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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NJOY, LLC, and
NJOY Holdings, INC.,
Petitioners,

v.

JUUL Labs, INC.,
Patent Owner

Case IPR2024-00536
U.S. Patent No. 11,606,981

**DECLARATION OF DR. JOHN COLLINS
IN SUPPORT OF PATENT OWNER'S PRELIMINARY RESPONSE**

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1. I have been retained on behalf of JUUL Labs, Inc. (“Patent Owner”) in connection with the above-captioned *inter partes* review (IPR). I have been retained to provide my opinions in support of Patent Owner’s Preliminary Response. I am being compensated for my time at the rate of \$450 per hour. I have no interest in the outcome of this proceeding.

2. In preparing this declaration, I have reviewed and am familiar with the Petition for IPR2024-00536, U.S. Patent No. 11,606,981 (“the ’981 patent”) and its file history, and all other materials cited and discussed in the Petition (including the declaration of Petitioner’s expert James Janet, Ph.D.), and cited and discussed in this Declaration.

3. The statements made herein are based upon my own knowledge and opinion. This Declaration represents only the opinions I have formed to date. I may consider additional documents as they become available or other documents that are necessary to form my opinions. I reserve the right to revise, supplement, or amend my opinions based on new information and on my continuing analysis.

I. QUALIFICATIONS

4. I have been employed since 2008 at the Consortia for Improving Medicine with Innovation and Technology (“CIMIT”) and am currently the Director of Innovation Platforms. CIMIT is a non-profit consortium of Boston’s leading teaching hospitals and universities along with a growing network of national and

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international affiliates. CIMIT is an operating unit within Massachusetts General Hospital where I have a faculty appointment.

5. Much of my responsibility at CIMIT is to facilitate collaboration among scientists, engineers, clinicians, and entrepreneurs to speed the discovery, development, and implementation of medical innovations into practice. I focus on assisting investigators in moving technologies from the lab into products and services that improve patient care. My current focus has been on developing and implementing CIMIT's CoLab and GAITS platforms in collaboration with CIMIT's many collaborators.

6. By way of example of CIMIT's work, it was recently responsible for the National Institute of Biomedical Imaging and Bioengineering (NIBIB) sponsored RADx Tech program. The program has committed more than \$1.5 Bn to develop and accelerate the commercialization of innovative point of care SARS-CoV-2 (COVID) tests into practice. That program supported more than 100 organization and resulted in 55 FDA authorized tests, including the 1st over-the-counter test for home use, and the production of over 7 billion tests¹.

¹ See NIH Website, accessed 2/28/2024: <https://www.nibib.nih.gov/covid-19/radx-tech-program>

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7. Also since 2008, I have been the Chief Technology and Innovation Officer for Reed Collins, LLC. At Reed Collins I provide consulting as an expert witness as well as to non-profits and as start-ups. Non-profit clients include EIT Health in Europe, Oxford University in the UK, and Howard University in the US.

8. I received a Ph.D. (1988) and M.S. (1982) in mechanical engineering from the Massachusetts Institute of Technology (“MIT”), as well as a B.S. (1980) in mechanical engineering, with a minor in economics, from Rensselaer Polytechnic Institute (“RPI”). At MIT, I worked in the Fluids Lab under the direction of Professors Asher Shapiro and Roger Kamm. My academic work focused on mechanical engineering with a concentration on fluid dynamics and heat/mass transfer, with my Ph.D. and M.S. theses applying these principles to pulmonary dynamics. My M.S. thesis was on high frequency ventilation: at the time a novel way to ventilate babies without over-pressurization of the lung, avoiding damage to the lung during ventilator assist. My Ph.D. thesis was on analytical and numerical modeling of forced exhalation from the lung. The results were a computational model of the lung that allowed for more sophisticated diagnostics based on the results of the simple Forced Expiration Pulmonary Function (“FEPF”) test.

9. I now have over 40 years of product design, development, and consulting experience covering a wide range of industries and products. Over that time, I have had a consistent focus on medical devices and related technologies,

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which includes my particular expertise in design, fluid mechanics and heat/mass transfer. In addition to doing engineering work, my responsibilities have included assembling and managing teams to develop new consumer, industrial and medical products.

10. I also have experience as an innovator and inventor. I am a named inventor on more than twenty U.S. patents, with foreign counterparts in addition, on new products and manufacturing processes. My CV is attached as Exhibit 2002 and contains a list of my US Patents and all the publications that I have authored in the last 10 years.

11. Prior to my time at CIMIT and Reed Collins LLC in 2008, I held various leadership positions at technology and product development companies. From 1982-1986, I worked at Booz, Allen & Hamilton, where I developed a number of consumer and industrial products. After taking time to return to MIT and complete my Ph.D., I was then employed by Arthur D. Little (“ADL”) until 1988. I then joined ADL as a design engineer and helped form its medical products business. I progressed to being responsible for the Technology and Innovation (“T&I”) Directorate, with more than 250 staff as Sr Vice President until 2002.

12. From 2002-2008, I worked in close collaboration with CEO and owner, Dr. Kenan Sahin, to form TIAX LLC from the resources of the ADL T&I Directorate. TIAX is and was a privately held technology transformation

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organization focused on advancing and developing technologies for commercialization in several core technology areas, including clean energy and materials, health and wellness, appliances and HVAC systems, and enhanced security. During my tenure at TIAX, part of which I served as president, the World Economic Forum recognized TIAX as a Technology Pioneer in 2002 and as a New Champion in 2007.

13. My experiences cover a broad technology base across a diverse set of industries, including in the areas of medical devices, energy, consumer products, emission technology for automobiles, and alternative smoking products.

14. By way of example, while at ADL, I worked with an operating unit within Philip Morris USA (“PM USA”) called Chrysalis Technologies, Inc. (“Chrysalis”) on an alternative smoking product that was battery-powered and puff-activated. Also, while at ADL, and then continuing that work at TIAX, I continued that work with Chrysalis on several related projects. These projects built off of and utilized the prior capillary aerosol generator research and development at PM USA and Chrysalis (the results of which are reflected in patents such as U.S. Pat. No. 5,743,251 to Howell et al.; U.S. Pat. No. 6,501,052 to Cox et al.; and U.S. Pat. No. 6,491,233 to Nichols) and applied it to efforts to atomize very low flow rates of liquid fuel for efficient combustion. One application was for a low-power, fuel based electric power generator (U.S. Pat. App. No. 2006/0093977 to Pellizzari I), and

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another was for a clean emission “coldstart” fuel injector for automobiles (U.S. Pat. No. 7,059,307 to Pellizzari II).

15. By way of further examples of products that I have worked on, I worked with Baxter Healthcare to develop a blood/fluid warmer based on the analytical optimization of the thermal performance of “conventional” resistance heating technology; Bausch & Lomb to develop a microsurgical fluid delivery system that allowed the surgeon to control the flow or pressure of irrigation fluid; and Johnson & Johnson to develop Trocars and clip appliers for minimally invasive surgery.

16. I have also performed services in numerous patent disputes as an independent technical expert and consultant and as an expert witness. I have consulted as an expert in matters involving the design of a variety of medical devices. See Exhibit 2002 for a list of matters in which I have offered expert opinions or testified in court in the last 4 years as well as all prior e-cigarette cases in which I testified or offered expert opinions. In total, I have worked on, testified or offered expert opinions in eight other e-cigarette matters.

II. LEGAL UNDERSTANDING

A. The Person of Ordinary Skill in the Art

17. I understand that a person of ordinary skill in the relevant art at the time of the invention (also referred to herein as “ordinary artisan”) is presumed to be

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aware of all pertinent art, thinks along conventional wisdom in the art, and is a person of ordinary creativity—not an automaton.

18. I have been asked to consider the level of ordinary skill in the field that someone would have had at the time the claimed invention was made. In deciding the level of ordinary skill, I considered the following:

- the levels of education and experience of persons working in the field;
- the types of problems encountered in the field; and
- the sophistication of the technology.

19. A person of ordinary skill in the art relevant to the '981 patent at the time of the invention would have a B.S. in mechanical engineering, electrical engineering, or an equivalent degree, and either at least two years of experience designing electro-mechanical consumer products or an advanced degree in mechanical engineering, electrical engineering, or an equivalent field. More education can substitute for practical experience and vice versa.

20. I have reviewed the declaration of Dr. Janet, including his opinions regarding the Person of Ordinary Skill in the Art. Dr. Janet provides a similar definition of a POSITA: “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 those fields, and such POSA would

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have been familiar with electrically powered vaporizing articles, their components or the underlying technologies.” Ex. 1005 ¶ 29.

21. My opinions set forth in this Declaration would be the same under either my or Dr. Janet’s proposal.

22. I am well-qualified to determine the level of ordinary skill in the art and am personally familiar with the technology of the ’981 patent. I was a person of at least ordinary skill in the art at the time of the priority date of the ’981 patent regardless of which definition used. Regardless, if I do not explicitly state that my statements below are based on this timeframe, all of my statements are to be understood as an ordinary artisan would have understood something as of the priority date of the ’981 patent.

B. Legal Principles

23. I am not a lawyer and will not provide any legal opinions. Though I am not a lawyer, I have been advised that certain legal standards are to be applied by technical experts in forming opinions regarding the meaning and validity of patent claims.

1. Obviousness

24. I understand that to obtain a patent, a claimed invention must have, as of the priority date, been nonobvious in view of prior art in the field. I understand that an invention is obvious when the differences between the subject matter sought

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to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.

25. I understand that to prove that prior art, or a combination of prior art, renders a patent obvious, it is necessary to: (1) identify the particular references that singly, or in combination, make the patent obvious; (2) specifically identify which elements of the patent claim appear in each of the asserted references; and (3) explain how the prior art references could have been combined to create the inventions claimed in the asserted claim. I further understand that the party advocating obviousness has the burden to show both a motivation to combine the prior art references, as well as a reasonable expectation of success in achieving the combination.

26. I understand that a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art, and that obviousness cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.

27. I also understand that a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent

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from the path that was taken by the applicant. Even if a reference is not found to teach away, I understand its statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference.

2. My Understanding of Claim Construction Law

28. I have been informed that patent claims are construed from the viewpoint of a person of an ordinary artisan and that patent claims generally should be understood consistent with their ordinary and customary meaning at the time of the invention. A review of the patent claim language, the patent specification, and its prosecution history are also necessary to determine the proper meaning and scope of the term at issue.

29. I have further been informed that in the specification and prosecution history the patentee may define a claim term in a way that differs from the ordinary and customary meaning. I understand that during prosecution of the patent before the U.S. Patent and Trademark Office, the Applicant may make representations or provide definitions of terms that may affect the scope of the patent claims. In particular, the Applicant may, during the course of prosecution, limit the scope of the claims to overcome prior art and/or disavow claim coverage by making clear and unambiguous statements to that effect.

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30. I have been informed that a ordinary artisan may, among other things, consider dictionaries, publications, other patents, and treatises (*i.e.*, “extrinsic evidence”). I understand that extrinsic evidence may generally not be relied on if it contradicts the meaning of claim language provided by the intrinsic evidence, such as express definitions given for terms in the specification.

3. Secondary Considerations of Non-Obviousness

31. I understand that one of the factual inquiries when determining the obviousness of a patent is to consider objective evidence related to the issue of obviousness, sometimes called “secondary considerations of non-obviousness” or “objective indicia of non-obviousness.” I understand that such evidence can often be probative of the issues of obviousness.

32. I understand that examples of objective evidence include (1) commercial success, (2) copying, (3) industry praise, (4) skepticism, (5) long-felt but unsolved need, and (6) failure of others.

33. I understand that there must be a nexus between the patented invention and the evidence of secondary considerations. I further understand that there is a presumption of such a nexus if the claims of the patent are coextensive with a product or products that are the subject of the secondary considerations evidence. I further understand that in order for a claim to be coextensive with a product, one must look at the claims at the whole and not just the new claimed feature. In addition, the

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claimed invention should not be merely a subcomponent of the products sold but should encompass the entire apparatus.

III. OVERVIEW OF THE '981 PATENT

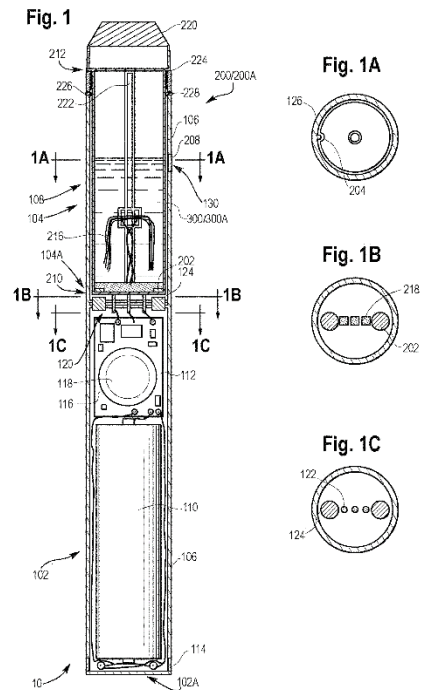
34. The '981 patent, titled "Vaporizer," is directed to rechargeable vaporizers or electronic cigarettes that consist of two primary components: a "battery portion" and a "cartomizer." '981 patent (Ex. 1001) at Abstract, 2:42-49, 6:22-27. The battery portion comprises an outer shell that forms "a battery segment and a cartomizer receiving segment," where the cartomizer receiving segment defines a "chamber" for receiving the cartomizer body. *Id.* at 1:49-56, 2:8-13. The cartomizer body includes several key elements: a volume for storing a vaporizable substance, a wicking element, a heating element, a mouthpiece, and cartomizer electrical contacts. These electrical contacts direct current to the heating element when the cartomizer body is received by the chamber defined by the cartomizer receiving segment. *Id.* at 2:13-38, 9:61-63. The vaporized fluid may mix with air to form an aerosol as it travels from the heater through an inhalation tube to the user. *Id.* at 10:3-8.

35. The '981 patent describes its invention as advancing the art of electronic cigarettes and vaporizers by including charging contacts at the end of the battery portion rather than within the chamber defined by the cartomizer receiving

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segment. This allows the device to “be operated in its typical fashion during the recharging of the battery.” *Id.* at 14:62-15:9.

36. Figure 1 shows important features of the '981 patent:



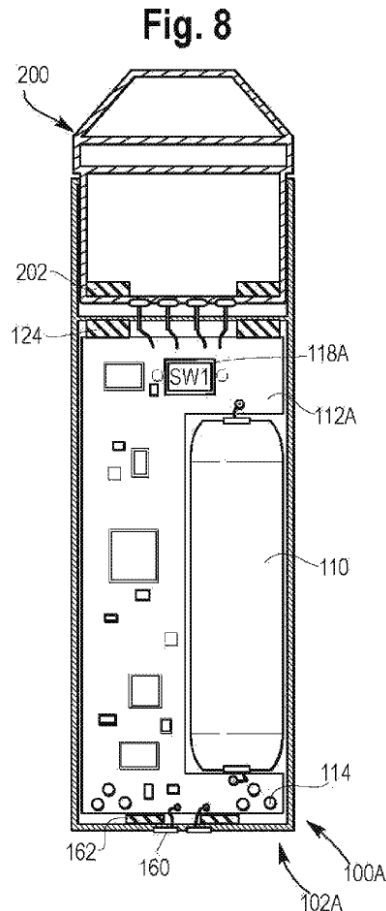
Id. at Figs. 1, 1A-C. A battery portion 100 and a cartomizer 200 connect together to comprise the complete vaporizer device. *Id.* at 5:63-65. The battery portion contains a battery housing segment 102 at a distal end (relative to the user), and a cartomizer receiving segment 104 at a proximal end. *Id.* at 5:65-6:2. An outer shell 106 is commonly shared by the battery housing segment and the cartomizer receiving segment. *Id.* at 6:2-11.

37. An internal reservoir defined by the body of the cartomizer holds a vaporizable liquid. *Id.* at 9:49-51. The body includes a heating element and wick.

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Id. at 9:61-63. The wick delivers the vaporizable fluid to the heating element, and the heating element then vaporizes the fluid. *Id.* at 10:3-20.

38. Figure 8 depicts charging contacts 160 located at the bottom:



Id. at Fig. 8; 12:59-65. Locating the contacts here allows the battery to charge while the device is operated. *Id.* at 14:62-15:8.

IV. OVERVIEW OF THE CITED PRIOR ART

1. Liu783

39. U.S. Patent Publication No. 2014/0150783A1 (Ex. 1010) (“Liu783”) is entitled “Electronic Cigarette Having a Connector for Magnetic Connection,” and

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was filed as a PCT Application on December 5, 2012. Liu783 discloses an electronic cigarette with a removable connector threaded into the device and a cartridge magnetically attached to the connector. I understand that Liu783 is listed as a cited reference on the face of the '981 patent and therefore was already considered by the patent office in issuing the '981 patent.

40. Liu783 teaches that that electronic cigarettes at the time were typically comprised of “a sucking rod and a power rod . . . connected together by threads,” where the threads served as a “connecting means for realizing the connection of the atomizing means” of the sucking rod “and the power rod.” Liu783 at [0002]. The threads used in those devices were typically integrally formed and inseparable from the sucking rod, which required replacement of the threads when the liquid smoke contained in the sucking rod was depleted. *Id.* (“Since the sucking rod is an inseparable entirety, it is required to replace the whole sucking rod when the liquid smoke is used out, which results in relatively high manufacture and use cost of the sucking rod.”).

