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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 IPR2024-00267
U.S. Patent No. 11,134,722

**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 IPR2024-00267, U.S. Patent No. 11,134,722 (“the ’722 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

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teaching hospitals and universities along with a growing network of national and 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

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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.

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

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

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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, 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

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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 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-

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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 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.

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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 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 ’722 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

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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 have been familiar with electrically powered vaporizing articles, their components or the underlying technologies.” Ex. 1005 ¶ 20.

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 ’722 patent. I was a person of at least ordinary skill in the art at the time of the priority date of the ’722 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 ’722 patent.

PUBLIC VERSION**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 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

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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 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 a 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

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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.

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

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

III. OVERVIEW OF THE '722 PATENT

34. The '722 patent, titled “Vaporizer,” is directed to rechargeable vaporizers or electronic cigarettes that consist of two primary components: a “battery portion” and a “cartomizer.” '722 patent (Ex. 1001) at Abstract, 2:15-22, 5:7-12. The battery portion comprises an outer shell that forms “a battery segment and a cartomizer receiving segment,” where the cartomizer receiving segment defines a

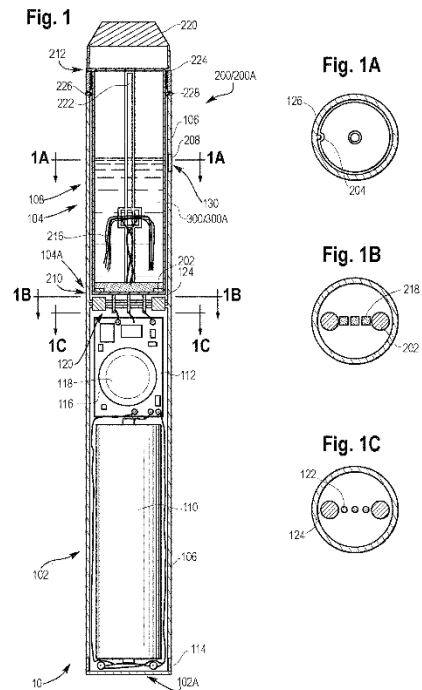
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“chamber” for receiving the cartomizer body. *Id.* at 1:48-54. The cartomizer body includes several key elements: a volume for storing a vaporizable substance, a wicking element, a heating element, a mouthpiece, and cartomizer electrical contacts. 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 1:54-2:11, 8:47-49.

35. The '722 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 segment. This allows the device to “be operated in its typical fashion during the recharging of the battery.” *Id.* at 15:16-29.

36. Figure 1 shows important features of the '722 patent:

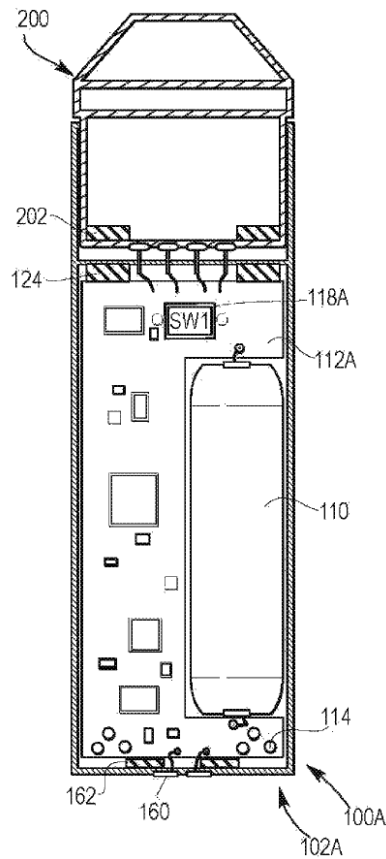
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Id. at Figs. 1, 1A-C. A battery portion 100 and a cartomizer 200 connect together to comprise the complete vaporizer device. *Id.* at 4:47-50. The battery portion contains a battery housing segment 102 at a distal end (relative to the user), and a cartomizer receiving segment 104 at a proximal end. *Id.* at 4:50-54. An outer shell 106 is commonly shared by the battery housing segment and the cartomizer receiving segment.

37. An internal reservoir defined by the body of the cartomizer holds a vaporizable liquid. *Id.* at 8:35-37. The body includes a heating element and wick. *Id.* at 8:47-49. The wick delivers the vaporizable fluid to the heating element, and the heating element then vaporizes the fluid. *Id.* at 8:56-9:1.

