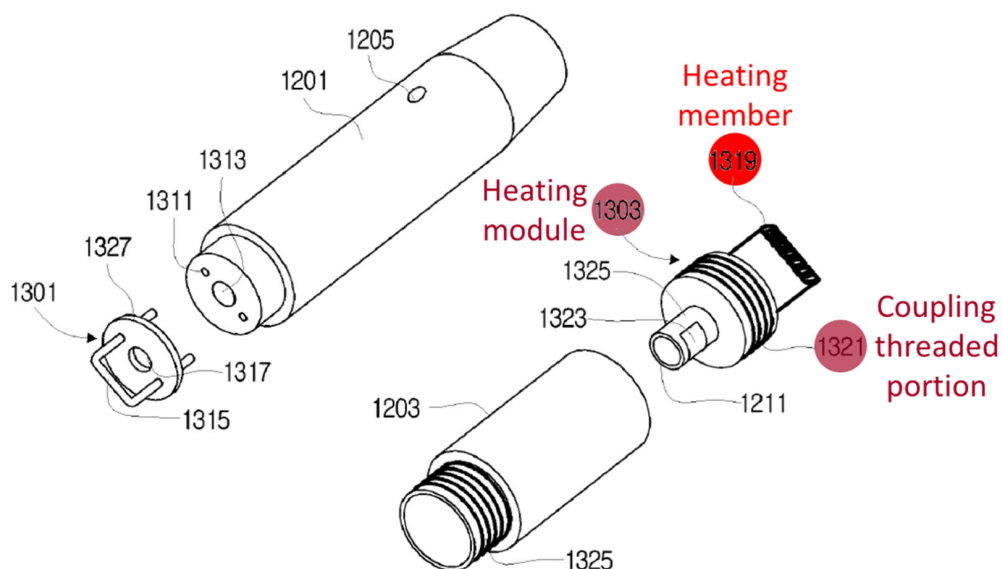
173. In my opinion, Cho discloses this limitation.

175. As I explained above for limitations [1.B] and [43.D], Cho discloses atomization container 1203 is installed below storage container 1201 to form the

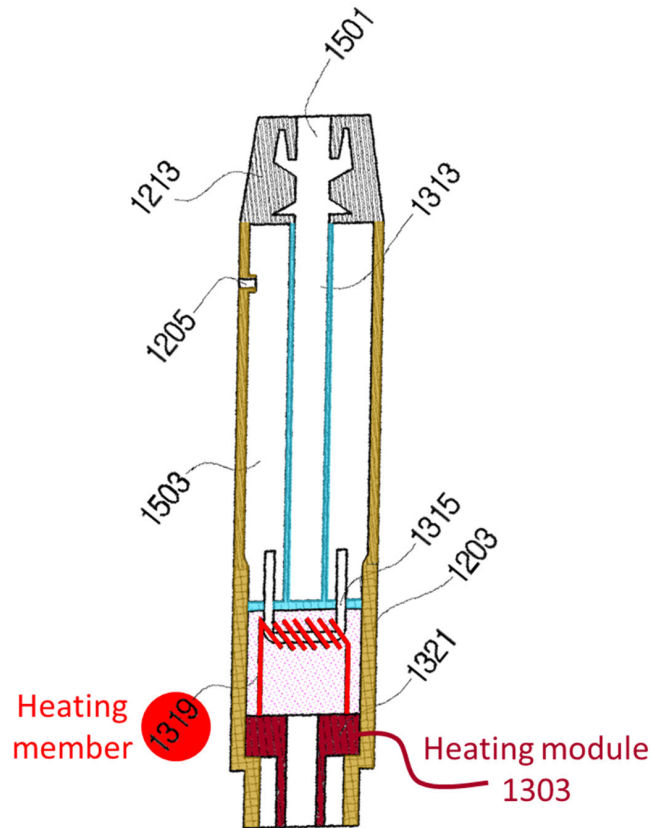
lower end of the cartridge housing.