41. To “facilitate the installation, detachment, and replacement” of the sucking rod of its electronic cigarette, Liu783 describes “an electronic cigarette having a connector for magnetic connection,” where “the connector has its one end magnetically connected with the atomizer, and its other end detachably connected with the power rod.” *Id.* at [0003]-[0004]. Figures 5, 7, and 8 respectively depict

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the sucking rod (left), connector (middle), and power rod (right) as separate components that are affixed together to form Liu783's electronic cigarette:

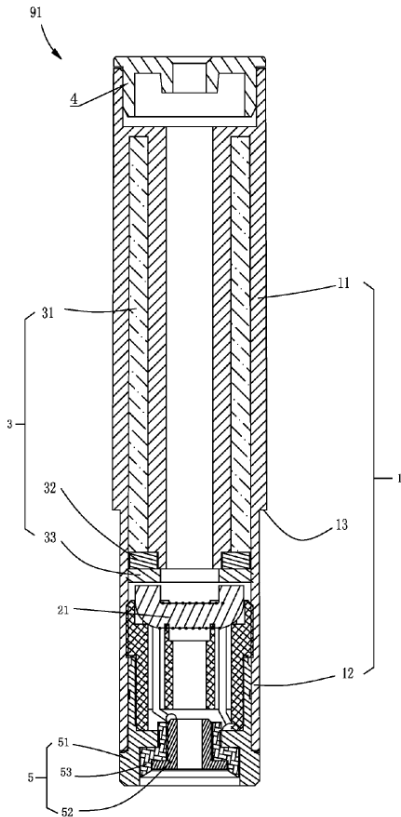


FIG. 5

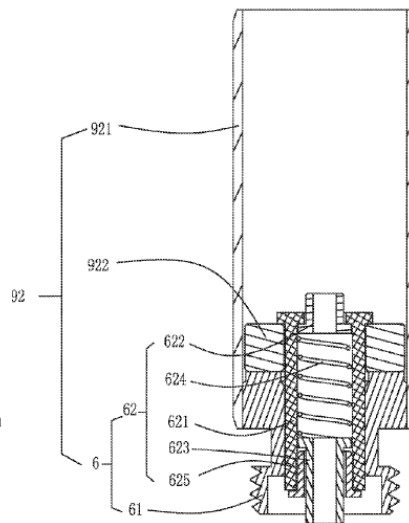


FIG. 7

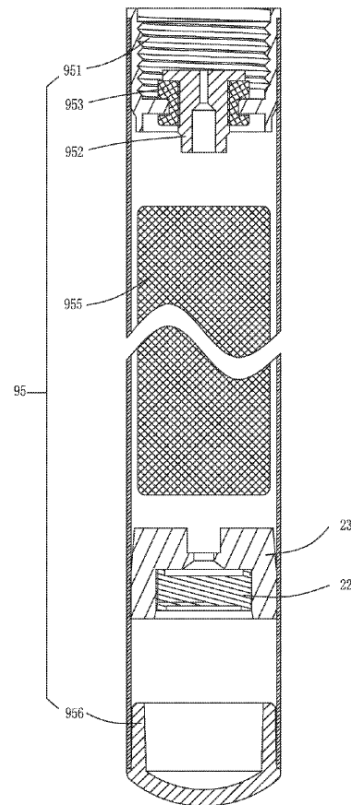


FIG. 8

Id. at Figs. 5, 7, 8.

42. Liu783's three-piece device provides three main technical advantages: (1) the atomizer and the connector are separate components that are "independently manufactured;" (2) "it is only required to replace the atomizer instead of the connector" when the atomizer is depleted, which saves on manufacturing and use costs; and (3) "assembly and detachment of the atomizer and the connector becomes very convenient." *Id.* at [0019].

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43. Liu783 explains that a combination of poles and seats are used to ensure a robust connection between the sucking rod and the connector:

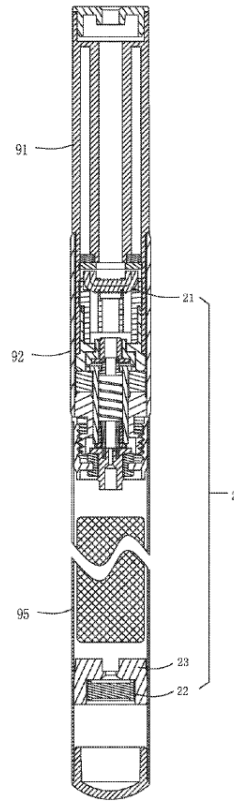


FIG. 3

Id. at [0042]; Fig. 3. One set of electrical contacts is spring-loaded, and another set includes a circumferential contact between the outer wall of the sucking rod and interior wall of the connector. *Id.* at [0042] (“[T]he side wall of the first seat 51 and the inner wall of the connecting casing 921 circumferentially contact with each other to realize conduction therebetween, to thereby achieve corresponding conduction of inner circuits of the atomizer 91 and the connector 92.”).

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2. Liu438

44. U.S. Patent Publication No. 2013/0319438 (Ex. 1013) (“Liu438”) is entitled “Electronic Cigarette and Its Sucking Rod,” and was filed as a PCT Application on June 5, 2012. Liu 438 discloses an electronic cigarette with a connecting module affixed to a sucking rod that threads into a device.

45. Liu438 describes a sucking rod with a sucking cylinder “formed by cutting a transparent or translucent elongated tube,” and a “liquid smoke compartment” used for storing liquid located completely outside of an outer decorative sleeve formed by the connecting module. Liu438 at [0045]-[0046]. Liu438 does not disclose magnets for removing the sucking cylinder from the connecting module. The connecting module is part of the sucking rod 90 that threads into the power rod 91:

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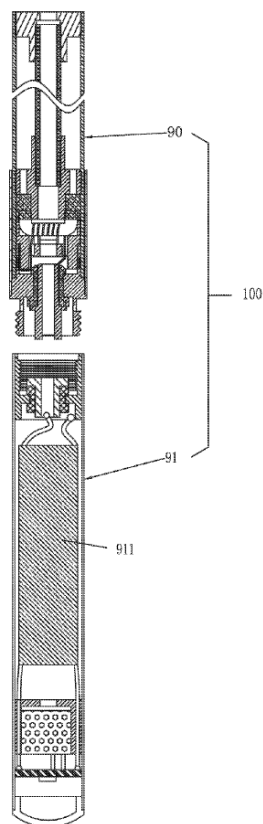


FIG. 13

Id. at [0043]; Fig. 13.

46. The connecting module in Liu438 is significantly different from Liu783's connector 92. Liu438's connecting module provides threads for the sucking rod, but is not designed to be removed from the sucking rod during regular use.

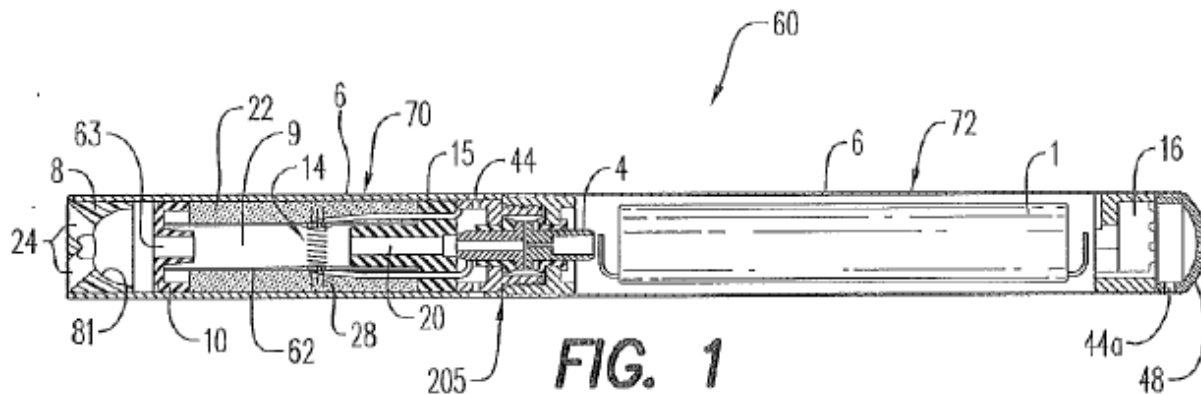
3. Tucker

47. U.S. Patent Publication No. 2013/0192623 (Ex. 1034) ("Tucker") is entitled "Electronic Cigarette," was filed on January 31, 2013, and was published on

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August 1, 2013. Tucker discloses an electronic cigarette with a window provided on the cartomizer portion of the device.

48. Tucker's electronic cigarette comprises a "replaceable cartridge" coupled to a "reusable fixture" bound together by a "threaded connection 205" or by a "snug-fit, detent, clamp, and/or clasp":



Tucker at [0033], Fig. 1.

49. Tucker's electronic cigarette includes a liquid supply which "comprises a liquid material and optionally a liquid storage medium 21 operable to store the liquid material therein." *Id.* at [0034]. This configuration allows the "wick 28" to access liquid material in the liquid storage medium from a central location of the liquid reservoir. *Id.* at [0035] ("A wick 28 is in communication with the liquid material in the liquid supply reservoir 22 and in communication with the heater 14 such that the wick 28 disposes liquid material in proximate relation to the heater 14.").

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4. Thorens788

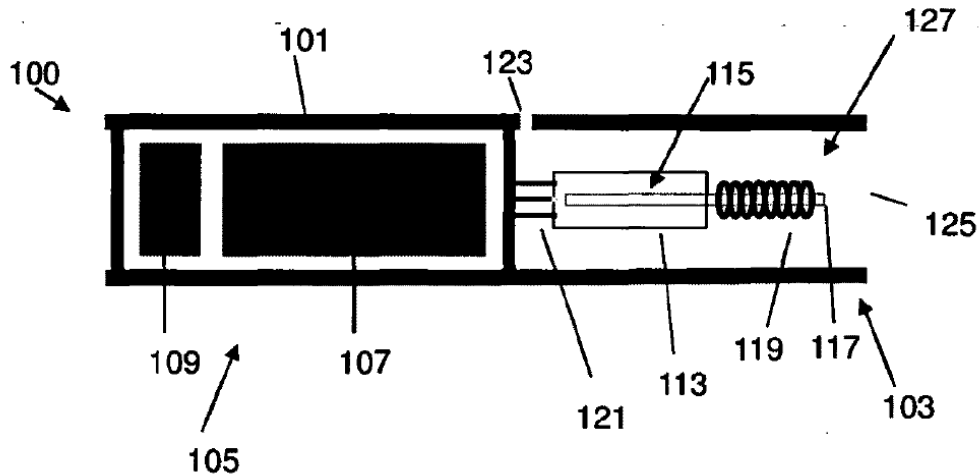
50. WO 2011/160788 A1 (Ex. 1004) (“Thorens788”) is entitled “An improved Aerosol Generator and Liquid Storage Portion for Use with the Aerosol Generator” and was filed on June 15, 2011. I understand that Thorens788 is listed as a cited reference on the face of the ’981 patent and therefore was already considered by the patent office in issuing the ’981 patent.

51. Thorens788 relates to a liquid storage portion for use with an aerosol generator. Thorens788 at 1:5-6. Thorens788 discloses that one perceived disadvantage of previous smoking utensils was that there was no way to determine that the liquid fed into the container was suitable for use with the device. *Id.* at 1:13-16. The object of Thorens788’s invention was to overcome this disadvantage, with various mechanisms to distinguish one type of liquid storage portion (*e.g.*, a container) from another. *Id.* Thorens788 is focused on identifying the liquid storage portion of a vaporizer and discloses no embodiments that have a mouthpiece.

52. Thorens788’s device has a size comparable to a conventional cigarette. *Id.* at 11:8-10. The liquid storage portion of Thorens788’s device is opaque, which limits degradation of the liquid by light. *Id.* at 7:26-27.

53. As shown below in the schematic of Figure 1, Thorens788’s device has programmable electric circuitry 109:

Figure 1

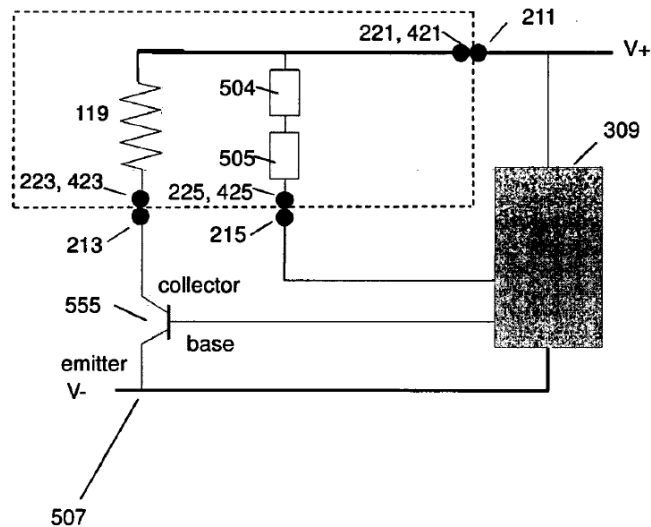


Id. at Fig. 1; 12:10-12.

54. Thorens788's Figure 7 depicts the electrical connectors 211, 213, 215 (which are connected to the conductive elements 201, 203, 205) to allow electrical signals to pass between the processor 309, which may be mounted in circuitry 109, and liquid storage portion 113:

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Figure 7



Id. at Fig. 7; 13:19-29.

55. The components enclosed by the dashed line in Figure 7 are located in a liquid storage portion 113. *Id.* The components located outside the dashed line enclosure are located in the aerosol generating portion 100. *Id.* As a result, the components within the dashed line enclosure may be replaced each time a liquid storage portion 113 is removed from the aerosol generating portion 100 and replaced with a new liquid storage portion 113.

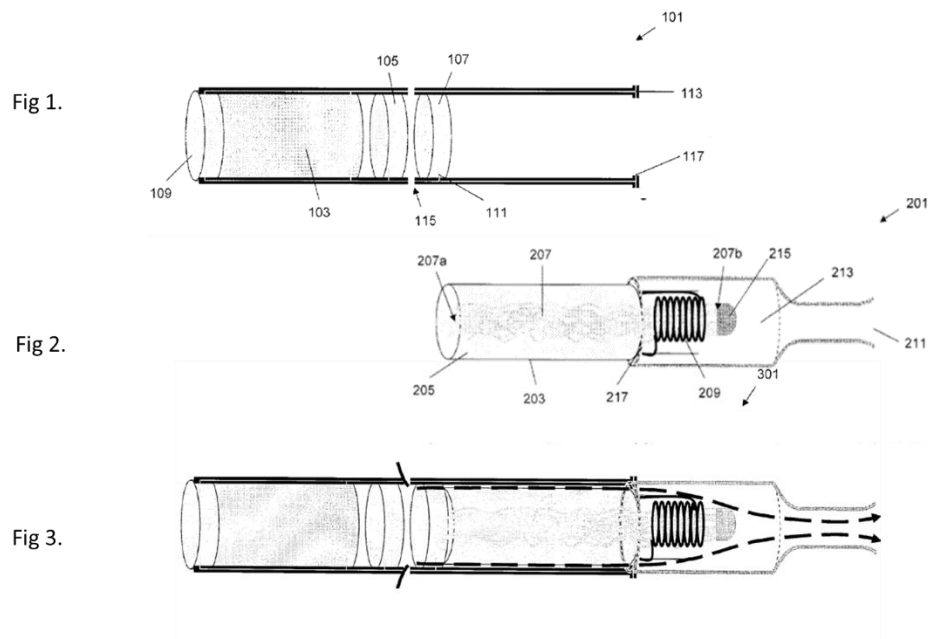
5. *Thorens231*

56. U.S. Patent No. 8,794,231 (Ex. 1002) (“Thorens231”) is entitled “Electrically Heated Smoking System Having a Liquid Storage Portion” and was filed on April 29, 2009. I understand that Thorens231 is listed as a cited reference

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on the face of the '981 patent and therefore was already considered by the patent office in issuing the '981 patent.

57. Thorens231 teaches an electrically heated smoking system comprising a shell and a replaceable mouthpiece. *Id.* at 1:51-52. Figs 1 to 3 of Thorens231 are reproduced below with Figs 1 and 2 positioned such that their relative axial position is as shown in Fig. 3. Figure 1 shows the shell 101 of an electrically heated smoking system. Figure 2 shows the mouthpiece 201 of an electrically heated smoking system. Figure 3 shows the electrically heated smoking system when the mouthpiece is inserted into the shell:



Id. at Figs. 1-3; see also *id.* at 6:23-29.

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58. The shell 101 includes a battery 103, electric circuitry 105 and puff detection system 107, a puff indicator 109, electrical connections 111, electrical contacts 113, air inlets 115, and a lock mechanism 117. *Id.* at 6:34-40.

59. The mouthpiece 201 includes a liquid storage portion (cartridge 203) containing liquid 205, a capillary wick 207, a heating coil 209, an air outlet 211 and an aerosol forming chamber 213. *Id.* at 6:44-47. The distal end 207a of the capillary wick 207 extends into the cartridge 203 and the proximal end 207b is surrounded by the heating coil 209. *Id.* at 6:47-50. The mouthpiece also includes a cap 215 to protect the proximal end capillary wick 207 and an insulation ring 217. *Id.* at 6:50-53.

60. Like Thorens788, Thorens231 teaches a liquid storage portion that is opaque, thereby limiting degradation of the liquid by light. *Id.* at 4:64-65.

61. The shell 101 and mouthpiece 201 are releasably locked together as shown in Figure 3 by a lock mechanism 117. *Id.* at 6:57-58. When locked, the heating coil 209 is in contact with the electrical contacts 113 in the shell. *Id.* at 6:58-60.