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

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Id. at Fig. 8; 13:15-21. Locating the contacts here allows the battery to charge while the device is operated. *Id.* at 15:16-29.

IV. OVERVIEW OF THE CITED PRIOR ART

1. Pan

39. U.S. Patent No. 8,205,622 (Ex. 1024) (“Pan”) is entitled “Electronic Cigarette” and was filed on May 7, 2009. Pan discloses that the electronic cigarette has two tubes that resemble a conventional cigarette: an electronic inhaler and an electronic atomizer. Pan at Abstract. These two components are held together and

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electrically coupled through either a screw thread connection or DC plugs. The components each have a circular cross section with similar diameters. *Id.* at 5:50-67. For example, Pan's Figure 2 discloses a screw thread connection between its different components:

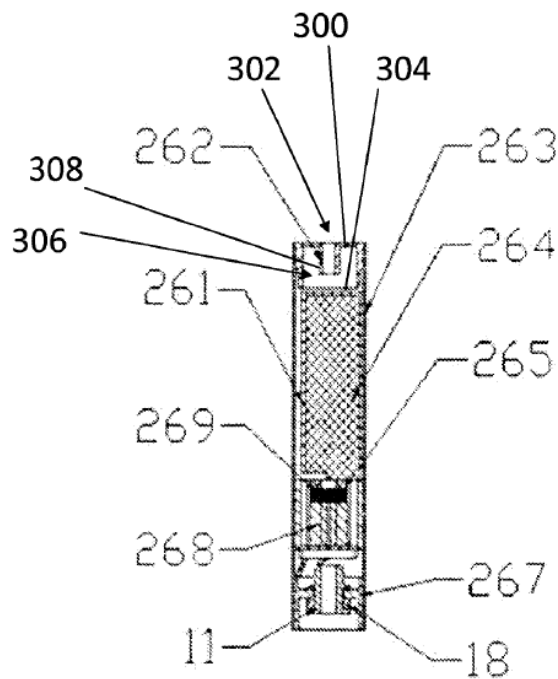


Figure 2

Id. at Fig. 2. Figure 2 additionally depicts an electronic atomizer including an atomizer tube 263 and, inside the atomizer tube 263, a second electric connector 267 with an internal screw thread with a rush pith 11 surrounded by a silica-gel insulator 18 and supporting piece 268. *Id.* at 4:33-39.

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40. Besides a screw connection, Pan also teaches in Figure 3 another electronic inhaler having a DC plug connection:

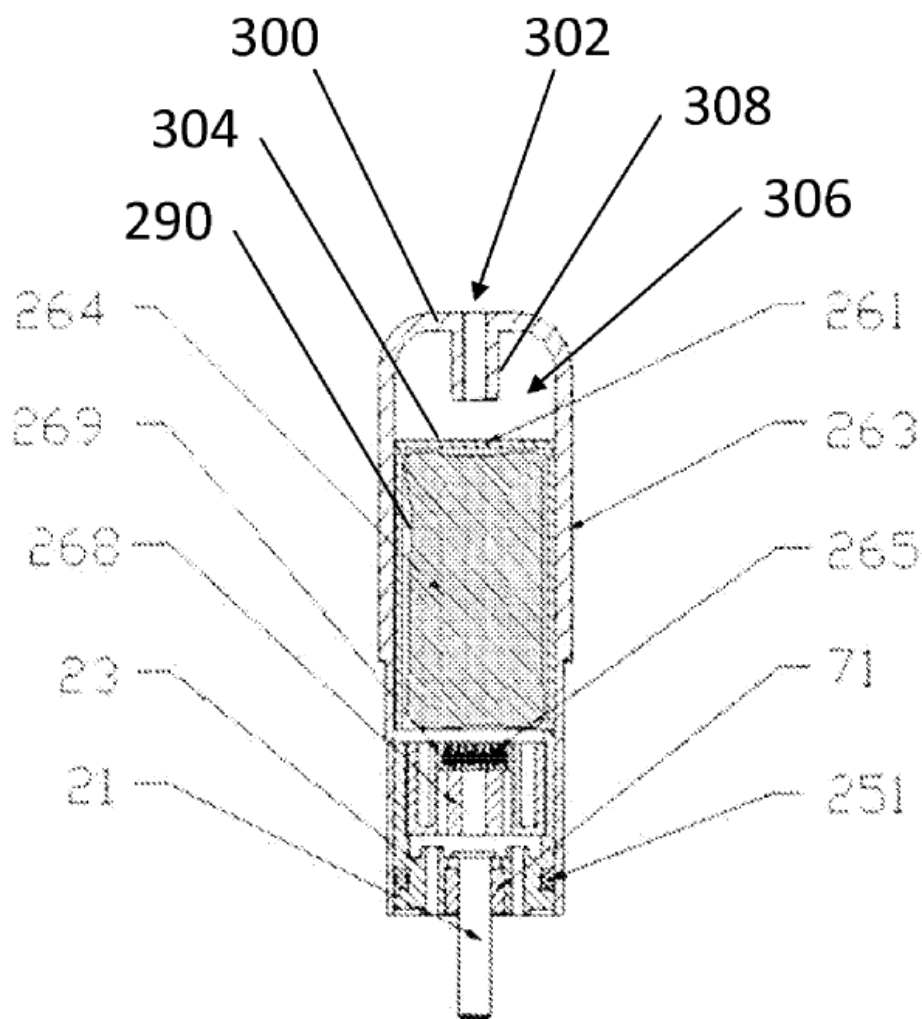


Figure 3

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Id. at Fig. 3. In Pan's Figure 3 embodiment, the electronic atomizer includes an atomizer tube 263 and, inside the atomizer tube 263, a second electric connector comprised of a DC plug 21 located on a plug seat 71, leak-proof piece 23, seal washer 251, and supporting piece 268. *Id.* at 4:63-5:7.

41. Pan's Figure 4 shows a section view of one electronic inhaler with a screw connector:

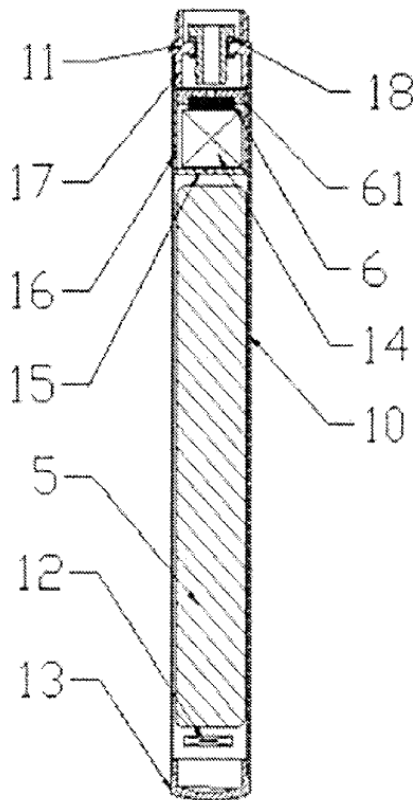


Figure 4

Id. at Fig. 4. The electronic inhaler in Pan's Figure 4 embodiment includes an inhaler tube 10, cigarette cap 13 with small holes for air inflow, LED indicator 12, electric

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power source 5, annular tube 16 with its cap 15, integrated circuit board with a CPU processor 15, electric airflow sensor 6, sensor supporter 61, and first electric connector 17 with an inserted rush pith 11 surrounded by a silica-gel insulator 18. *Id.* at 5:8-15.

42. Further, the electric power source 5 connects to the circuit board 14, which connects to the first electric connector 17 and the electric airflow sensor 6. The LED 12 is connected to both electric power source 5 and the circuit board 14. The electric airflow sensor 6 is assembled onto the sensor supporter 61. The first electric connector 17 with an outskirts screw thread is partially embedded in the inhaler tube 10, which can be connected to the second electric connector of the electric atomizer to form an electronic cigarette. *Id.* at 5:16-24.

43. The operation of Pan's electronic cigarette begins when the user inhales through the air-puffing hole located at the end of the device. This action causes the pressure to drop and is detected by the airflow sensor, which the CPU interprets as an airflow signal, which then triggers an electric current to be sent through the heating wire. While the current is flowing, the LED indicator 12 illuminates, mimicking the burning ember of a traditional cigarette. Once the user stops inhaling, the electric current to the heater ceases, and the LED indicator 12 turns off. *Id.* at 4:23-27.