176. Cho further discloses heating module 1303 (atomizer assembly) is installed in the bottom of atomization container 1203, thereby closing the lower end of atomization container 1203. EX1005 (Cho), ¶82 (“The heating module 1303 has a coupling threaded portion 1321 fixed in electrical contact with the inner bottom surface of the atomization container 1203 ...”). I annotated Cho Figures 8 and 11 below to show this configuration.

[Fig. 8]



EX1005 (Cho), Fig. 8.



EX1005 (Cho), Fig. 11 (integrated embodiment).

13. Claim 86

- a. [86.A] The cartridge of claim 43, wherein the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

177. As I discussed for limitation [1.K] above, the wick is configured to transfer the atomization liquid by capillarity from the liquid reservoir to the atomizer.

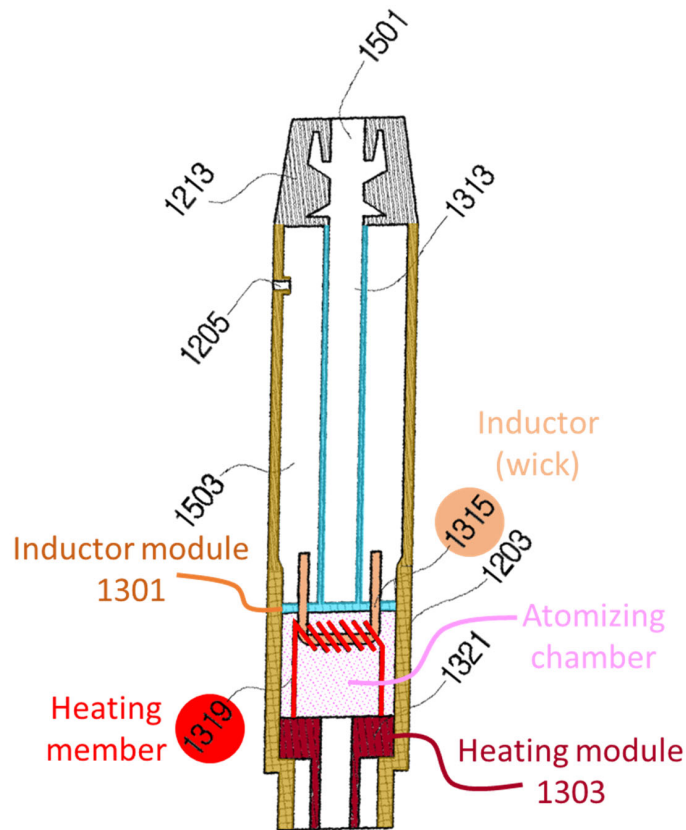
14. Claim 89

- a. [89.A] The cartridge of claim 43, wherein the atomizing chamber comprises an open atomization chamber, and

178. In my opinion, Cho discloses this limitation.

179. As I discussed for limitation [1.C] above, Cho discloses an atomizing chamber formed by atomization container 1203, heating module 1303, and inductor module 1301. As I discussed for limitation [1.E] above, the atomizing chamber has an inhalation port 1211 (air inlet) and an air entry hole 1317 (atomizer outlet).

180. As shown in Cho Figure 11, the atomizing chamber is open because it has an inlet and an outlet—inhalation port 1211 (air inlet) and air entry hole 1317 (atomizer outlet)—and the atomizing chamber—the space inside atomization container 1203 between the coupling threaded portion 1321 of heating module 1303 and the fixing plate 1327 of inductor module 1301—contains only heating member 1319 (atomizer) and inductor 1315 (wick). I annotated Cho Figure 11 below to highlight the open atomization chamber.



EX1005 (Cho), Fig. 11 (integrated embodiment).