62. Thorens231 teaches that when a user draws on the mouthpiece through the air outlet 211, ambient air is drawn through air inlets 115 in the shell. *Id.* at 6:63-65. The puff detection system 107 detects the puff and signals the controls to supply a pulse of electricity to the heating coil and switches on the puff indicator 109. *Id.*

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at 6:65-67. The liquid in the second end 207b of the wick 207 is then vaporized by the heating coil 209 to create a supersaturated vapor. *Id.* at 7:2-4. The vapor is mixed with and is carried in the air flow from the air inlets 115 towards the aerosol forming chamber 213. *Id.* at 7:7-9. In the aerosol forming chamber 213, the vapor cools and condenses to form an inhalable aerosol, which is carried towards the outlet 211 and into the mouth of a user. *Id.* at 7:9-12. At the same time, the liquid being vaporized is replaced by further liquid moving towards the second end 207b of wick by capillary action. *Id.* at 6:62-7:12.

63. Thorens231 does not describe the specifics of the airflow path of the assembled device. Instead, Thorens231 briefly notes that in one embodiment ambient air is drawn through air inlets 115 of the shell and passes around the cartridge 203 before reaching the proximal end 207b of the wick and the heating coil 209. *Id.* at 7:41-43. It also briefly describes an alternative embodiment in which the cartridge is positioned downstream of the end 207b of the wick (now the distal end) and the heating coil such that ambient air will be drawn through the air inlets 115 and then mix with vapor and pass around the cartridge on the way to the air outlet. *Id.* at 7:43-49.

V. CLAIM CONSTRUCTION

64. I understand that Dr. Janet and Petitioner have, for the purposes of this IPR, construed the claim term “wicking element” as “any material through which

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liquid may be drawn via capillary action.” Ex. 1005 ¶ 85. I agree with this claim construction and have applied it in my analysis.

65. I understand that Dr. Janet and Petitioner have, for the purposes of this IPR, construed the claim term “heating element” as “conductive material shaped into a wire, coil, or flat ribbon that generates heat in response to current.” Ex. 1005 ¶ 86. I agree with this claim construction and have applied it in my analysis.

66. I understand that Dr. Janet and Petitioner have, for the purposes of this IPR, construed the claim term “window” as “opening or slit [on or proximate to] / [in] the shell through which the cartomizer is viewed.” Ex. 1005 ¶ 87. I agree with this claim construction and have applied it in my analysis.

67. I understand that Dr. Janet and Petitioner implicitly suggest a claim construction of “a battery portion having an outer shell and a chamber defined by the outer shell” to not require what Dr. Janet and Petitioner term a “unitary outer shell.” Pet. 28. I disagree with this proposed claim construction as it is not sufficient. In my opinion, a person of ordinary skill in the art would have understood from the plain language of the claims that the outer shell must be part of the battery portion as opposed to a separate component, but it is not limited to being a unitary structure. To the extent that Dr. Janet or Petitioner disagree, there is no supporting intrinsic or extrinsic evidence, and such an interpretation would be contrary to the plain and ordinary meaning of the claim terms.

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68. I understand that Dr. Janet and Petitioner implicitly suggest a claim construction of “the battery electrical contacts being coplanar” that would allow them to treat Liu783’s electrical contacts as abstracted points, and thus supposedly coplanar (because “two points always fall on a plane”). Pet. 62-63. I disagree with this proposed claim construction. Consistent with the specification, the physical position and dimensions of the electrical contacts in question should be assessed, and then compared to each other to determine if the contact are on the same plane. See ’981 patent at 7:31-34 (“In embodiments where button 118 is coplanar or aligned with the surface of outer shell 106, as described herein, ring indicator 116 may also be coplanar or aligned with button 118 and the surface of outer shell 106.”). I do not discern any intrinsic or extrinsic evidence that supports Dr. Janet and Petitioner’s proposed claim construction.

69. In my opinion, all other claim terms should be given their ordinary meaning in light of the specification.

II. GROUND 1: LIU783, LIU438, AND KNOWLEDGE OF A PERSON OF ORDINARY SKILL IN THE ART DO NOT RENDER CLAIMS 1, 2, 5, OR 13-16 OBVIOUS

70. It is my opinion that the base reference relied on by Petitioner and Dr. Janet, Liu783, fails to teach critical limitations of the challenged independent claims. Additionally, it is my opinion that Petitioner and Dr. Janet have not established a

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motivation to combine Liu783 with Liu438 and “knowledge of a POSA” to achieve the challenged independent claims with a reasonable expectation of success.

A. Liu783 Does Not Disclose or Render Obvious, Alone or in Combination with Any Other Reference, “a Battery Portion Having an Outer Shell and a Chamber Defined by the Outer Shell”

1. *Liu783 Does Not Disclose “a Battery Portion Having an Outer Shell and a Chamber Defined by the Outer Shell”*

71. In my opinion, Liu783 does not disclose this limitation because the outer shell of its battery portion does not define a chamber. Instead, the outer shell of its battery portion defines a threaded connection to separate shell that forms a chamber that receives the sucking rod. In particular, Liu783 describes a battery portion (power rod 95) having an outer shell and a separate chamber (connector 92), which is a distinct piece of hardware that threads into the battery portion. A person of ordinary skill in the art would have recognized that Liu783 teaches the benefits of the separate connector 92 “to facilitate the installation, detachment and replacement of the atomizing means and the connecting means of the sucking rod.” Liu783 at [0002]. Therefore, a person of ordinary skill in the art would have understood that the chamber is not defined by the outer shell of the battery portion, as required by claims 1 and 13 of the ’981 patent.

72. I understand that Dr. Janet contends that the battery portion is comprised of the combination of the power rod 95 and the connector 92. Ex. 1005

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¶340. Thus, in Dr. Janet's view, the chamber in connector 92 in Liu783's device is part of the battery portion, and hence defined by an outer shell of the battery portion. *Id.* ¶¶338-41. I disagree with Dr. Janet. To the contrary, Liu783 describes the power rod 95 as the portion of the vaporizer device "configured with a storage battery 955" (*i.e.*, the battery portion). Liu783 at [0043]. In my opinion, Liu783 never suggests that the connector 92 is part of the battery portion, or that any portion of the connector 92 contains a battery. In all cases, Liu783 treats the power rod 95 and the connector 92 as separate components. A person of ordinary skill in the art would have thus followed the taxonomy of components as specified in Liu783. As an example, Figure 2 depicts atomizer 91, connector 92, and power rod 95 as the three separate components of Liu783's device:

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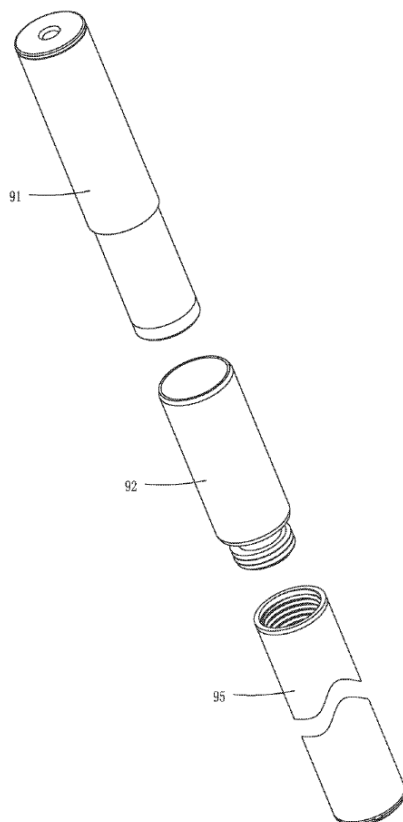


FIG. 2

Id. at Fig. 2.

73. As mentioned earlier in this declaration about claim construction, although the outer shell of the battery portion need not be unitary to define the chamber, the outer shell must be a part of the battery portion, as opposed to a separate component, as required by the plain language of the claims. In my opinion, the specification's discussion of the "battery portion," "outer shell," and "chamber" are consistent with this view. *See, e.g.*, '981 patent at 9:44-46 ("Chamber 108 is defined by outer shell 106 and electrical connector 120."); 6:2-11 (discussing the "outer shell"). Dr. Janet does not cite any contrary intrinsic evidence. Thus, it is my

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opinion that Petitioner and Dr. Janet's apparent claim construction position lacks merit, and Liu783 alone does not disclose "a battery portion having an outer shell and a chamber defined by the outer shell."

2. *Liu783, Alone or in Combination with Any Other Reference, Does Not Render Obvious "a Battery Portion Having an Outer Shell and a Chamber Defined by the Outer Shell"*

74. I understand that Dr. Janet contends that "To the extent that it is argued that Liu738's battery component and connector do not share a common housing or shell, it is my opinion that a POSA would have found it obvious." Ex. 1005 ¶332. Dr. Janet argues that the prior art "This is evident by the many teachings in the prior art that e-cigarette connector components can be formed integrally with battery portion." *Id.* I disagree.

75. As an initial matter, Dr. Janet and Petitioner rely on four additional prior art references that are not part of Ground 1. *See generally* Exs. 1022, 1025, 1035, 1036. Dr. Janet fails to explain how the teachings of any of these references represent the state of the art or the general knowledge of a person of ordinary skill in the art, and I do not agree that they do. Dr. Janet fails to explain how Liu783's device would be modified according to the teachings of the four additional references. Dr. Janet does not provide any motivation for a person of ordinary skill in the art to modify Liu783's device according to the teachings of any of the other four references. Indeed, Dr. Janet does not describe the other four references in any

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level of detail, other than citing a line from each that purportedly discloses a “unitary battery portion.”

76. I do not agree with Dr. Janet’s generalized—not tied to any of the four references—motivations to combine. Dr. Janet alleges that “integrating the battery portion and connector reduces the number of total components needed in the device. Having less components reduces the complexity and expense of manufacturing a device.” Ex. 1005 ¶333. I do not agree. Dr. Janet fails to quantify this benefit, and additionally ignores the cost of redesigning Liu783’s existing device. In my opinion, the cost of such a redesign would be significant, and would not result in an overall reduction in complexity or cost. Moreover, Liu783’s three-piece solution with the intermediate connector 92 was done to reduce manufacturing and use cost: “An object of the present invention is to provide an electronic cigarette having a connector for magnetic connection, to decrease manufacture and use cost of the electronic cigarette, and facilitate the installation, detachment and replacement of the electronic cigarette.” Liu783 at [0003]. Thus, the benefit of “an integrated component” was already achieved in Liu783’s initial design.

77. Dr. Janet further contends that “whether the connector is a separate component or integrated with the battery component is a matter of design choice.” Ex. 1005 ¶333. I disagree. Dr. Janet does not provide any supporting analysis. Dr. Janet cites to Ex. 1036, which is not part of Ground 1. Moreover, a person of

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ordinary skill in the art would have recognized that there are a number of different technical considerations that go into designing connections between components of ENDS devices, and Dr. Janet over-simplifies the analysis. The nature of the other components in an ENDS device influences the nature of any connection between a battery and a cartomizer, and there are numerous possible connecting options, each of which requires careful technical analysis to integrate into a given system.

78. Dr. Janet writes that “integrating the connector with the battery component, [sic] decreases the possibility that the consumer can damage the device during assembly and disassembly.” *Id.* I disagree. Dr. Janet does not quantify this benefit, nor does he cite any evidence identifying this as a real concern. Dr. Janet does not identify any specific assembly/disassembly problem with Liu783’s existing device. Additionally, it is my opinion that Liu783’s device is not unduly susceptible to damage during assembly or disassembly, since Liu783 itself states that “assembly and detachment of the atomizer and the connector become very convenient.” Liu783 at [0019].

79. Dr. Janet argues that “a POSA would have recognized that an integrated connector and battery component provides benefits to the consumer. For instance, with an integrated component, the consumer has fewer pieces to assemble and/or misplace.” Ex. 1005 ¶333. I disagree. Dr. Janet does not quantify this benefit or cite any evidence. In my opinion, this argument also runs directly contrary to

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Liu783's own disclosure, which touts its convenience: "assembly and detachment of the atomizer and the connector become very convenient." Liu783 at [0019]; *see also id.* at [0003] ("An object of the present invention is to . . . facilitate the installation, detachment and replacement of the electronic cigarette.").

80. I understand that Dr. Janet contends that there would be a reasonable expectation of success in modifying Liu783 because the "the connector component simply functions as an extension of the battery component. Integration with the battery component would not interfere with the operation of either component." Ex. 1005 ¶334. I disagree. In my opinion, Dr. Janet oversimplifies the effect of changing the connector on the other aspects of the device. Airflow, electrical and physical connections, and heat dynamics would all be affected and require study.

81. Last, Dr. Janet argues that "it was well-known and common practice for the battery component to connect directly to the atomizer." *Id.* I disagree. Dr. Janet's only citation here is to Ex. 1025, which is not part of Ground 1. I do not believe that citation to one piece of prior art in this context is sufficient to establish whether such a configuration was "well-known and common practice."

B. Liu783 Does Not Disclose Cartomizer Electrical Contacts at the Base of the Chamber

82. I understand that challenged independent claim 1 of the '981 patent requires "a plurality of cartomizer electrical contacts . . . positioned to contact a plurality of battery electrical contacts at a base end of the chamber when the

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cartomizer body is inserted into the chamber.” Similarly, I understand that challenged dependent claim 16 specifies “wherein cartomizer electrical contacts are positioned to contact a plurality of battery electrical contacts at a base end of the chamber when the cartomizer body is inserted into the chamber.”

83. In my opinion, Liu783 does not disclose these limitations because the electrical contact located in connector 92 of Liu783’s device is located “circumferentially” along the inside walls of connector 92 and thus, not at the base end of connector 92. Liu783 at [0042] (“[T]he side wall of the first seat 51 and the inner wall of the connecting casing 921 circumferentially contact with each other to realize conduction therebetween, to thereby achieve corresponding conduction of inner circuits of the atomizer 91 and the connector 92.”). Moreover, as I have discussed earlier in this declaration, the inner volume of connector 92 is not the claimed chamber because it is defined by connector 92 rather than by the outer shell of the battery portion of the device. Thus, even if the contact is assumed to be located at the base end of connector 92 (which it is not), it still would not be located at a base end of a chamber.

84. Dr. Janet states without explanation that the “conductive portion of the inner wall of the connecting casing 921 is the electrical contact” located at the base end of the chamber because “it does the contacting.” Ex. 1005 ¶368. I disagree. Dr. Janet fails to explain how that electrical contact is supposed located at the base end,

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as opposed to the inner wall, of connector 92. To the contrary, a person of ordinary skill in the art would have recognized that that electrical contact is located at the inner wall of connector 92. Indeed, Dr. Janet admits that the “[s]econd seat 61, however, does not directly contact first seat 51 because it is separated from the chamber base by permanent magnet 922.” *Id.* Dr. Janet therefore appears to agree with me that the contacts within connector 92 are not located at the base of end of connector 92, and are hence not located at the base end of any chamber, let alone the base end of the alleged chamber in Liu783.

III. GROUND 2: LIU783, LIU438, TUCKER, AND KNOWLEDGE OF A PERSON OF ORDINARY SKILL IN THE ART DO NOT RENDER CLAIMS 9-10 OR 17-18 OBVIOUS

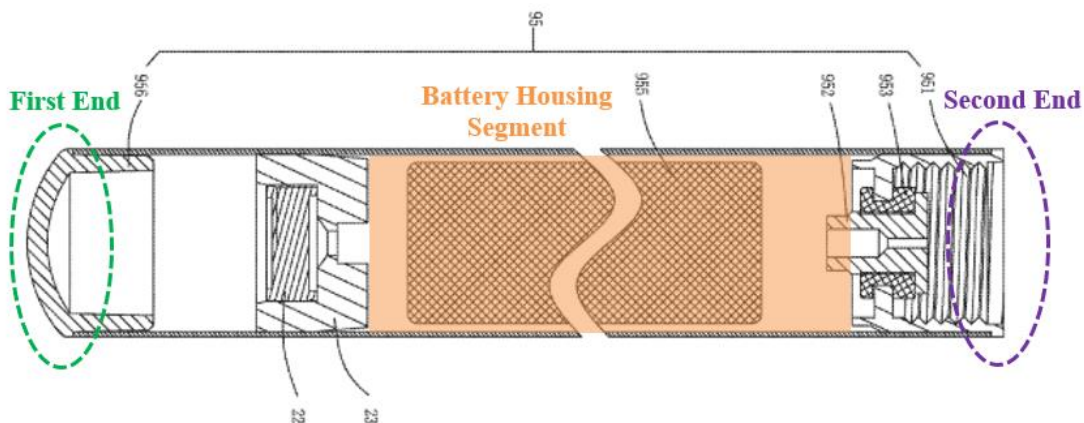
A. Liu783 Does Not Disclose or Render Obvious, Alone or in Combination with Any Other Reference, “the Cartomizer Receiving Segment Comprising a Chamber Defined by an Outer Shell of the Battery Portion” or “Wherein the Cartomizer Body Is Configured for Insertion into a Chamber Defined by an Outer Shell of a Battery Portion of a Vaporizer Device”

85. In my opinion, the combination of Liu783, Liu438, and Tucker does not render obvious these claim limitation for the same reasons as discussed previously in this declaration in the context of Ground 1. A person of ordinary skill in the art would have recognized that Liu783 does not disclose a chamber defined by an outer shell of the battery portion. Instead, a chamber is defined by an outer shell of connector 92, which separately forms the cartomizer receiving segment, outside of the battery portion.