PUBLIC VERSION2. Levin

44. U.S. Patent No. 9,427,022 (Ex. 1003) (“Levin”), titled “Electronic Vaporizing Device and Methods for Use,” was filed on March 12, 2013. Levin contends that its invention provides for improved functionality and aesthetics to provide a more realistic and satisfying “smoking” or vaporizing experience for a user by being configured to resemble the general appearance of a cigarette or cigar, including specifically the lit end of a cigar during traditional smoking. Levin at 8:27-32. According to Levin, inhaling vaporized active ingredients is still referred to as “smoking” despite no traditional combustion smoke being produced. *Id.* at 33-35. Consistent with this, Levin teaches a device that has an air passageway and a light source to simulate the burning end of a cigar. *Id.* at 35-37.

45. In response to airflow sensed by an inhalation sensor, the light source, such as one or more LEDs, simulates the lit tip of a cigar. *Id.* at 9:40-60. Levin’s device includes circuitry that varies the light output of the light source in proportion to the level of airflow drawn through the device. For example, inhaling at a low flow rate would activate one LED, while inhaling at a higher flow rate would activate four LEDs so as to more closely simulate an actual lit tip of a cigarette or cigar. *Id.* These LEDs are used to indicate various states of the device, such as a low level of

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the substance within the cartridge, a lower power source, or an indication that the device is charging or is fully charged. *Id.*

46. In the background section, Levin teaches that many of the conventional electronic vaporizing devices vaporize liquid solution by using a wick to move the liquid solution onto a heating element. The solution is vaporized by directly contacting the heating element. However, Levin teaches that a problem with this approach is that it severely reduces the life of the heating element and thus often necessitates frequent replacement of the heating element. So, like Pan, such conventional devices typically employ a disposable “cartomizer” which combines the heater and nicotine capsule into one piece. *Id.* at 1:47-56.

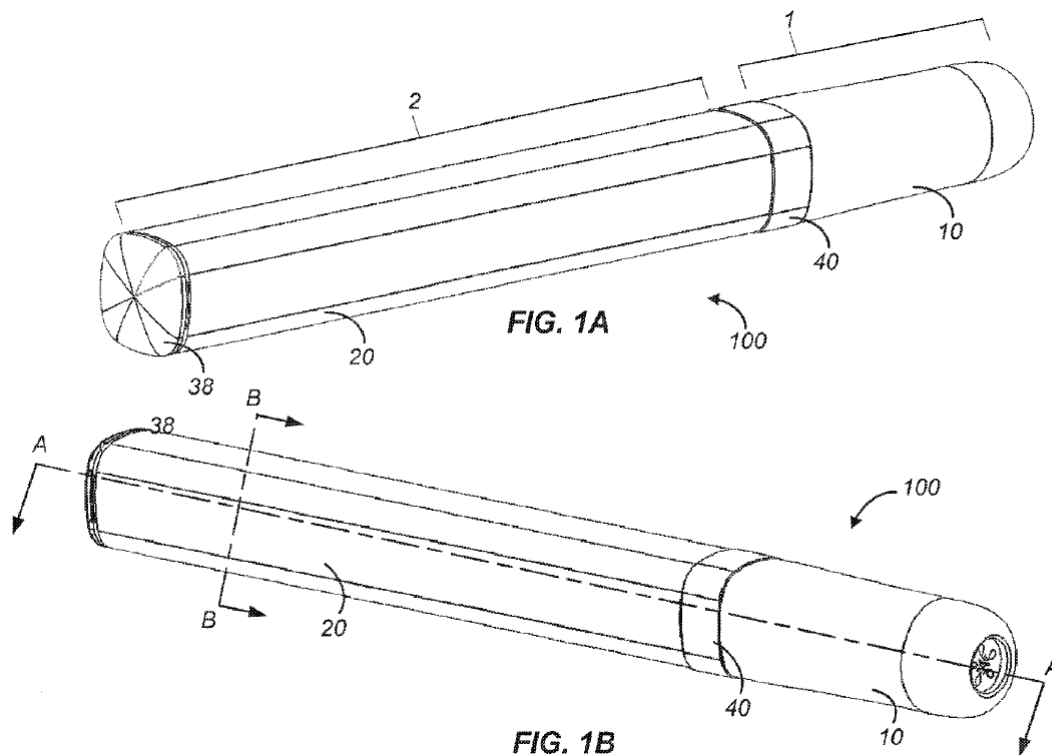
47. Instead, Levin teaches placing a “heating portion” or “heating unit” in the device rather than in the cartridge. *Id.* at Abstract and at 10:31-38. The cartridge contains the vaporizable substance, which could be in the form of a liquid or gel solution of propylene glycol/vegetable glycerin/nicotine, a powder, wax, oil, or a solid brick. *Id.* at 21:26-30. The heat is rapidly transferred from the device by utilizing convection of hot air, radiation, or conduction. *Id.* at 12:31-35

48. In addition to extending the life of a heating element, Levin describes another benefit of this approach as better insulating the heater to minimize thermal losses and be more energy efficient. *Id.* at 10:43-48. Another benefit of this

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approach is to shorten lag time in heating the air to a temperature suitable for vaporization of the selected substance. *Id.* at 12:3-5.