- b. [89.B] wherein the wick causes capillarity-driven transfer of the atomization liquid from the liquid reservoir to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

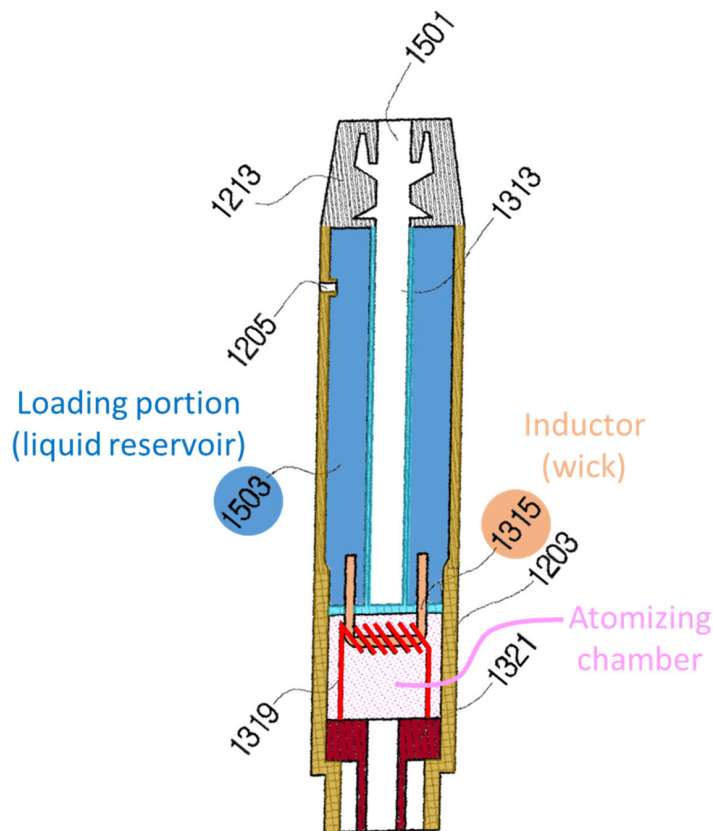
181. In my opinion, Cho discloses this limitation.

182. Cho discloses inductor 1315 (wick) causes capillarity-driven transfer of the liquid mixed composition from loading portion 1503 (liquid reservoir) to the open atomization chamber in a controlled manner without flooding the open atomization chamber.

183. As I discussed for limitation [1.K] above, Cho discloses inductor 1315

(wick) absorbs the liquid mixed composition from the loading portion 1503 (liquid reservoir), and the mixed composition travels by capillarity to heating member 1319 (atomizer) in the atomizing chamber.

184. As I discussed for limitation [1.H] above, Cho further discloses the ends of inductor 1315 (wick) are pressed into or otherwise sealed to the storage container's induction insertion holes 1311, which ensures that the mixed composition remains contained to heating member 1319 and inductor 1315 and does not flood the atomizing chamber. I annotated Cho Figure 11 below to show this configuration.



EX1005 (Cho), Fig. 11 (integrated embodiment).

15. Claim 93

- a. **[93.A] The cartridge of claim 43, further comprising the atomization liquid.**