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B. Liu783 Does Not Disclose “a Battery Housing Segment Proximate the First End of the Battery Portion”

86. In my opinion, Liu783 does not disclose this limitation because the cartomizer receiving segment (connector 92) is not part of the battery portion of the device (power rod 95). To the contrary, Liu783’s connector 92 is a separate piece of hardware that threads into the battery portion of the device. Liu783 at [0030] (describing “power rod 95” and “connector 92” as separate components that are “assembled together,” and explaining that, after assembly, “connector 92 is located between atomizer 91 and the power rod 95”). And without extra length supplied by the connector 92, the battery housing segment of the battery portion is closer to the second end of the battery portion than it is to the first end of the battery portion. As shown below in an annotated version of Figure 8, the battery housing portion is thus not proximate to the first end of the battery portion, as required by claim 9:

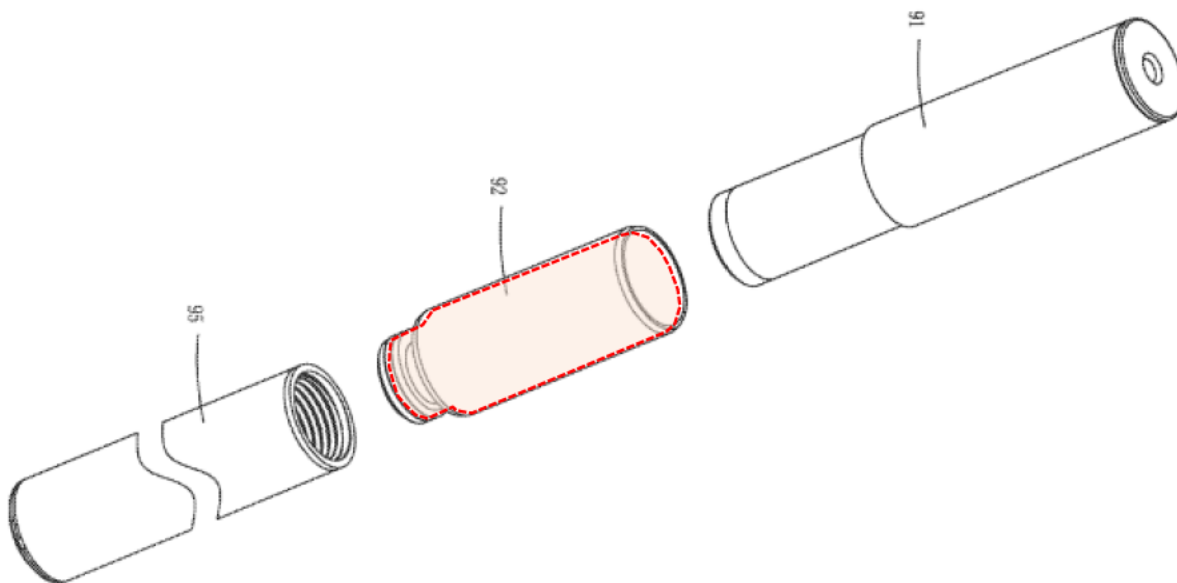


Id. at Fig. 8 (annotated).

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C. Liu783 Does Not Disclose “a Cartomizer Receiving Segment Proximate the Second End of the Battery Portion”

87. In my opinion, Liu783 does not disclose this limitation because the battery portion of its device (power rod 95) does not include the alleged cartomizer receiving segment (connector 92). Rather, as explained earlier in this declaration, the cartomizer receiving segment (connector 92) is a separate component that attaches to the battery portion of the device and can be easily be removed using a threaded connection. For example, in Liu783’s Figure 2, the cartomizer receiving segment identified by Dr. Janet (connector 92) is displayed as a separate component that threads into the battery portion of the device (power rod 95):



Id. at Fig. 2 (annotated).

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88. Dr. Janet fails to explain how the battery portion (power rod 95) comprises the cartomizer receiving segment (connector 92). Instead, Dr. Janet simply assumes that the battery portion includes the cartomizer receiving segment, based on a figure where the two components are assembled using a threaded connection. But Liu783 repeatedly explains that the power rod is the battery portion. And the battery portion does not comprise the cartomizer receiving segment because connector 92 is defined by its own outer shell, rather than by the outer shell of the battery portion.

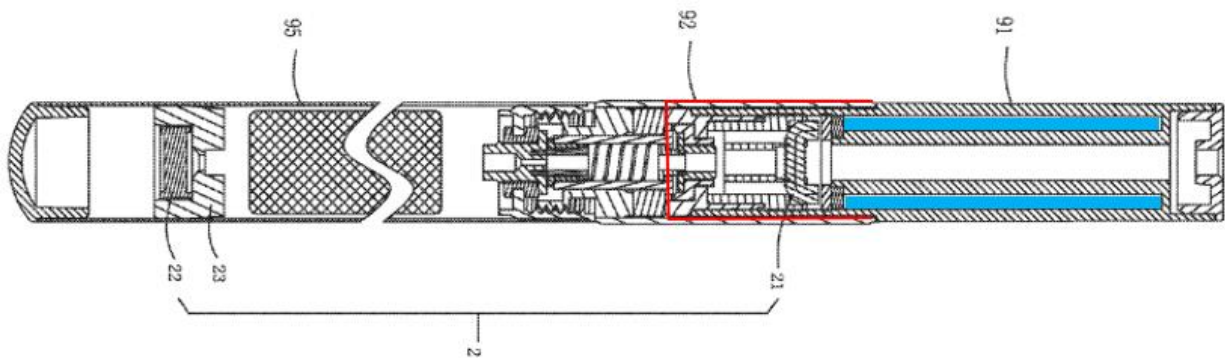
D. Liu783, Liu438, and Tucker Do Not Render Obvious a Window

89. I note that Dr. Janet does not dispute that neither Liu783 nor Liu438, alone or in combination, disclose or render obvious a window provided in the outer shell of the battery portion of the device. Ex. 1005 ¶393 (“Liu783 and Liu483 [sic] in combination discloses a transparent cartridge but does not disclose that the outer shell covering the cartridge includes a window.”). Instead, Dr. Janet relies on Tucker’s disclosure of a window formed on the cartridge used for viewing the amount of liquid remaining in the liquid reservoir. *Id.* ¶394 (“Tucker, on the other hand, teaches the use of a window to view the remaining liquid.”).

90. In my opinion, a person of ordinary skill in the art would not have been motivated to combine Tucker’s disclosure of a window on a cartridge with Liu783’s outer shell, or casing, of the connector because Liu783’s liquid reservoir is located

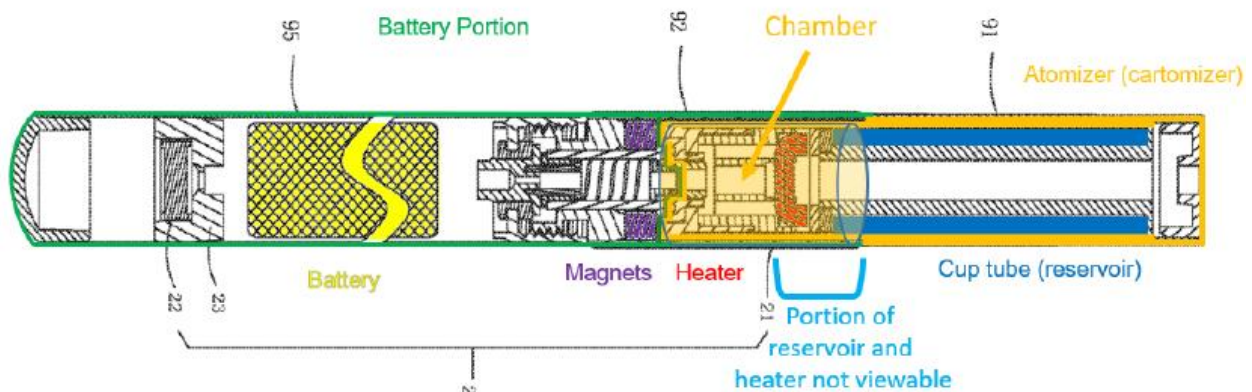
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substantially outside of the chamber defined by connector 92, and would thus allow a viewer to directly view the remaining liquid level without need for a window formed in the outer shell of connector 92:



Liu783 at Fig. 3 (annotated with shell of connector 92 highlighted in red and the vaporizable fluid highlighted in blue).

91. I further note that Dr. Janet suggests that window should allow viewing of the wicking and heating elements in addition to an insubstantial portion of the liquid reservoir located below the insertion edge of connector 92, as shown below in Petitioner's annotated version of Figure 3:



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Pet. 47 (Petitioner's annotation of Liu783's Fig. 3). I disagree. Dr. Janet fails to provide any motivation as to why a smoker would want to see the wicking or heating elements. Dr. Janet has provided no indication that the heater or wicking elements would provide any indication of liquid level, and the overwhelming majority of the liquid supply reservoir is already visible in Liu783's device. Moreover, Dr. Janet does not explain how adding Tucker's window near the heating element in Liu783's device could withstand the heat generated by the heating element, and in my opinion it could not. Nor does Dr. Janet address how the wicking and heating elements could be viewed through Tucker's window when they would likely be blocked by a heat shield or other opaque material to prevent damage to the cartomizer body.

92. Dr. Janet cites to an additional reference that is not part of Ground 2 for the proposition that a user would need to monitor the very bottom portion of the liquid reservoir to "prevent an empty burning of the heating wire after the liquid smoke has run out." Ex. 1005 ¶397 (citing Ex. 1030 at 4:32-35). I disagree. A user would best be able to prevent "empty burning of the heating wire" by ceasing use of the device before the liquid reservoir is completely depleted, and thus would not need to view the amount of liquid remaining in the last several millimeters of the liquid reservoir. Plus, the argument that the remaining liquid when the reservoir is nearly depleted would necessarily accumulate near the heater is incorrect. Any liquid will be at the lowest point in the cartomizer relative to gravity. If the

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cartomizer were horizontal, the liquid would lay along the bottom length of the cartomizer and easily visible. If the cartomizer were held with the mouthpiece end down relative to gravity, the liquid would pool near the mouthpiece end and, again, be readily visible. Thus, a cartomizer body formed of a translucent material (with the liquid supply reservoir almost completely exposed) would not need to be combined with a window on the outer wall of connector 92, to purportedly prevent such a situation from arising.

93. Moreover, adding Tucker's window to the outer wall of connector 92 would increase manufacturing costs and complexity, both of which would deter anyone from making modifications to any device. It is my opinion that a person of ordinary skill in the art would be dissuaded from adding Tucker's window to Liu783's device due to the commensurate increase in cost and complexity, particularly given Liu783's emphasis on reasonable cost and simplicity.

94. Finally, I note that, in the combination proposed by Dr. Janet and Petitioner, the window would be formed on connector 92, not an outer shell of the battery portion of the device because connector 92 is not part of the battery portion of device. Therefore, even the proposed combination would not render the relevant claim language obvious.

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E. Liu783 Does Not Disclose or Render Obvious, Alone or in Combination with Any Other Reference, Coplanar Battery Electrical Contacts (Claim 17)

95. I understand that challenged independent claim 17 of the '981 patent requires a battery portion comprising “battery electrical contacts for completing a circuit with the cartomizer electrical contacts when the cartomizer electrical contacts are received into the chamber, the battery electrical contacts being coplanar.”

96. As I previously explained, it is my opinion that Liu783 does not disclose a chamber of a cartomizer receiving segment defined by an outer shell of the battery portion of the device. That in turn means that the cartomizer electrical contacts could not be received by a chamber of the battery portion because the chamber that receives the cartomizer is part of connector 92 rather than the battery portion.

97. Additionally, it is my opinion that, even if it connector 92 could form a chamber of the battery portion, Liu783 does not disclose this limitation because the battery electrical contacts located in the chamber of connector 92 are not coplanar. A person of ordinary skill in the art would have understood that coplanar refers to surfaces that lie on the same plane. Dr. Janet cites to 7:31-34 of the '981 patent, which is consistent with this interpretation because it refers to “aligned” (*i.e.*, on the same plane) surfaces as “coplanar.” Ex. 1005 ¶446. I disagree with Dr. Janet when he argues that any two contacts are coplanar: “because Liu783 discloses only two

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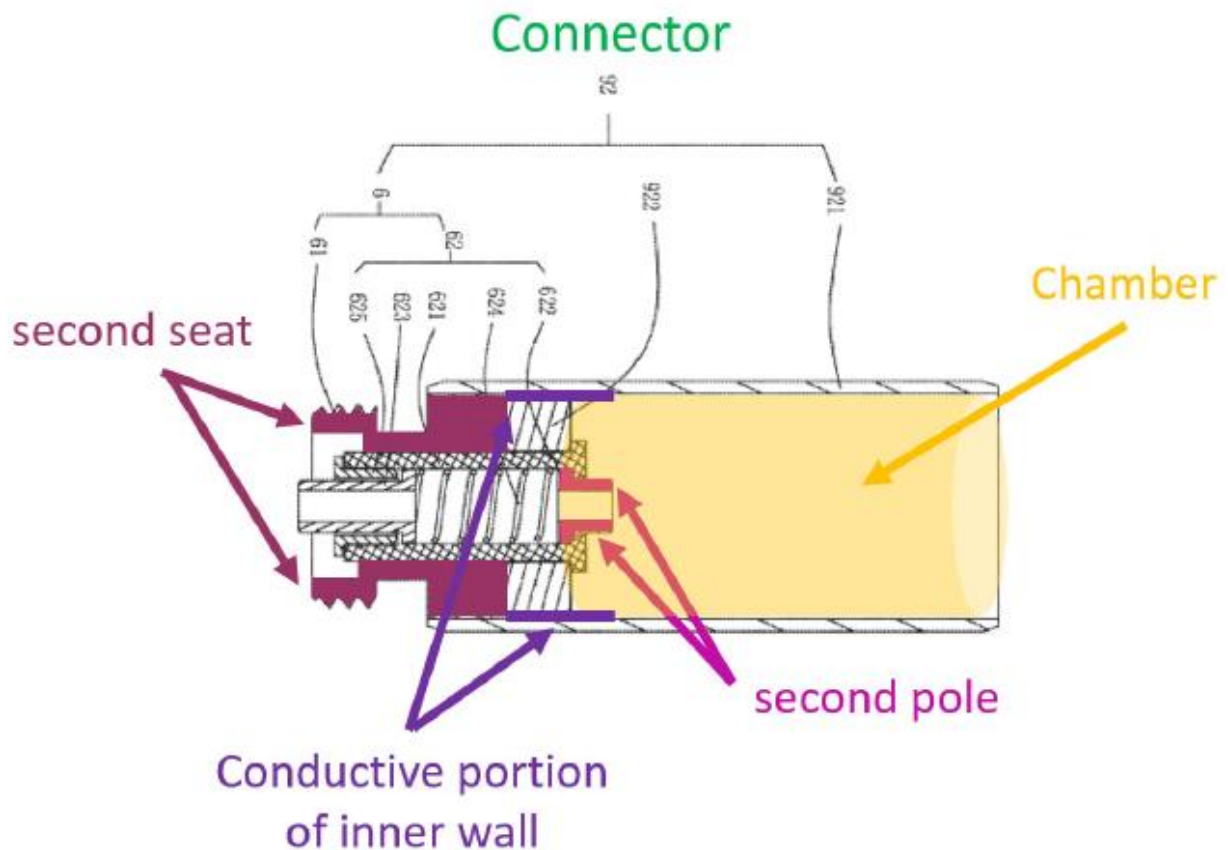
battery contacts, and two points always fall on a plane, Liu783's contacts are coplanar." *Id.* ¶447.

98. First, while two points may fall on the same plane, by definition two points define a line and a line can fall on an infinite number of planes. A plane needs at least three points to be defined. As such, the two asserted points themselves do not define a surface that falls on the same plane.

99. Second, a point is a mathematical concept used to describe an infinitesimally small discrete position in space, not the surface of an object. The battery electrical contacts in Liu783's device are not abstract mathematical concepts. They are objects in physical space with dimensions, surfaces, and orientations. A person of ordinary skill in the art would have understood that flat tabs, for example, will only be considered coplanar when their length and width dimensions (perpendicular to its thickness dimension) fall on the same plane.