49. As shown in Figures 1A-B, Levin's devices have a rounded rectangle or filleted rectangle shape, preferably in a square prismatic shape with rounded corners:

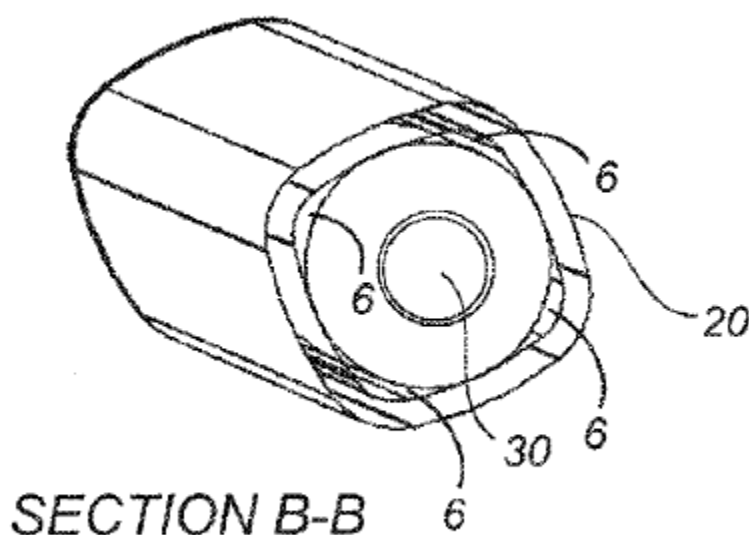


Id. at Figs. 1A, 1B; see also *id.* at 10:65-11:3. In particular, the main housing 20 has a non-circular cross-section, such as a square with rounded corners. *Id.* at 11:4-5.

50. Figure 2B further illustrates the non-circular cross-section of main housing 20, which is advantageous as it allows sufficient space for the power source

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30 (e.g., cylindrical batteries) within while also defining air passageways 6 outside the batteries, in the gap between the power source 30 and the housing 20, to allow airflow through the device:

**FIG. 2B**

Id. at Fig. 2B; 11:7-17. The housing 20 has an inner cross-sectional area that is large enough to allow sufficient air flow through the housing 20 so as to provide a satisfying inhalation experience with enough airflow to provide improved efficiency and to allow for increased ease of use and portability of the device. *Id.* at 11:17-31. The four passageways 6 around the battery allow the device to more closely simulate the sensation of drawing air through a real cigarette. *Id.* at 23:27-33. This feature also allows the air intakes to be located away from the central portion of the device,