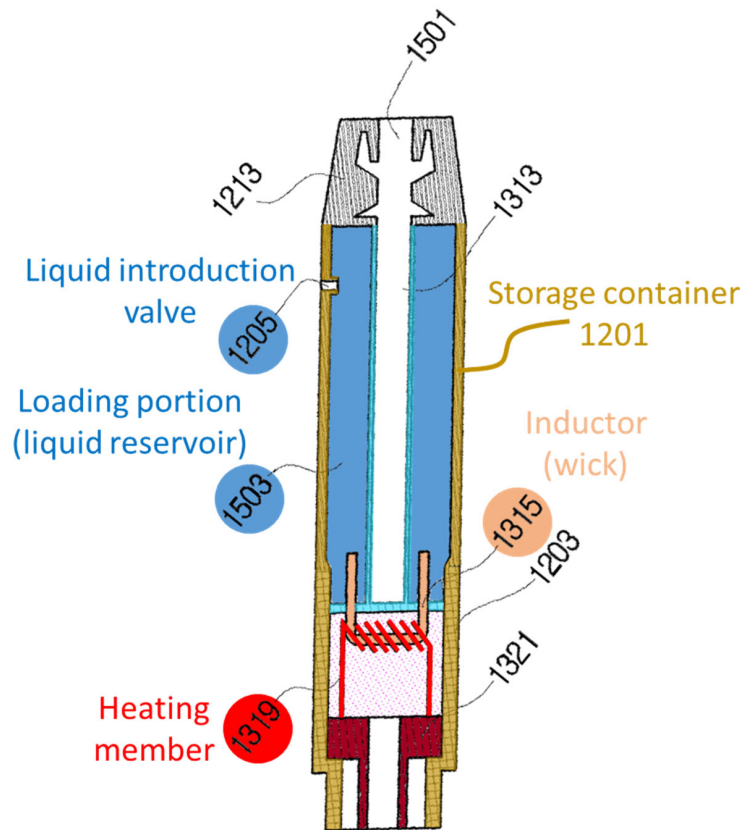
185. As I discussed for limitation [43.H] above, the cartridge contains atomization liquid.

B. Ground 2: Claim 80 of the '114 Patent is Rendered Obvious Over WO 2011/065754 A2 (“Cho”) in View of U.S. 2009/0283103 A1 (“Nielsen”)

186. In my opinion, Cho in view of Nielsen renders obvious claim 80 of the '114 Patent. I provide detailed reasons below.

1. Motivation to Combine

187. As I explained above for limitation [1.A] above, Cho discloses an electronic cigarette comprising a vaporization unit (cartridge) coupled to a power operation unit (power supply portion). As I discussed for limitations [1.G] and [43.H] above, the vaporization unit (cartridge) has a storage container with a liquid loading portion (liquid reservoir). And as I discussed for limitation [43.H] above, the storage container also includes a liquid introduction valve used to fill the loading portion (liquid reservoir) with a liquid mixed composition to be vaporized by a heating member (atomizer).



EX1005 (Cho), Fig. 11 (integrated embodiment).

188. In my opinion, a POSITA would have recognized that, although Cho's liquid introduction valve provides a convenient entry point to add liquid mixed composition to the loading portion (liquid reservoir), it would have been difficult to properly fill the loading portion (liquid reservoir) without being able to see the liquid level in the device. A POSITA would have known that without the ability to see how much liquid is in the device, adult consumers could overfill or underfill the loading portion (liquid reservoir). A POSITA would have recognized that overfilling could cause mixed composition to spill out of the device. The mixed composition could be toxic in liquid form, so a spill could be dangerous to adult

consumers. Moreover, mixed composition spilled on or around the device would be a chore to clean up, and any mixed composition lost in a spill would increase costs to adult consumers. Similarly, A POSITA would have recognized that underfilling could be detrimental. A POSITA would have known that it is important to maintain adequate liquid levels in an electronic cigarette to generate sufficient vapor and prevent damage to the device. At best, low mixed composition levels would diminish adult consumers' experiences, and worse, adult consumers could incur the cost of replacing a damaged device.

189. Accordingly, a POSITA would have been motivated to add a liquid level window to Cho's storage container. A POSITA would have recognized that a liquid level window would prevent these problems and improve Cho's device in several ways. For example, a liquid level window would make Cho's device more convenient by allowing adult consumers to visually confirm how much liquid is left in the device rather than guess (*e.g.*, by shaking the device or remembering when the device was last filled to estimate liquid levels). Further, a liquid level window would make Cho's device safer and more economical by enabling adult consumers to add only enough liquid to fill the device to capacity, which would prevent potentially harmful and wasteful spills caused by overfilling. Moreover, a liquid level window would make Cho's device more robust by improving device longevity in at least two ways. First, the adult consumer would not be forced to disassemble the inhalation

contact 1213 (mouthpiece) from the storage container 1201 to determine liquid levels, thus preventing unnecessary wear on those components. Second, adult consumers could use the liquid level window to easily verify that there is sufficient liquid in the device to prevent any damage that could result from low liquid levels. *See* EX1011 (Yeom), ¶0067 (“... since the present invention forms the inhalation portion 1 as transparent or translucent, the remaining amount of liquid stored in the reservoir 14 can be easily checked by eye, and even if a little liquid remains, the remaining amount of liquid can be checked by tilting the electronic cigarette so that the remaining amount of liquid can be easily checked without removing the reservoir 14. This prevents the absorber 242 from burning out due to liquid depletion.”).