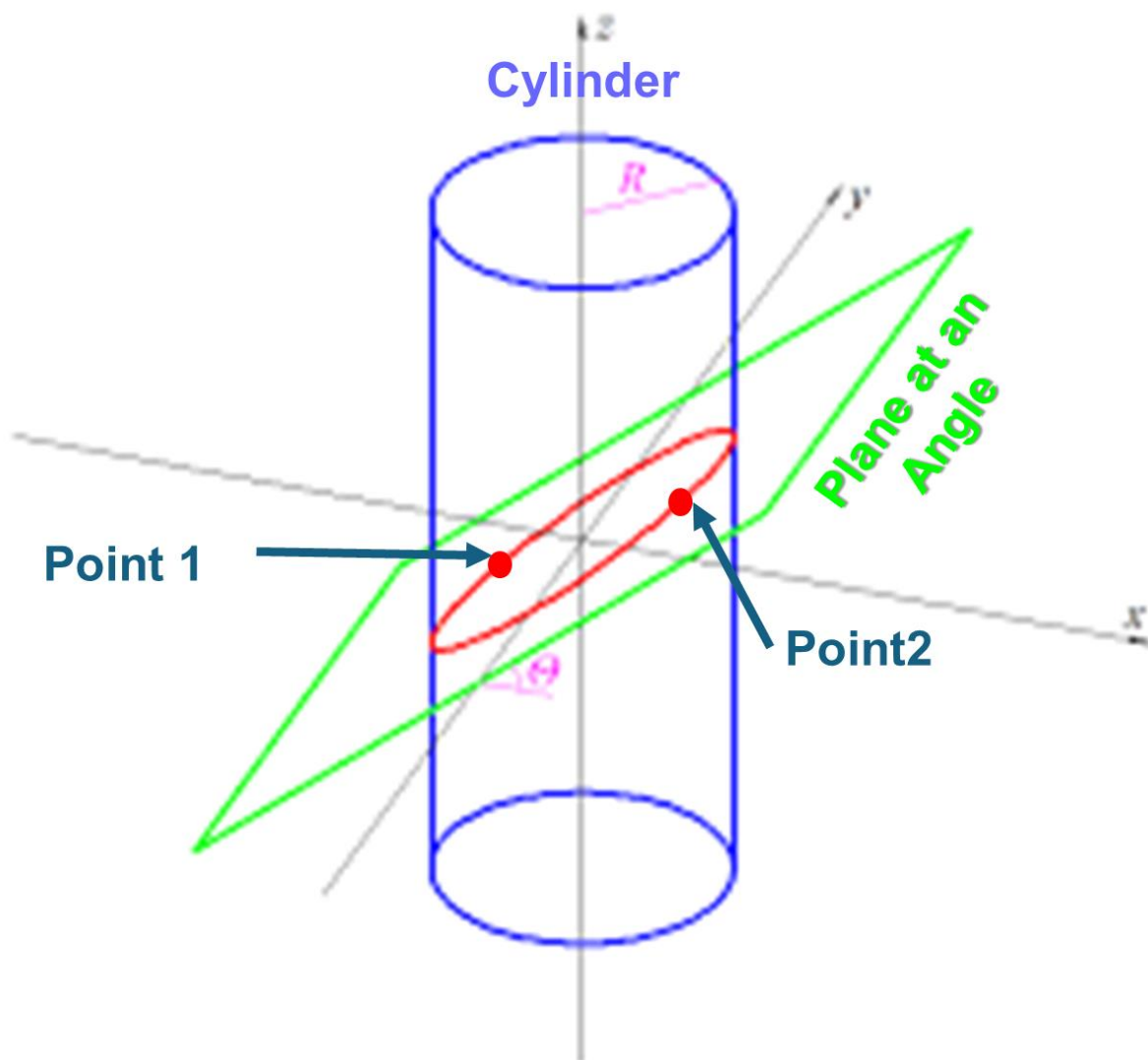
100. Third, Petitioner and Dr. Janet assume that any two surfaces that intersect the same plane are coplanar. As shown below in Petitioner's annotated version of Liu783's Figure 7, Petitioner and Dr. Janet assume that cross sections of the inner wall of connector 92 and second pole are coplanar because they are intersected by a single plane that defines the cross section:

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Pet. 62 (Petitioner’s annotation of Liu783’s Fig. 7). In my opinion, this position renders the “coplanar” claim term meaningless, because a plane can be found in any 3D object on which any two points fall. For example, as shown in the illustration below, two points on the surface of a cylinder are shown which are angularly and axially offset:

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A plane can be drawn on which those two points will fall, no matter where they are. However, a person of ordinary skill in the art would never consider Point 1 and Point 2, which are on the surface of a cylinder but offset angularly and axially, as being “coplanar” as Petitioner and Dr. Janet contend.

101. Alternatively, Dr. Janet argues that if coplanar was understood to refer to two surfaces that fall on the same plane, such a configuration would be obvious because surfaces forming “electrodes could easily be arranged to be flat.” Ex. 1005

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¶401. Dr. Janet describes several alternative arrangements where the contacts disclosed by Liu783 could purportedly be modified to be coplanar. *Id.* ¶¶400-04. I disagree. In my opinion, Dr. Janet does not properly assess the difficulty in forming electrical circuits between planar surfaces. For example, a person of ordinary skill in the art would have had difficulty implementing structures such as springs, pogo pins, and bent tabs that would have to be used to ensure a robust electrical connection at the compact interface between the cartomizer electrical contacts and the battery electrical contacts. In my opinion, implementation of such systems would be especially difficult in the arrangement disclosed by Liu783, where both the battery and cartomizer electrical contacts are concentric between the cartomizer and connector portion of the device. Thus, a person of ordinary skill in the art would not have had a reasonable expectation of success implementing a system that could maintain robust electrical connection between coplanar contacts that are concentric in the device disclosed by Liu783.

102. Dr. Janet next argues that a person of ordinary skill in the art could have easily implemented coplanar electrical contacts because the magnets at the base of connector 92 could serve a dual purpose as both a connection means and an electrical contact interface. Ex. 1005 ¶402. I also disagree with this aspect of Dr. Janet's opinion. To the contrary, a person of ordinary skill of art would have known that permanent magnets are not typically good conductors. Most permanent magnets are

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made from materials like iron, nickel, cobalt, or their alloys. These materials are ferromagnetic, meaning they can be magnetized and retain their magnetization. However, they are not particularly good conductors of electricity compared to materials like copper or aluminum. A person of ordinary skill in the art would therefore not use a permanent magnet as a conductor as this would drain the battery much faster. Rather, it is standard design practice to avoid using magnets as both a fastening and conducting means. For all of these reasons, it is my opinion that a person of ordinary skill in the art thus would not have had any reasonable expectation of success implementing coplanar electrical contacts made of magnets or contacts that are arranged above magnets. Further, this is supported by Liu783's teaching to not use the magnets as electrical conductors.

VI. GROUND 3 FAILS FOR THE SAME REASONS AS GROUND 1

103. Ground 3 of the petition challenges claim 8, which depends on claim 1 (challenged in Ground 1), and uses the same base references as Ground 1—Liu783 and Liu438. The addition of Zheng does not remedy the deficiencies of Liu783 and Liu438 with respect to claim 1. Therefore, in my opinion, Ground 3 fails for the same reasons I discussed above with respect to Ground 1.

VII. GROUND 4: THORENS788 AND THORENS231 DO NOT RENDER OBVIOUS CLAIMS 1, 2, OR 13-16

104. It is my opinion that Petitioner and Dr. Janet have not established a motivation for a person of ordinary skill in the art to combine Thorens788 with

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Thorens231 in order to modify Thorens788's device to achieve the challenged independent claims. It is further my opinion that Petitioner and Dr. Janet have also not established a reasonable expectation of success in making the proposed combination.

A. Thorens788 and Thorens231 Do Not Render Obvious a Mouthpiece

105. I understand that challenged independent claims 1 and 13 each specify “a mouthpiece at or proximate to the mouthpiece end, the mouthpiece in fluid communication with the inhalation tube.” I further understand that Dr. Janet concedes Thorens788 does not have a mouthpiece, and instead relies on a modification of Thorens788 according to the teachings of Thorens231 to render obvious these limitations. Ex. 1005 ¶¶464-67.

106. In my opinion, a person of ordinary skill in the art would not have found it obvious to combine Thorens788 and Thorens231 in the manner suggested by Petitioner and Dr. Janet.

107. It is my opinion that Petitioner and Dr. Janet have not established either a motivation to combine Thorens788 with Thorens231, or a reasonable expectation of success. I note in particular that Petitioner and Dr. Janet do not even contend that the modification would be performed with a reasonable expectation of success, which I understand is a required and indispensable element of showing obviousness.

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108. First, I understand that Dr. Janet argues that “Thorens788 already discusses a mouthpiece housing, and it would have been natural for a POSA to consider Thorens231, which is directed to substantially the same invention and shares common inventors with Thorens788.” Ex. 1005 ¶467. I disagree. Neither Petitioner nor Dr. Janet have actually established that the two references are “substantially the same invention.” Indeed, they are meaningfully different, particularly in the mouthpiece aspect, as well as the position of the alleged heating element and alleged wicking element.

109. I understand that Dr. Janet’s declaration devotes three paragraphs to the contention that Thorens788 and Thorens231 “are directed to substantially the same device.” *Id.* ¶¶464-66. But these paragraphs simply cite portions of the two references without analysis. I disagree that anything cited by Dr. Janet establishes that Thorens788 and Thorens231 “are directed to substantially the same device.”

110. Second, I understand that Dr. Janet argues that “a POSA would have been motivated to modify Thorens788’s smoking system to incorporate a mouthpiece housing because Thorens788 discloses that its mouthpiece is replaceable, and without a housing to protect the heating element, a consumer would have to pull on the heating element to remove the mouthpiece, which may burn the consumer if the heating element is not completely cooled down and also is an inconvenience and unsanitary.” *Id.* ¶ 467. However, I note that neither Thorens788

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nor Thorens231 mention any such potential burn injury or related defect with their devices' structure. Furthermore, a person of ordinary skill in the art would have understood that concern for potential burns from the heating coil would counsel in favor of merely enclosing or protecting the heating coil in some manner, not providing a cartomizer body with all of the various claimed limitations that Petitioner and Dr. Janet concede are not disclosed by Thorens788.

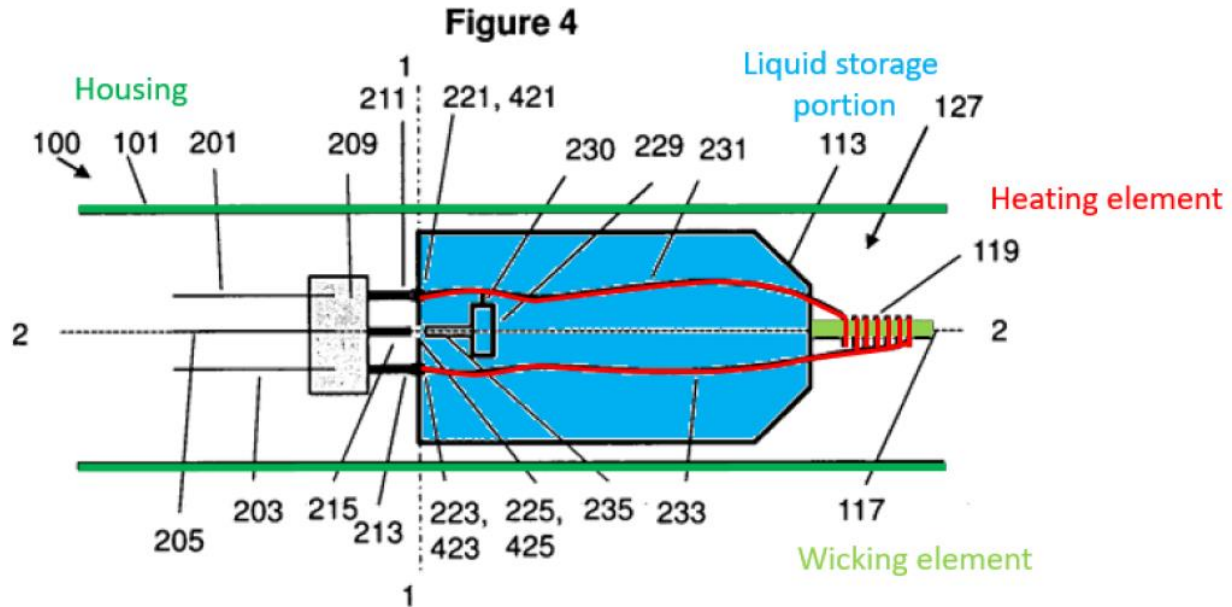
111. I believe that it is important to note that neither the Petition nor Dr. Janet's declaration contain any allegation, much less analysis or explanation, that a person of ordinary skill in the art could have made the proposed mouthpiece modification to Thorens788's device with a reasonable expectation of success.

112. In my opinion, there are several additional reasons why a person of ordinary skill in the art would not have been motivated to modify Thorens788's device to add Thorens231's mouthpiece as Dr. Janet suggests, and would not have a reasonable expectation of success in doing so.

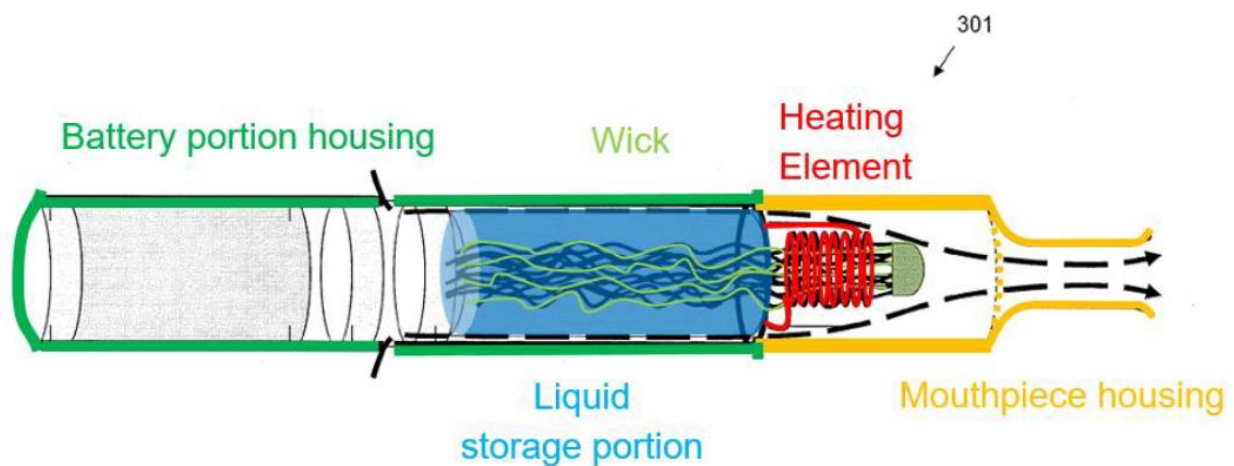
113. First, Petitioner and Dr. Janet do not take into account the different form factors and structural configurations of the separate devices described in Thorens788 and Thorens231. Petitioner and Dr. Janet do not address how modifying Thorens788's device to include a mouthpiece would affect the performance or functionality of the modified device. A person of ordinary skill in the art would have recognized that the two devices have the heating elements located at different

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positions from the sides of the device enclosures. This difference is clearly visible from Petitioner's own annotations to the figures for each reference:



EX1004, Fig. 4



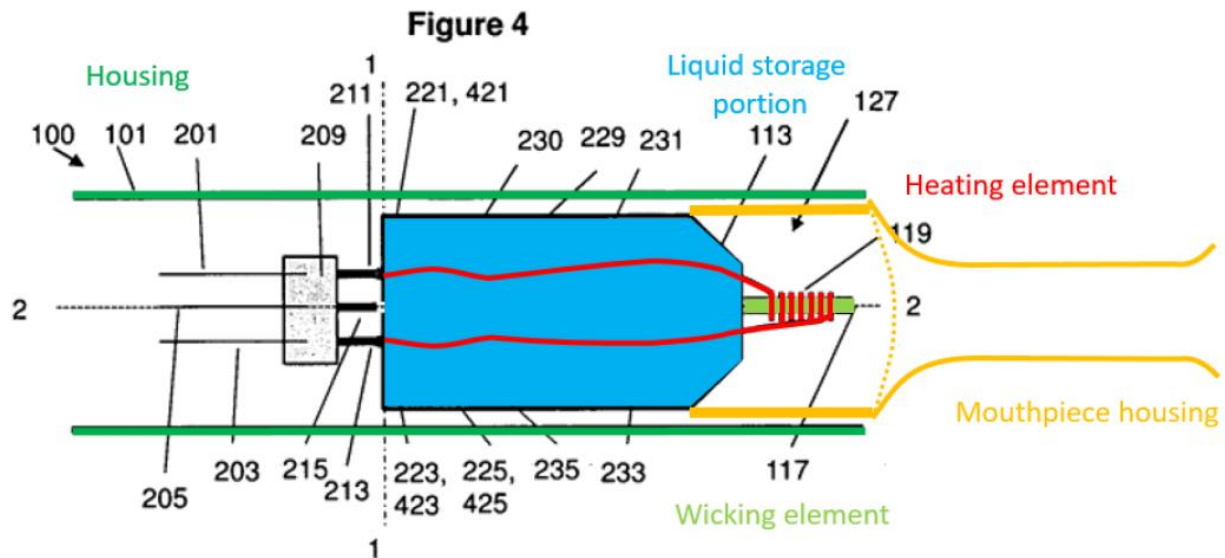
EX1002, Fig. 3.

Petition at 63-64.

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114. Importantly, the size of the heating element for each device is correlated to energy consumption, rate of liquid consumption, temperature of vapor, amount of vapor, particle size of the aerosol, materials selection, battery life, and airflow of each device, all of which the Petitioner and Dr. Janet fail to consider. The devices also have significantly different wick placements, which a person of ordinary skill in the art would know changes the characteristics of the device, such as the air flow path, draw resistance, placement of components, and similar factors. Moreover, the heating element for Thorens788 is located within the housing of the device, while the heating element for Thorens231 is located outside of the housing and within the mouthpiece. However, Petitioner and Dr. Janet do not discuss how the air would flow in the modified device after the addition of the mouthpiece. I note in particular that Petitioner's annotated Figure 4 appears to depict blocking any airflow through the device and out of the mouthpiece. Petitioner and Dr. Janet do not explain how the mouthpiece would be attached to the liquid storage portion in Thorens788. Furthermore, as drawn by the Petitioner, the wicking element touches what is presumably the air inlet for the mouthpiece, which a person of ordinary skill in the art would understand could negatively affect performance or user experience, such as draw resistance:

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Pet. 65 (Petitioner’s annotation of Thorens788 Fig. 4 with the addition of yellow “Mouthpiece housing” transplanted from Thorens231 Fig. 3). Additionally, assuming the mouthpiece is attached to the liquid storage portion, Petitioner’s depiction of the combined device has no path for air to flow into the area surrounding the heating element.