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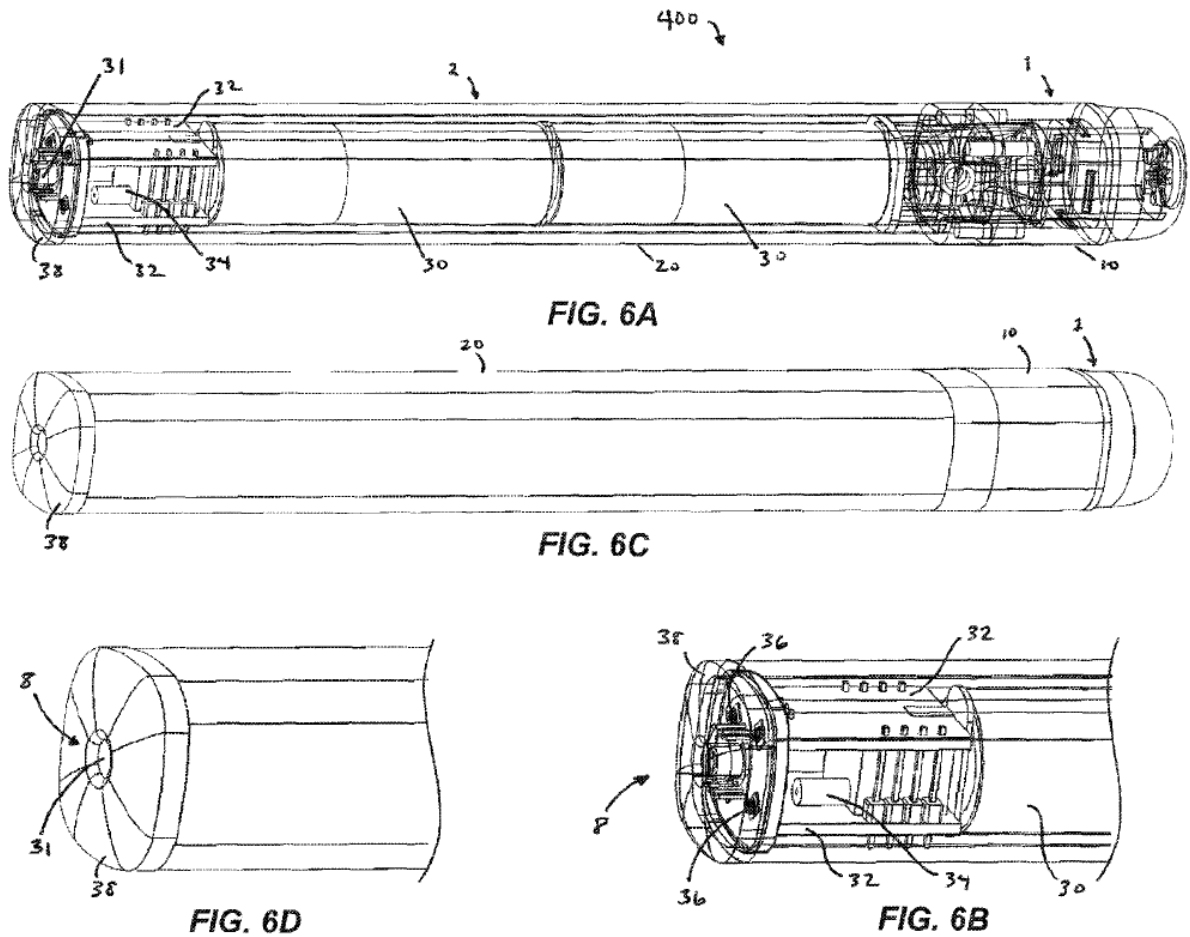
which in turn prevents the air intakes from being covered by the user's fingers when the device is held during use. *Id.* at 23:34-37. This also allows indrawn air in to cool the electronics and power source to prevent overheating of the device. *Id.* at 23:36-41.

51. The cross section of the housing 20 is a square with rounded corners, measuring about 15 mm by 15 mm. *Id.* at 11:26-27. For context, cigars are 15 to 20 mm in diameter. Levin also teaches that in certain embodiments, the length of the device is about 150 to 300 mm long, such as about 230 mm long so as to provide sufficient space for the power source, air intake, grinder, mouthpiece, inhalation sensor, and associated electronics. *Id.* at 11:27-31.

52. Levin further teaches that its heating portion is placed within the device so that there is sufficient distance (20 mm to 60 mm) between the heating portion and the opening of the mouthpiece, which enables for adequate cooling of the heated air before reaching the user's mouth. Levin contends that these dimensions are advantageous because they accommodate enough airflow to allow for rapid inhalation, improved efficiency in heating, and adequate cooling of the heated vapor for inhalation by the user. *Id.* at 11:30-41.