190. Vaporizer devices with liquid level windows were well known in the prior art before June 28, 2011. For example, Nielsen, Korean Utility Model No. KR20-0453400Y1 (“Yeom”), and Korean Utility Model No. KR20-0454110Y1 (“Yoon”) all disclose vaporizer devices with liquid level windows. *E.g.*, EX1006 (Nielsen), ¶0027 (“Additional embodiments of the [electronic vaporizing device] may include a viewing-window to enable a user to visually monitor the level of fluid in the liquid cartridge.”); *see also* EX1011 (Yeom), ¶0067; EX1012 (Yoon), ¶0034. As I explained above, a POSITA would have appreciated a liquid level window’s benefits and would have known that a liquid level window like those disclosed by

Nielsen, Yeom, and Yoon could be easily added to Cho's storage container because it is a simple combination of prior art elements that yields predictable results.

191. A POSITA would have had a reasonable expectation of successfully combining Cho with Nielsen, Yeom, or Yoon. A POSITA would have known that Nielsen, Yeom, and Yoon's liquid level windows could be added to Cho to produce a functional device because all four references are directed to the same field, which is, generally, devices that vaporize liquid. *See, e.g.*, EX1005 (Cho), ¶1 ("The present invention relates to a device for vaporisation and inhalation that vaporizes a substance ..."); EX1006 (Nielsen), ¶0002 ("This invention relates to inhalation devices, and more specifically, to improved electronic vaporizing devices (EVD) and docking stations that provide a heated or non heated vapor for inhalation utilizing liquid substances."); EX1011 (Yeom), ¶0001 ("The present invention relates to an electronic cigarette in which smoke generated by combustion of a nicotine-containing liquid is inhaled by a user like a cigarette ..."); EX1012 (Yoon), ¶0001 ("The present invention relates to an electronic cigarette, and more specifically, to an electronic cigarette that ensures that the liquid of medicinal substances remains appropriately sucked in a suction wick or a suction pipe ..."). Combining Cho with Nielsen, Yeom, or Yoon is a predictable use of electronic vaporizer components according to their established functions. Accordingly, it would have been routine for a POSITA to combine Cho with Nielsen, Yeom, or

Yoon.

2. Claim 80

- a. **[80.A] The cartridge of claim 43, wherein the liquid reservoir comprises a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir.**

192. In my opinion, the combination of Cho and Nielsen renders obvious this limitation.

193. As explained above in Section VIII.B.1, it would have been obvious to add Nielsen's liquid viewing window to Cho.

194. The combination of Cho and Nielsen renders obvious a liquid reservoir with a clear or translucent window to an exterior of the cartridge housing, the clear or translucent window allowing visual determination of a liquid level within the liquid reservoir. EX1006 (Nielsen), ¶0027 ("Additional embodiments of the [electronic vaporizing device] may include a viewing-window to enable a user to visually monitor the level of fluid in the liquid cartridge.").

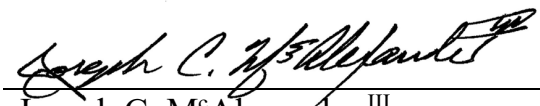
VI. SECONDARY CONSIDERATIONS OF NONOBVIOUSNESS

195. I am not aware of any alleged evidence of secondary considerations of nonobviousness with a nexus to the challenged claims.

VII. DECLARATION

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Dated: February 12, 2024

By: 
Joseph C. McAlexander III