115. Second, in my opinion a person of ordinary skill in the art would have been cognizant that Thorens231 claims that one of the benefits of its invention is that “because the replaceable mouthpiece contains the at least one heating element, the liquid storage portion of the wick, all elements which are potentially in contact with the liquid are changed when the mouthpiece is replaced.” Thorens231 at 2:11-15. According to Thorens231, this means that “there will be no cross-contamination in the shell between different mouthpieces, for example ones using different liquids.” *Id.* Thorens231 further states that “the mouthpiece structure means that

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there is a low risk of leakage from the liquid storage portion, which is not the case for many of the electrically heated smoking systems,” and that “if the mouthpiece is replaced at suitable intervals, there is little chance of the heating element becoming clogged with liquid.” *Id.* at 2:22-30. However, it is important to note that all of these advantages described by Thorens231 are specifically related to the location and configuration of the mouthpiece in Thorens231’s device, and Thorens788’s device. Petitioner and Dr. Janet do not discuss how the proposed modification of incorporating Thorens231’s mouthpiece into Thorens788’s device could provide the same advantages that Thorens231 describes.

116. Third, it is my opinion that a person of ordinary skill in the art would not have a reasonable expectation of success in making the proposed changes to Thorens788’s device. Altering the mouthpiece would necessitate substantial design and analysis efforts, including modifications to the electrical connections of the pressure sensor and battery. Such changes would require a comprehensive redesign of the device’s airflow, which is extremely complex and the subject of extensive research in the development of e-cigarettes. Achieving the correct airflow, connections, and fit is crucial, as the objective is to simulate the experience of using a traditional cigarette. Draw resistance is a critical factor that is notoriously challenging to perfect, as it is well-known among those skilled in the art. Draw resistance influences vapor production, the size of the visible vapor cloud, throat hit,

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and the particle size of the aerosol. All of these factors must be meticulously adjusted to ensure a satisfactory user experience. However, modifying Thorens788's device as proposed by Petitioner and Dr. Janet would disrupt these parameters, potentially compromising the user experience and, at the very least, necessitating significant analysis to restore the balance following any alterations. A person of ordinary skill in the art would recognize that these changes are not straightforward, but rather intricate. A person of ordinary skill in the art would not be able to implement the proposed modifications with a reasonable expectation of success. Instead, they would anticipate considerable additional work to evaluate the proposed changes.

F. Thorens788 and Thorens231 Does Not Render Obvious a Translucent Cartomizer Body

117. I understand that challenged independent claim 1 requires that at least a portion of the claimed cartomizer body comprises “a translucent material configured to allow viewing of the fluid vaporizable substance.”

118. It is important to note at the outset that Thorens788 teaches away from a translucent cartomizer body. It states that liquid storage portion is preferably opaque, as this limits degradation of the liquid by light. Thorens788 at 7:26-27 (“Preferably, the container is opaque, thereby limiting degradation of the liquid by light.”). In my opinion, this is a strong indication to a person of ordinary skill in the

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art that that Petitioner and Dr. Janet's proposed combination does not render these limitations obvious.

119. Moreover, Thorens788's instruction to use an opaque container makes technical sense. A person of ordinary skill in the art would know that, without countermeasures, light (or heat, oxygen, or moisture) may alter the liquid, such as making it spoil faster than normal. In turn, this affects how the liquid is vaporized, the performance of the device, and user experience. Dr. Janet contends that the liquid could be protected "by using a tinted glass," Ex 1005 ¶487. I disagree. In this context, depending on the degree of tint, glass could still allow too much light into the container, and light degradation may still occur; and Dr. Janet provides no evidence of how much light or tint would be allowed.

120. I note that Dr. Janet appears to consider Thorens788's clear expression of preference for opacity to also be a disclosure of translucency. Ex. 1005 ¶485 ("While Thorens788 discloses that the container of the liquid storage portion is preferably opaque, a POSA would have understood the preference to mean that the container may be optionally not opaque (*i.e.*, translucent)."). I disagree. This interpretation does not accord with plain English, or the technical considerations present in Thorens788. A person of ordinary skill in the art would follow Thorens788's direction to use an opaque liquid storage rather than do the opposite.

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I do not believe that Thorens⁷⁸⁸'s explicit preference for opacity could somehow be read to suggest translucency.

121. I further understand that Dr. Janet contends that because the combination reference Thorens²³¹ states that the cartridge can be glass, it necessarily means that it is translucent. Ex. 1005 ¶486. I do not agree. In my opinion, a person of ordinary skill in the art would have understood that there are many types of glass or plastics that are opaque, and may have labels covering them to make a wall even made of clear glass opaque, and these would also be suitable for the Thorens²³¹'s devices. Notably, Thorens²³¹ does not describe its device's cartridge as translucent. Nor does it list any benefits to a translucent cartridge. Thorens²³¹ teaches that the wall materials should be acceptable for use in the pharmaceutical or food industries because of their ability to hold liquid. Thorens²³¹ at 7:34-35. The advantages cited by Dr. Janet are therefore not expressed in the references themselves, and I do not agree that they exist. The advantages run directly contrary to other guidance in the references. For example, Dr. Janet contends that a person of ordinary skill in the art would have been motivated to use a translucent container so that a consumer can more easily refill the cartridge, but that ignores Thorens⁷⁸⁸'s teaching that the "liquid storage portion is arranged to hold liquid for a pre-determined number of puffs." Thorens⁷⁸⁸ at 7:26-31. Additionally, I understand that Petitioner concedes in the context of Ground 6 that this advantage is

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not actually present in the proposed combined device. Pet. 98 (“The advantages of a translucent container, however, are mitigated by Thorens788’s housing 101, which extends to cover the entirety of the liquid container when the cartomizer is inserted into the housing.”).

G. Thorens788 and Thorens231 Do Not Render Obvious “an Inhalation Tube in Fluid Communication with the Heating Element and the Wicking Element”

122. I do not agree that a person of ordinary skill in the art would modify Thorens788’s device to add an inhalation tube. I note that Dr. Janet does not contend that Thorens788 discloses an inhalation tube. Dr. Janet also does not explain how Thorens788’s device would be modified to add Thorens231’s purported inhalation tube and does not identify any motivations to combine the references to accomplish the modification, nor does Dr. Janet contend that the modification could be performed with a reasonable expectation of success.

123. Moreover, in my opinion, all of the issues with Dr. Janet’s proposed mouthpiece modification discussed earlier would apply here as well. I note that the inhalation tube plays a critical role in the process of converting the vapor into an aerosol as it travels and mixes with air to cool and form an aerosol. Many competing considerations go into the design of an inhalation tube, and in my opinion a person of ordinary skill would not be able to simply transplant Thorens231’s purported inhalation tube into Thorens788’s device without undue experimentation and costly

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engineering work. This would dissuade a person of ordinary skill in the art from making the proposed modification.

124. It is also important to note that there is no inhalation tube present in Thorens231. A person of ordinary skill in the art reading Thorens231 and studying its figures would have understood that Thorens231 only describes, at most, an air flow path, not a separate inhalation tube. None of Dr. Janet's analysis for this limitation identify an inhalation tube, and a person of ordinary skill in the art would know that an "aerosol forming chamber" or "air outlet" is not the same thing as an inhalation tube. Dr. Janet appears to contend that Thorens231's "aerosol forming chamber" is an inhalation tube. Ex. 1005 ¶497 (citing Thorens231 at 5:63-64). But nothing in that cited section indicates that the "aerosol forming chamber" is an inhalation tube, and the name suggests that it is a chamber, not a tube. The aerosol is formed in the "aerosol forming chamber," which is where the heater is located and the vapor is created. The aerosol goes directly from the aerosol forming chamber through the mouthpiece to the smoker. In my opinion, a person of ordinary skill in the art would have recognized that the structure and function of the "aerosol forming chamber" in Thorens231 are distinct from an inhalation tube. It is clear that there is no inhalation tube described in Thorens231.

VIII. GROUND 5 FAILS FOR THE SAME REASONS AS GROUND 4

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125. Ground 5 of the petition challenges dependent claim 5, which depends from independent claim 1 challenged in Ground 4, and uses the same base references as Ground 4 (Thorens788 and Thorens231). The additional Levin reference does not correct any of the issues that I identified in the context of Ground 4. Therefore, in my opinion, Ground 5 fails for the same reasons I discussed above with respect to Ground 4.

IV. GROUND 6: THORENS788, THORENS231, AND TUCKER DO NOT RENDER OBVIOUS CLAIMS 9-11 OR 17-18

A. Thorens788, Thorens231, and Tucker Do Not Render Obvious a Translucent Cartomizer Body (Claim 9)

126. I understand that challenged independent claim 9 requires that at least a portion of the claimed cartomizer body comprises “a translucent material configured to allow viewing of the fluid vaporizable substance.” I understand that Petitioner contends that Thorens788 discloses this limitation, or in the alternative renders it obvious in combination with Thorens231. Pet. 78, 100. Petitioner does not rely on any aspect of Tucker for this limitation. Therefore, for the reasons given above in the context of Ground 4 and the similar limitation of claim 1, “wherein at least a portion of the cartomizer body comprises a translucent material configured to allow viewing of the fluid vaporizable substance,” the combination of Thorens788, Thorens231, and Tucker does not render this limitation obvious.

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B. Thorens788, Thorens231, and Tucker Do Not Render Obvious a Window (Claims 9 and 17)

127. I understand that challenged independent claim 9 of the '981 patent requires a cartomizer receiving segment defined by an outer shell of the battery portion, “wherein a window is provided in the outer shell, and wherein the translucent portion of the cartomizer body aligns with the window when the cartomizer body is inserted into the chamber.” I further understand that challenged independent claim 17 requires “an outer shell forming at least part of the chamber, wherein a window is formed in the outer shell to permit viewing of the cartomizer body when the cartomizer body is received into the chamber.” In my opinion, the combination of Thorens788, Thorens231, and Tucker does not render this limitation obvious.

128. I note that Dr. Janet concedes that Tucker’s window is on the cartridge, but as discussed earlier in this declaration, both Thorens references expressly teach that liquid storage portions are opaque so that light degradation is minimized. However, Petitioner and Dr. Janet’s proposed combination would modify both the housing and liquid storage portion of Thorens788, which both Thorens788 and Thorens231 teach against.

129. A person of ordinary skill in the art would have recognized that Tucker also counsels against the risk of liquid degradation. Tucker states that its “outer tube 6 is not clear, the liquid supply reservoir 22 is protected from light so that the risk of

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degradation of the liquid material is significantly reduced.” Tucker at [0062]. “Thus, a high level of shelf-life and cleanliness can be maintained.” *Id.* In my opinion, Tucker therefore teaches away from being combined with Thorens788 and Thorens231 in the manner suggested by Petitioner and Dr. Janet.

130. I additionally note that Dr. Janet does not provide any motivation to combine or reasonable expectation of success other than a cross-reference to Ground 2, where Liu783 was the base reference. Ex. 1005 ¶539. And for the same reasons that I provided when I addressed that issue, the combination would not have been obvious.

C. Thorens788, Thorens231, and Tucker Do Not Render Obvious a Mouthpiece (Claim 17)

131. I understand that challenged independent claim 17 specifies “a mouthpiece at or proximate to the mouthpiece end, the mouthpiece in fluid communication with the inhalation tube.” Dr. Janet only relies on his analysis of the combination of Thorens788 and Thorens231 for a similar limitation of claim 1 in Ground 4 (but mislabels the cross-reference as “Ground 5, limitation [1.I]”). Ex. 1005 ¶568. Dr. Janet does not rely on any aspect of Tucker for this limitation. Therefore, for the reasons I provided above, in the context of Ground 4, it is my opinion that the combination of Thorens788, Thorens231, and Tucker does not render this limitation obvious.

IX. GROUND 7 FAILS FOR THE SAME REASONS AS GROUND 4

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132. Ground 7 of the petition challenges dependent claim 8, which depends from independent claim 1 challenged in Ground 4, and uses the same base references as Ground 4 (Thorens788 and Thorens231). The additional Zheng reference does not correct any of the issues that I identified in the context of Ground 4. Therefore, in my opinion, Ground 7 fails for the same reasons I discussed above with respect to Ground 4.

X. SECONDARY CONSIDERATION OF NON-OBVIOUSNESS

133. In my opinion, there is strong, objective evidence that the '981 patent is not obvious. Patent Owner JUUL Labs, Inc. ("JLI") successfully manufactured and sold electronic cigarette devices that embody, and in fact are coextensive with, the '981 patent. These products comprised a JUUL Device and various removable JUULpod cartridges that could be inserted into a JUUL Device. Together, JLI marketed these products as the JUUL System.

134. As I explain below, the JUUL System met the long-felt need for a nicotine alternative to conventional combustion cigarettes. The JUUL System unexpectedly met this need by declining to use cigarette iconography and instead focusing on modularity and a system that would provide the best user experience. As a result, the JUUL System received significant industry praise and commercial success, raising its market share to over 70% within a few years. The success of the JUUL System also led to copying by competitors, including by Petitioners and

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Petitioners' parent company, Altria Group, Inc ("Altria") (f/k/a Philip Morris), whom I understand is a real party-in-interest.

A. Nexus

135. In my opinion, the JUUL System is coextensive with at least claim 1 of the '981 patent and therefore I understand it is assumed there is a nexus between the '981 patent and the objective evidence relating to the JUUL System. As I show below, the JUUL System embodies claim 1 of the '981 patent.

1. 1[pre]: A vaporizer device comprising:

136. In my opinion, the JUUL System is a vaporizer that [REDACTED]

[REDACTED]

[REDACTED]”:

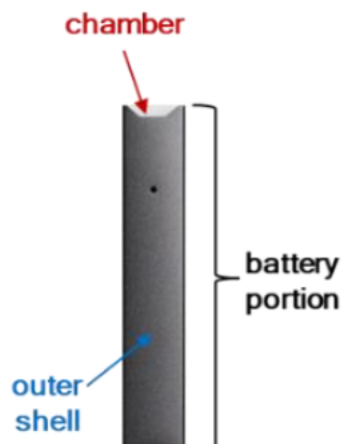
[REDACTED]

Ex. 2003, 9, 11.



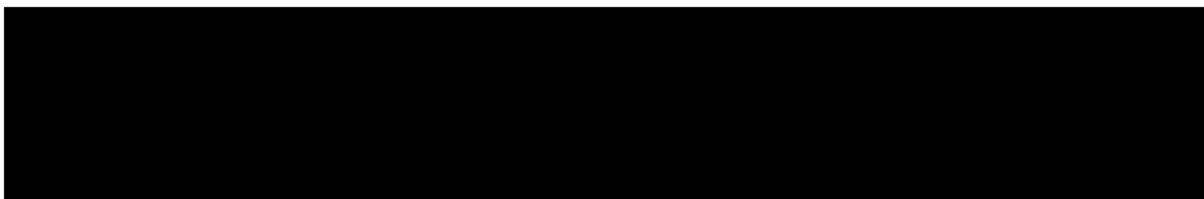
Ex. 2054 (annotated).

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Ex. 2055 (annotated).

137. In addition, the JUUL System is a vaporizer:

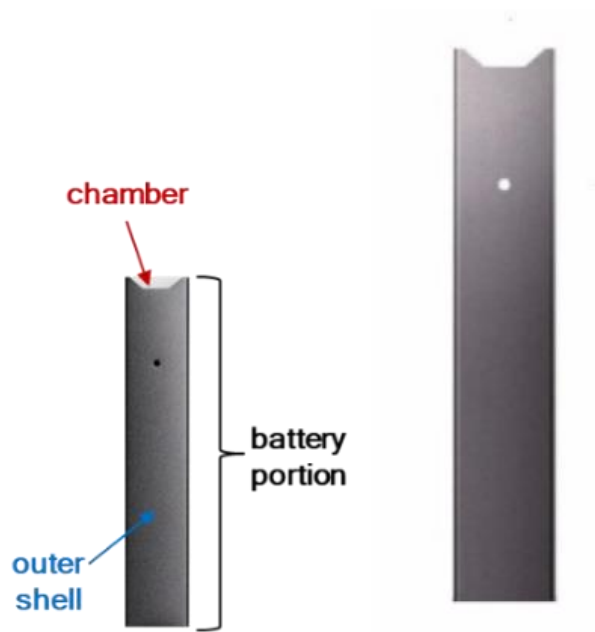


Ex. 2003, 11.

2. 1[a]: a battery portion having an outer shell and a chamber defined by the outer shell; and,

138. In my opinion, the JUUL System comprises a battery portion having an outer shell and a chamber defined by the outer shell. The JUUL System's battery portion is shown below:

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Ex. 2055 (annotated); Ex. 2003, 11.

3. 1[b]: a cartomizer having a mouthpiece end and an insertion end disposed opposite the mouthpiece end, the cartomizer comprising:

139. In my opinion, the JUUL System comprises a cartomizer having a mouthpiece end and an insertion end disposed opposite the mouthpiece end. The JUUL System's cartomizer is depicted below:

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Ex. 2005 (annotated).

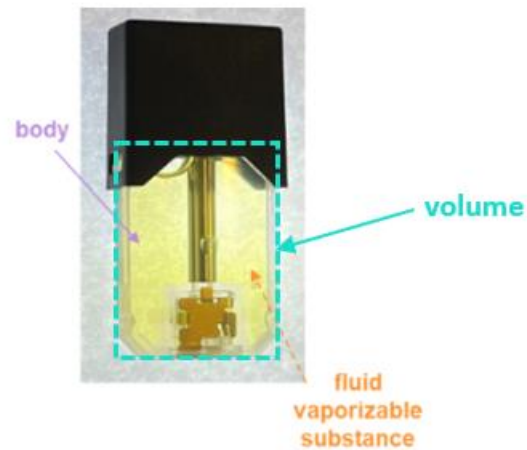


Ex. 2003, 26 (annotated).