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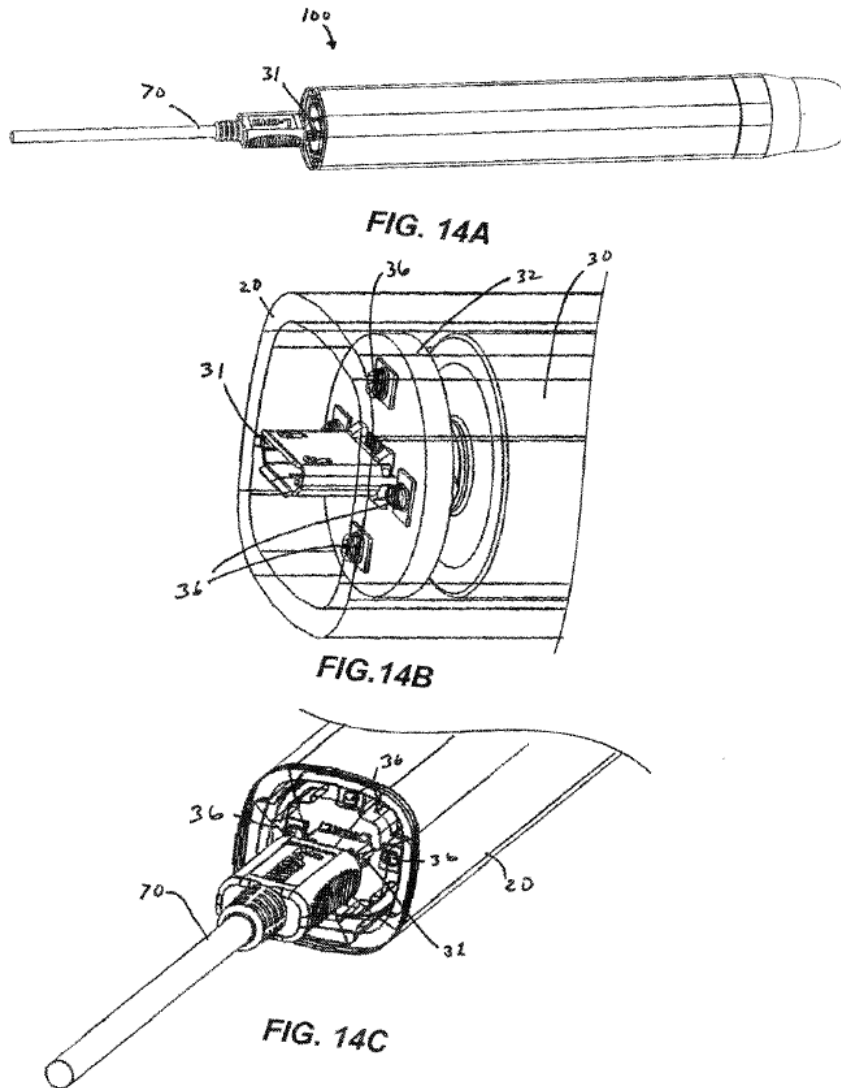
53. As shown below in Figures 6A-6D, Levin teaches that the air intake 8 is provided at or near the lens tip 38, such as through spaces 8 between the lens tip 38 and the opening of the device or through a central air passageway 8:



Id. at Figs. 6A-D. This configuration allows the air intake to be sufficiently far from where a user's hand grasps the outer housing 20, which prevents inadvertent blockage of the air intakes by the user when holding the device. *Id.* at 11:41-49.

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54. As shown below in Figures 14A-14C, Levin teaches that its devices include a port 31 to recharge the power source 30, such as a micro-USB charging port located on a printed circuit board behind the lens tip or end cap:



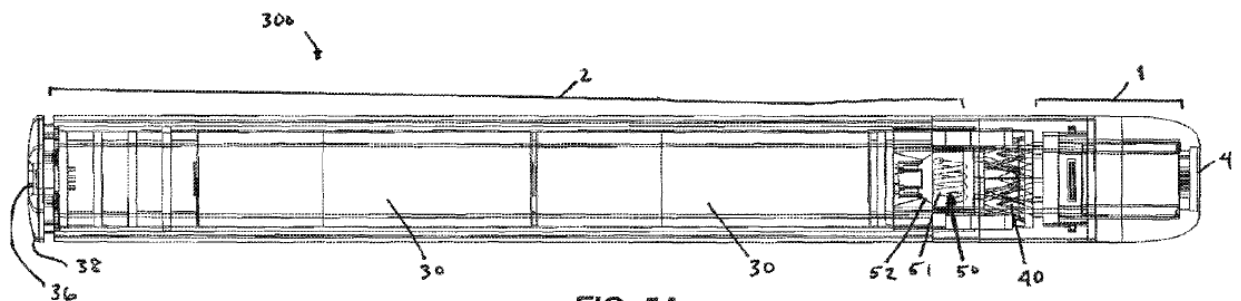
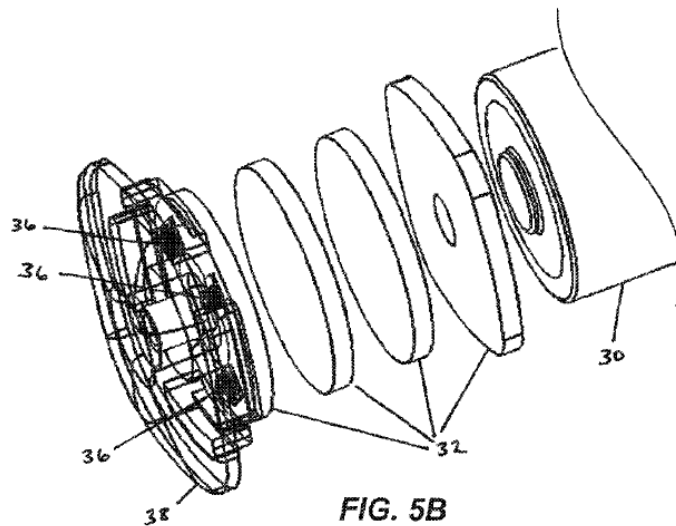
Id. at Figs. 14A-C. The port may be used to recharge non-removable batteries by connecting a recharging cable 70, such as a USB cable, to a port. *Id.* at 14:10-25.