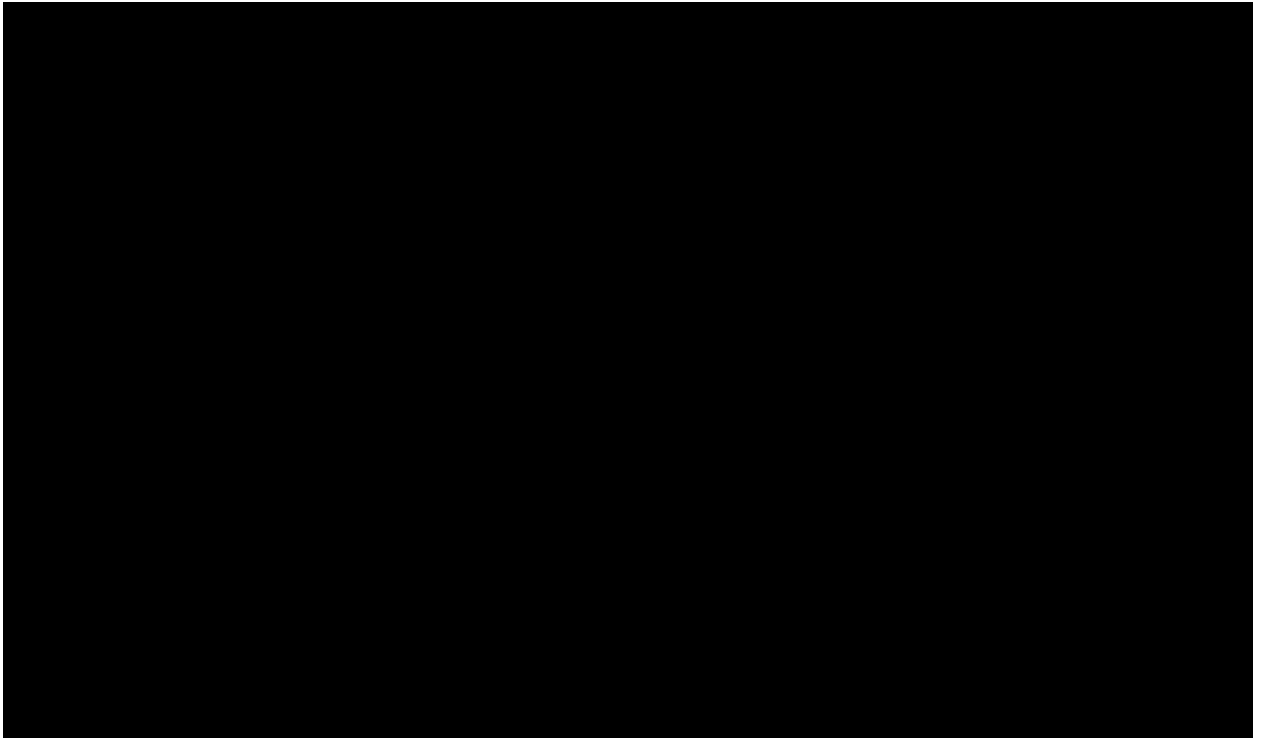
4. 1[c]: a cartomizer body having a volume defined therein, the volume configured to hold a fluid vaporizable substance,

140. In my opinion, the JUUL System comprises a cartomizer comprising a cartomizer body having a volume defined therein, the volume configured to hold a fluid vaporizable substance. The JUUL system's cartomizer body is depicted below:

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Ex. 2054 (annotated).

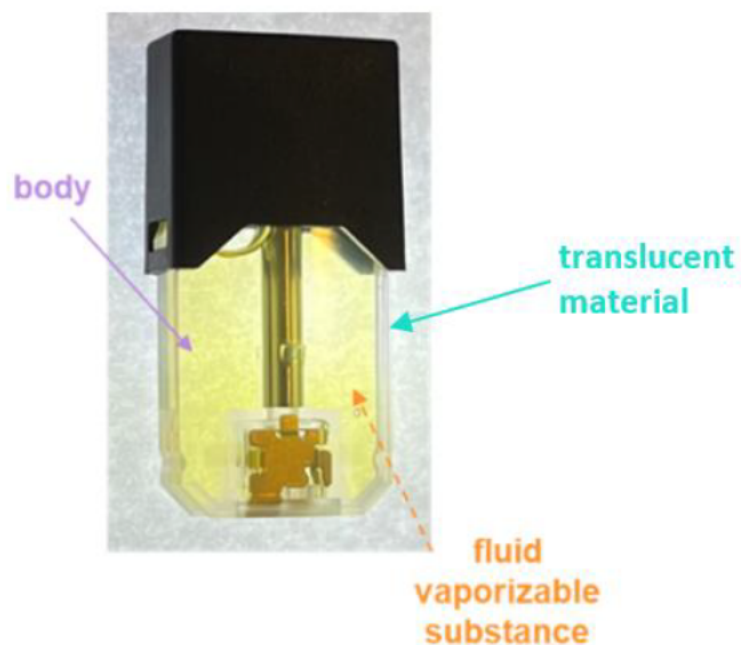


Ex. 2003, 26 (annotated).

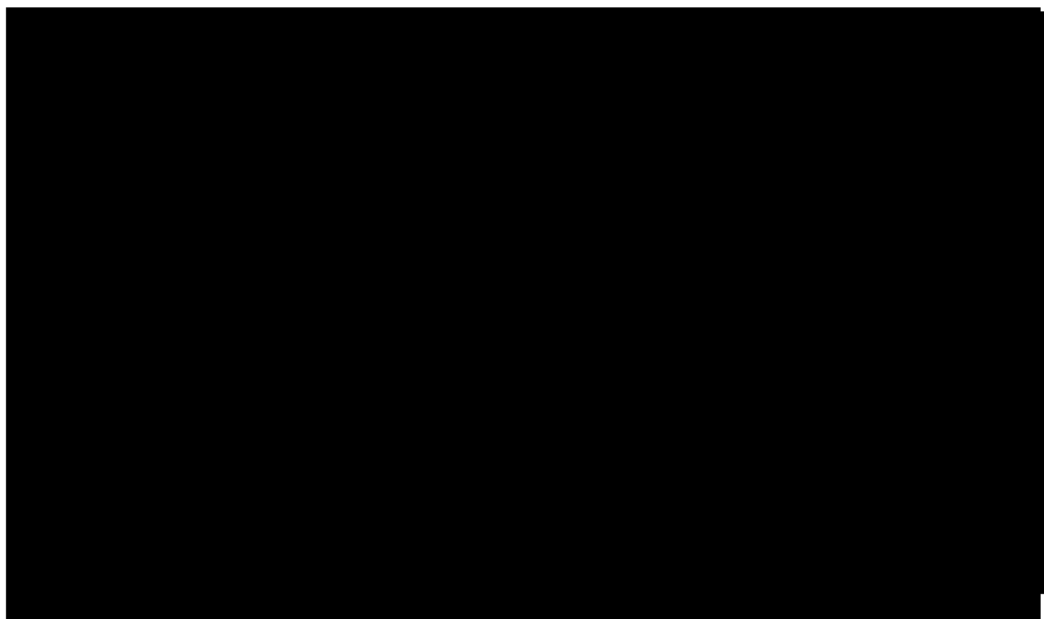
5. 1[d]: wherein at least a portion of the cartomizer body comprises a translucent material configured to allow viewing of the fluid vaporizable substance,

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141. In my opinion, the JUUL System comprises a cartomizer, wherein the cartomizer body comprises a translucent material configured to allow viewing of the fluid vaporizable substance. The JUUL system's cartomizer body is depicted below:



Ex. 2054 (annotated).

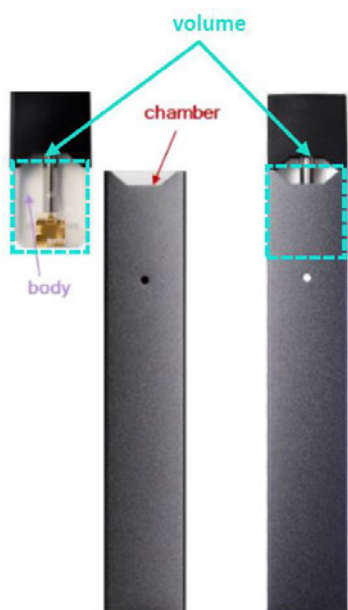


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Ex. 2003, 26 (annotated).

6. 1[e]: wherein the cartomizer body is configured for insertion into the chamber such that at least part of the volume is positioned in the chamber when the cartomizer body is inserted into the chamber;

142. In my opinion, the JUUL System comprises a cartomizer, wherein the cartomizer body is configured for insertion into the chamber such that at least part of the volume is positioned in the chamber when the cartomizer body is inserted into the chamber. The JUUL System's cartomizer body, volume, and chamber are depicted below:

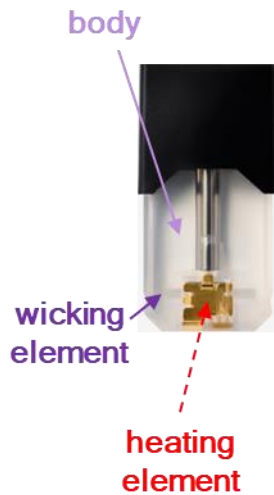


Ex. 2053 (annotated); Ex. 2056 (annotated).

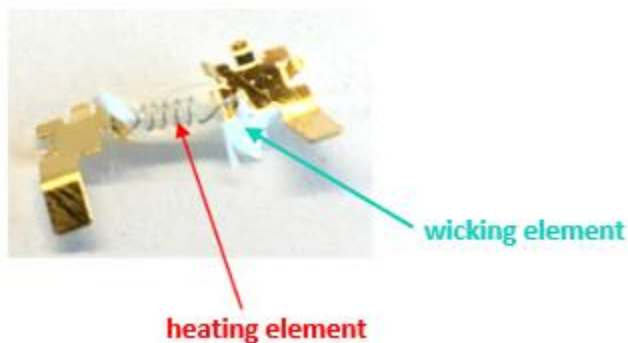
7. 1[f]: a heating element and a wicking element within the cartomizer body;

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143. In my opinion, the JUUL System comprises a cartomizer comprising a heating element and a wicking element within the cartomizer body. The JUUL System's cartomizer body, heating element, and wicking element are shown below:

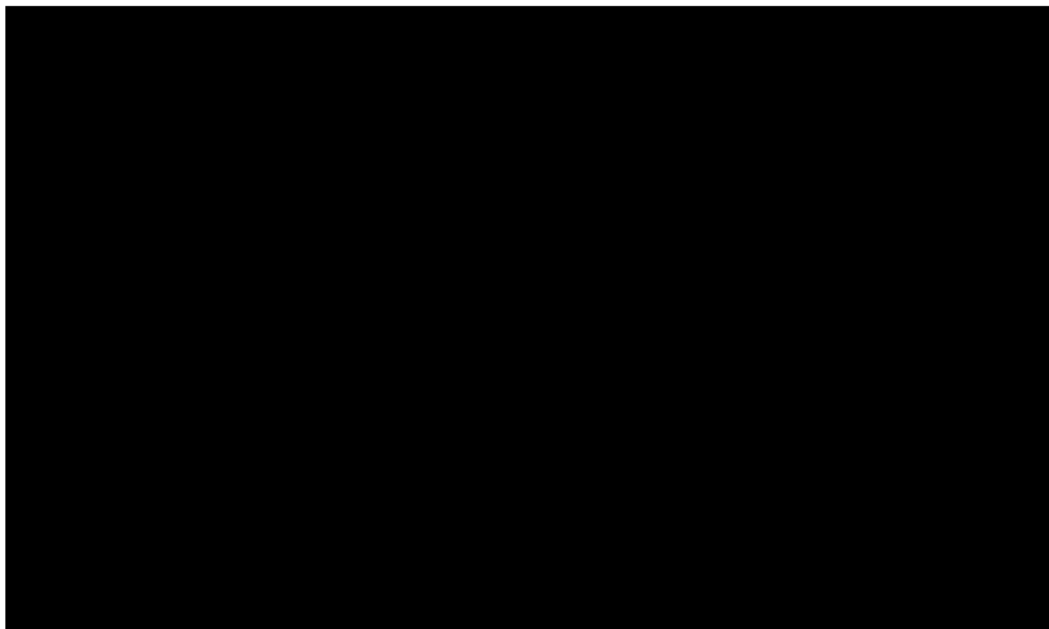


Ex. 2005 (annotated).



Ex. 2006 (annotated).

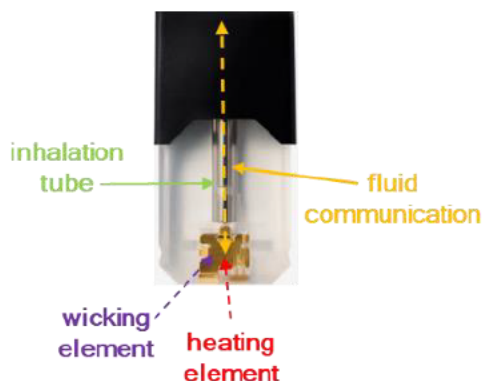
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Ex. 2003, 26 (annotated).

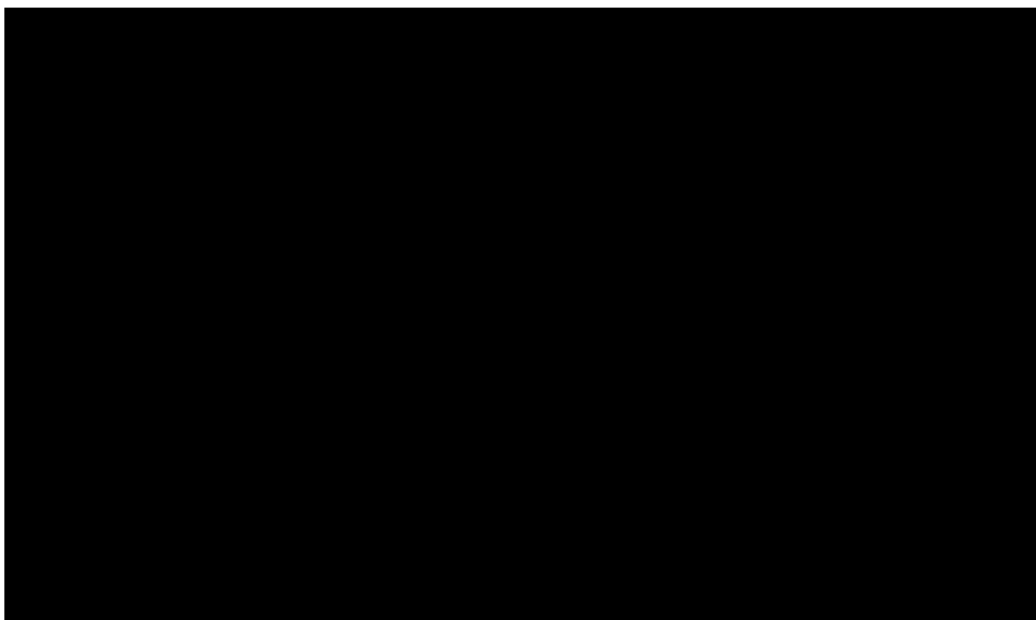
8. 1[g]: an inhalation tube in fluid communication with the heating element and the wicking element;

144. In my opinion, the JUUL System's cartomizer comprises cartomizer comprising an inhalation tube in fluid communication with the heating element and the wicking element. The JUUL System's inhalation tube, heating element, and wicking element are shown below:



Ex. 2005 (annotated).

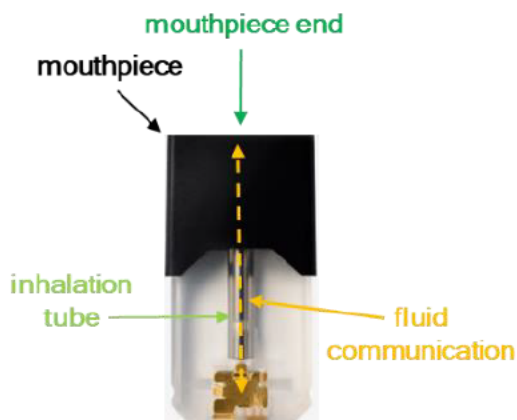
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Ex. 2003, 26 (annotated).

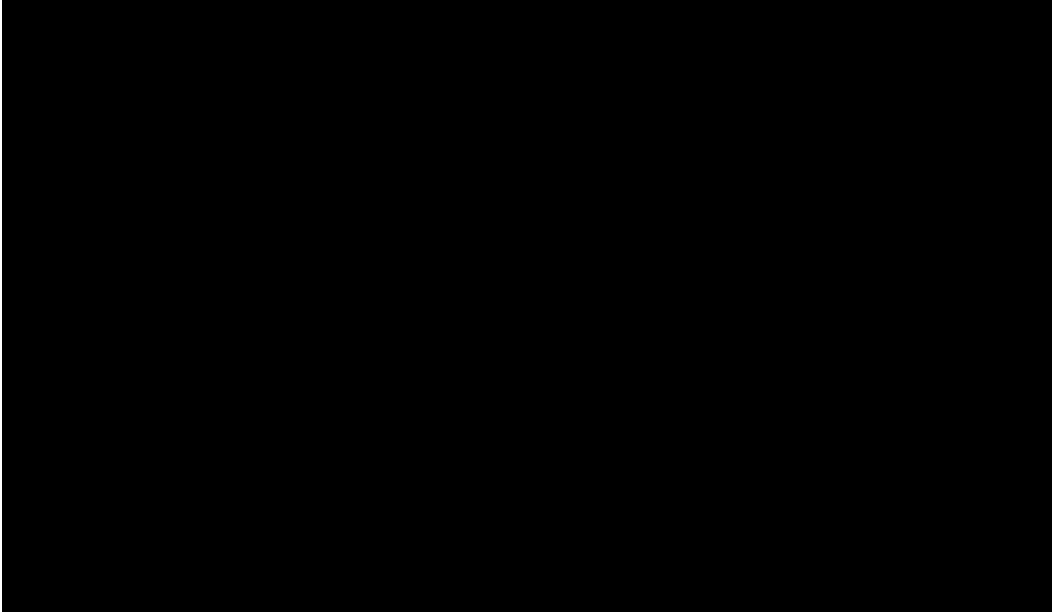
9. 1[h]: a mouthpiece at or proximate to the mouthpiece end, the mouthpiece in fluid communication with the inhalation tube; and

145. In my opinion, the JUUL System comprises a cartomizer comprising a mouthpiece at or proximate to the mouthpiece end, the mouthpiece in fluid communication with the inhalation tube. The JUUL System's mouthpiece is shown below:



Ex. 2005 (annotated).

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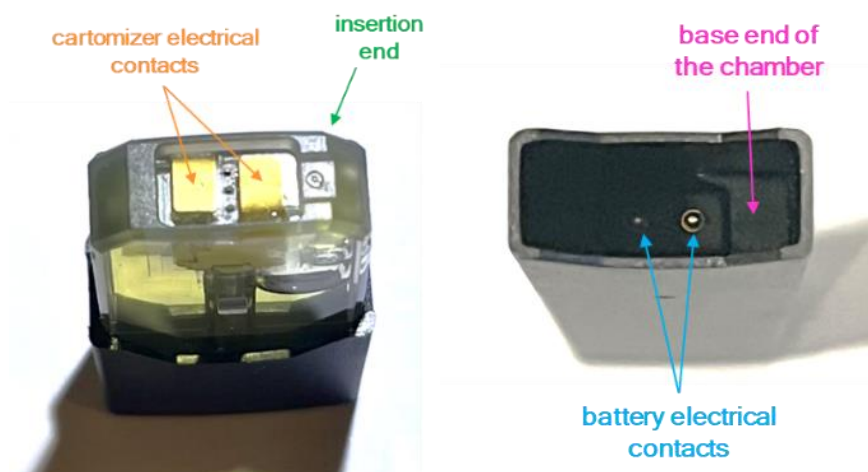


Ex. 2003, 26 (annotated).

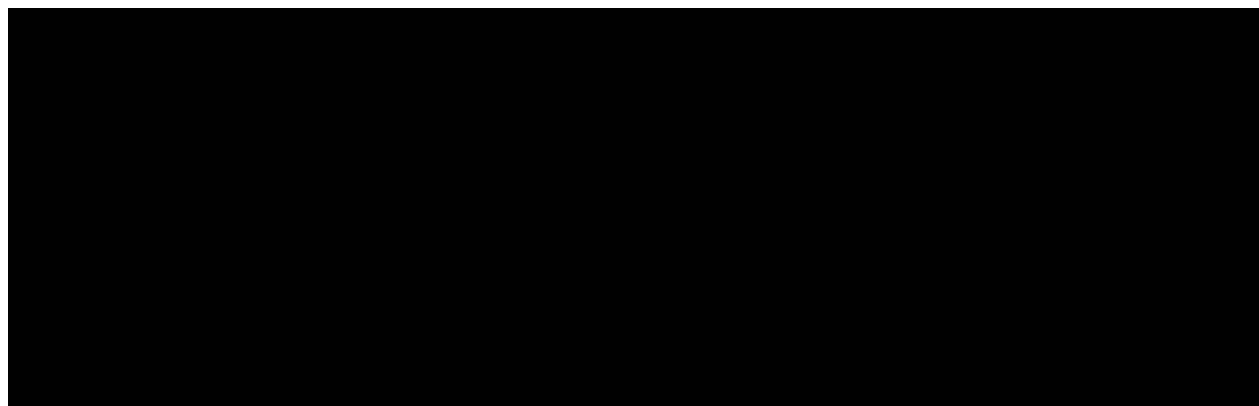
10. 1[i]: a plurality of cartomizer electrical contacts on an exterior of the insertion end, wherein the plurality of cartomizer electrical contacts is positioned to contact a plurality of battery electrical contacts at a base end of the chamber when the cartomizer body is inserted into the chamber.

146. In my opinion, the JUUL System comprises a cartomizer comprising a plurality of cartomizer electrical contacts on an exterior of the insertion end, wherein the plurality of cartomizer electrical contacts is positioned to contact a plurality of battery electrical contacts at a base end of the chamber when the cartomizer body is inserted into the chamber:

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Ex. 2057 (annotated).



Ex. 2003, 23.

B. Long-felt Need

147. In my opinion, the JUUL System met the long-felt need for a satisfying nicotine delivery product that did not have the unhealthy adverse health effects of smoking combustible cigarettes.

148. A person of ordinary skill in the art would have recognized that before the JUUL System was first introduced in 2015, smoking tobacco cigarettes had long been known to have significant health risks. Both federal and state governments had

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for decades made it a priority to decrease smoking through regulations, taxes, and informational campaigns about the dangers of smoking.

149. Thus, before 2015, it was known to people of ordinary skill in the art that tobacco smoke kills up to half of its users who don't quit, and more than eight million people die from smoke-related diseases worldwide each year, including an estimated 1.3 million non-smokers who are exposed to second-hand smoke. Ex. 2009; Ex. 2010. It was also known to people of ordinary skill in the art that smoke from burning tobacco contains toxic chemical compounds that are directly and primarily responsible for the illness and death caused by cigarettes. Ex. 2011, 3; Ex. 2012, 3. Although nicotine is addictive, an FDA commissioner has recognized that nicotine itself does not directly cause the disease associated with smoking cigarettes. Ex. 2013, 2. Smoking has also caused a significant increase in national healthcare costs. Ex. 2014; Ex. 2015 (CDC estimate of \$240 billion increase in health care costs from smoking).

150. Despite these known adverse health effects, many smokers have struggled to quit smoking because of the addictive nature of nicotine. About 70% of adult smokers report that they desire to give up smoking. Ex. 2016. Yet the average smoker attempts to quit at least 30 times before successfully foregoing smoking for at least a year. Ex. 2017. Moreover, a 2007 study concluded that, at

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the time, smoking cessation failed over 90% of the time without some form of support. Ex. 2018.

151. In light of the above, people of ordinary skill in the art were well-aware that companies have long tried to design alternative mechanisms for delivering nicotine to help users quit combustible cigarettes. For example, in the 1980s, Philip Morris and R.J. Reynolds invested billions in developing “heat-not-burn” cigarettes that deliver nicotine from tobacco without burning it. Ex. 2019, 3-4.

152. Some companies developed early electronic nicotine vaporizer products that resembled combustible cigarettes, often referred to as “cig-a-likes.” These early Electronic Nicotine Delivery Systems (“ENDS”) products were often white and cylindrical and approximately the same size as a cigarette in order to mimic the shape, look, and feel of a cigarette as well as a LED light at the tip to simulate the glowing tip of a cigarette. Ex. 2020, Ex. 2021, 1. However, despite the long-time availability of these early ENDS products before 2015, widespread consumer adoption did not occur before the JUUL System. Ex. 2022 (finding that although 90% of current and recent smokers were aware of ENDS, only one-third had ever used them, and only one-fifth were actively using them).

153. For example, I understand that in 2013, Altria (formerly Philip Morris and currently Petitioners’ parent company and RPI to this proceeding) sold through its subsidiary NuMark a cig-a-like product called MarkTen—but Altria did not

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consider the product to be a success because it “could [not] provide the satisfaction necessary to convert smokers.” Ex. 2024, ¶613.

154. I understand that JLI took a different approach with its JUUL System, abandoning traditional cigarette iconography altogether, in particular the cylindrical shape, outward-facing, flame-simulating LED, and a screw-in cartridge. The JUUL System’s inventive design provided the user with a fundamentally different user experience, including with respect to vapor production and nicotine delivery that satisfied smokers’ cravings and that were enabled through practice of the ’981 patent. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

155. The industry recognized that the JUUL System products were unique and abandoned the industry norms of emulating the iconography of traditional cigarettes. Ex. 2019, 3; Ex. 2027. This approach was regarded as technological, elegant, and sophisticated, while also providing satisfactory vapor production and nicotine delivery in a small form factor—all of which were enabled through practice of the '981 patent. Within a few years of the JUUL System launch, JLI became recognized as a leader in the ENDS device market. Ex. 2028, 1, 4; Ex. 2029; Ex. 2030.

156. Thus, in my opinion, the JUUL System met the long-felt need for nicotine delivery systems alternatives to combustible cigarettes.

C. Unexpected Results

157. In my opinion, the JUUL System achieved the unexpected result of a reliable, user-satisfying ENDS system, while departing from industry design norms and attempting to replicate a smokers experience with conventional cigarettes, providing sufficient vapor production and nicotine delivery, and using a relatively small form factor. For example, providing users with a reliable device that also allowed users to view the current liquid level while the pod was inserted in the

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vaporizer was unexpected in view of the concern about light degradation of the liquid nicotine formulation. Providing adequate airflow for satisfying vapor production and accurate pressure sensing to avoid accidental triggering of the device were also unexpected, as was providing a pod-based device with a liquid tank as opposed to prior devices that stored liquid in the wick or other sponge-like absorbent material.

158. It is also my opinion that designing a reliable, user-satisfying ENDS system that could be manufactured in a cost-efficient manner was also unexpected.

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED].

159. I understand that Altria also made considerable investments in the e-cigarette space before it invested in JUUL. I understand that Altria itself

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acknowledged that it “really didn’t have success with [its] internally developed products,” despite all the effort “put ... into engineering reduced-risk products.” Ex. 2024, ¶¶144-45. Altria’s failed products included the De-Nic, Accord, SCOR, Marlboro Snus, Marlboro Moist Smokeless Tobacco, MarkTen King Size and MarkTen XL. *Id.*, ¶¶146-202.

D. Industry Praise

160. In my opinion, the JUUL System received widespread recognition from its customers and others in the industry. In the years following its release, the JUUL System became the leading alternative for adult smokers, which analysts called a “runaway success.” See Ex. 2029; Ex. 2031; Ex. 2032.

161. Altria, Petitioners’ parent company, has also praised the JUUL System as revolutionary and fueled by a strong innovation pipeline. Altria has described the JUUL System as “an innovative breakthrough.” Ex. 2024, ¶¶213-214. It has acknowledged that while “most of the major players in the e-vapor industry acquired their products, [JUUL] ‘is one of the few companies that is responsible for the design and manufacturing of its own products.’” *Id.*, ¶214. Altria acknowledges that JUUL was “really the first pod product in the marketplace.” *Id.* It has said that “within the context of the context of the classic three-part structure, JUUL offered a number of signature features that resonated with adult consumers, including ‘the unique form-factor body, the liquid-level viewing window, the reversible pod with locking gaps,

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the fresh air flow design, and the simple user operation.” *Id.*, ¶219. Altria has acknowledged that “[p]rior to the emergence of Juul, most e-cigarettes were cigalikes” whereas JUUL had a “‘simple, intuitive, [and] easy-to-use’ product design” which “contributed to JUUL’s success.” *Id.* ¶¶ 220-22; *see also*, Ex. 2026, 25:6-30:8, 35:7-35:24, 63:3-12, 68:23-69:10, 121:18-122:17.

E. Commercial Success

162. In my opinion, the evidence clearly shows that the JUUL System has enjoyed significant commercial success since its release in 2015. For example, a Wells Fargo analysis of Nielsen data reported that JLI’s effective annual dollar sales increased 783% in the 52-week period ending June 16, 2018, reaching \$942.6 million. Ex. 2028, 1. This came from an 882% increase in unit sales over the same period. *Id.* Other analysis made similar findings. *See* Ex. 2032; Ex. 2033, 3 (“JUUL’s 4-week sales growth grew over 800% in 2017, with under \$5M in sales during the 4 weeks ending mid-February 2017 and over \$46M in the 4 weeks ended mid-January 2018.”).

163. As a result of this huge increase in revenue and unit sales, the JUUL System held dominant market share. For example, by August 2018, one analyst estimated JUUL to have approximately 70% of market share. Ex. 2034, 8; Ex. 2035, 3; Ex. 2032, 4. Another report similarly estimated 72% market share for JUUL by September 2018. Ex. 2036, 2. A report from 2018 also showed that JUUL’s

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competitors saw decreasing market share shortly after the 2015 JUUL System launch. Ex. 2037, 3.

164. The success of JUUL System also contributed to growth in the ENDS market as a whole, which had experienced relatively flat sales before the JUUL System. See Ex. 2035, 3, 5; Ex. 2036, 3; Ex. 2038, 4; Ex. 2039, 2; Ex. 2040, 3. The JUUL System accounted for a significant portion of the surveyed weekly volume sales of the ENDS pod retail market in the years following the release of the JUUL System: 43.1% of March 2017 annual growth, 90.7% of March 2018 annual growth, and over 95% of growth from April to September 2018.

165. Altria also recognized the commercial success of the JUUL System in its offers to potentially license JLI's intellectual property. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

F. Copying

166. In my opinion, others copied the JUUL System. There are several sources that have acknowledged such copying shortly after the JUUL System's release.

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167. As an initial matter, I understand that in prior investigations before the International Trade Commission involving the JUUL System, the Commission itself has observed copying of the JUUL System. For example, the Commission has observed that “[a] number of competitors, including some respondents, have admitted to using the JUUL system as a reference when manufacturing their own ENDS products.” *See* Ex. 2042, 250-51.

168. I understand that industry commentators have also noted copying of the JUUL System. For example, in a letter to the U.S. Food and Drug Administration, industry commentators noted how “[m]any of the newly introduced e-cigarette products appear to be attempting to capitalize on the recent marketing success of Juul” and “new products appear to mimic the sleek design of Juul.” Ex. 2043. Copying is further evidenced by competitor marketing material that touts the fact that their products are compatible with the JUUL Device. *See, e.g.*, Ex. 2044 (stating that “[e]ver since the Juul device burst onto the vape market, companies have been churning out ... Juul-compatible pods to keep up with the trend.”); Ex. 2047 (advertising JUUL-compatible pods).

169. I further understand that Altria has also represented that it began “working on an internal pod-based product concept designed to appeal to cigarette smokers” in June 2017, two years after JUUL was launched. Ex. 2024, ¶ 190. This effort was called “Project Panama” and was “in the works for less than a year before

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it was paused to free up resources to fix the many problems plaguing Altria's on-market products." *Id.* Altria has said that "[a]ll told, although Nu Mark ultimately pursued at least a half dozen internal device projects, many of which were the subject of 'years' of effort, none ever 'yielded fruit.'" *Id.* ¶191.

170. I additionally understand that Altria has admitted, since it was "[u]nable to develop an e-vapor product internally, Altria did what it always did when its innovation efforts failed: It turned to acquiring existing products." *Id.* ¶192. Altria began "searching in the spring of 2017 for opportunities to branch out from MarkTen cig-a-like and to participate in the pod market." *Id.* ¶301. This was because "after August 8, 2016 (the predicate date under the Deeming Rule), Altria 'didn't have the ability . . . to develop anything internally to compete without waiting multiple years to compete, and . . . thought it was important to go scan the environment to see if there were any pod products that were available.'" *Id.* ¶302. Internally, Altria referred to this project as "Project Mule." *Id.* ¶303.

171. I understand that In late-May 2017, Altria's Strategy & Business Development group "surveyed the market" and based on "conversations with a number of different companies" recommended that Altria pursue an acquisition of JLI. *Id.* ¶305. Altria considered JUUL to be the "[t]op performer among adult smokers and vapers" and acknowledged that "Juul offers key benefits of a hybrid-evaporator system,' providing cig-a-like users 'better performance without

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sacrificing convenience’ and open-system users ‘convenience in a non cigarette form.’” *Id.* ¶307.

172. I understand that Altria approached JLI to begin discussing a potential acquisition of, or investment in, JLI in May 2017. *Id.*, ¶¶306, 308. By this point, Altria had admitted that it “found itself with ‘virtually nothing in [Nu Mark’s] pipeline, in-house pipeline, for [it] to sell. Cigalike was declining very quickly. The pod business was growing exponentially, driven by JUUL. And ... [Altria was] getting [its] butt[] kicked week in and week out.’” *Id.* ¶324. Starting in 2018 Altria shifted some of its focus to an internally-developed pod-based product, the MarkTen Elite, but ultimately did not see a viable path forward for that product given the lack of demand, product defects including excessive leaking, and constraints imposed by the existing regulatory regime. *See id.* ¶¶570-573, 653-54.

173. Like its parent company Altria, Petitioners’ products prior to the release of the JUUL System were cig-a-like products. After the JUUL System was released and Petitioners observed the success of the JUUL System, Petitioners copied the design and features of the JUUL System in releasing its first pod-based product, the NJOY Ace.

XI. CONCLUSION

174. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the

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United States Patent and Trademark Office. I also recognize that I may be subject to cross-examination in the case and that cross-examination will take place within the United States. If cross-examination is required of me, I will appear for cross-examination within the United States during the time allotted for cross-examination.

175. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on the 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.

Executed: May 14, 2024

/s/ John Collins

John Collins, Ph.D.