PCB 32 has a memory module with firmware to activate and control the heating and

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light source in response to various inputs from a user or various sensors or components of the device. *Id.* at 18:58-63.

55. In Figures 5A-5B, Levin teaches the use of LEDs mounted on a PCB 32 that is situated behind the lens tip:

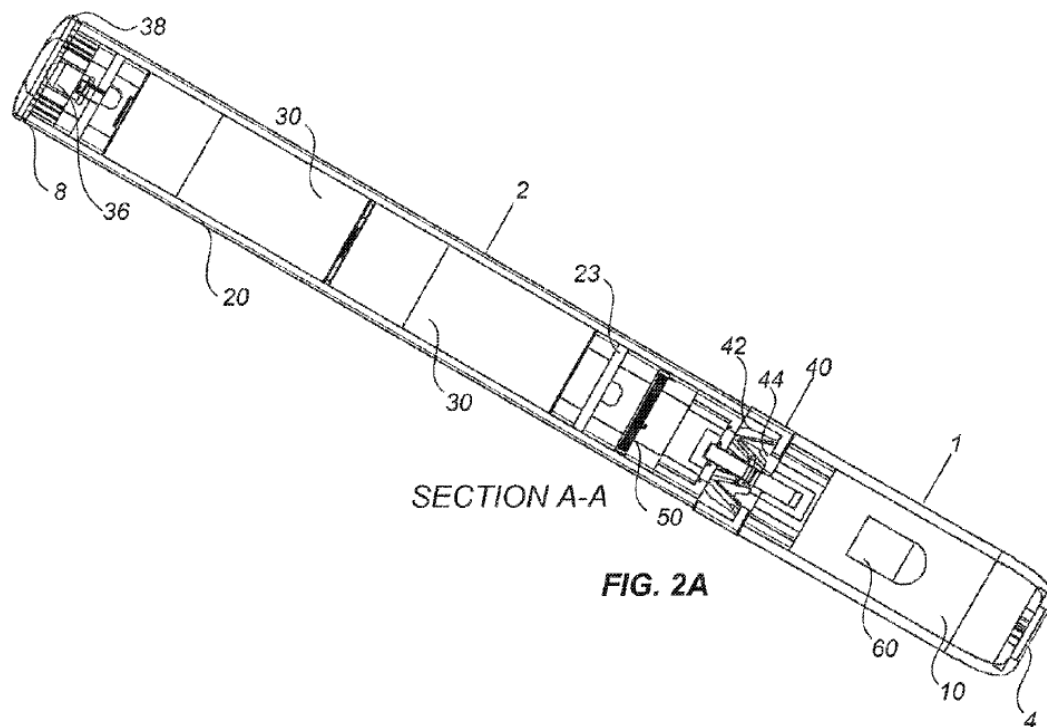
**FIG. 5A****FIG. 5B**

Id. at Figs. 5A, 5B. The LEDs may be configured so as to fade up and down so as to vary in illumination intensity in proportion to an air flow velocity through the device so as to simulate the glowing tip of a cigar so that when the user inhales faster, the LEDs glow brighter, just as the tip of a cigar flares up with a quick inhalation.

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Id. at 13:10-20. The LEDs signal different states of the device to a user, such as low battery or a low cartridge level. *Id.* at 13:20-63. For example, a green LED could be used to indicate the device has power. *Id.*

56. In Figure 2A, Levin teaches a device that includes a distal lens tip 38 that may be translucent or a clear end cap that covers one or more LEDs 32, such as four red LEDs:

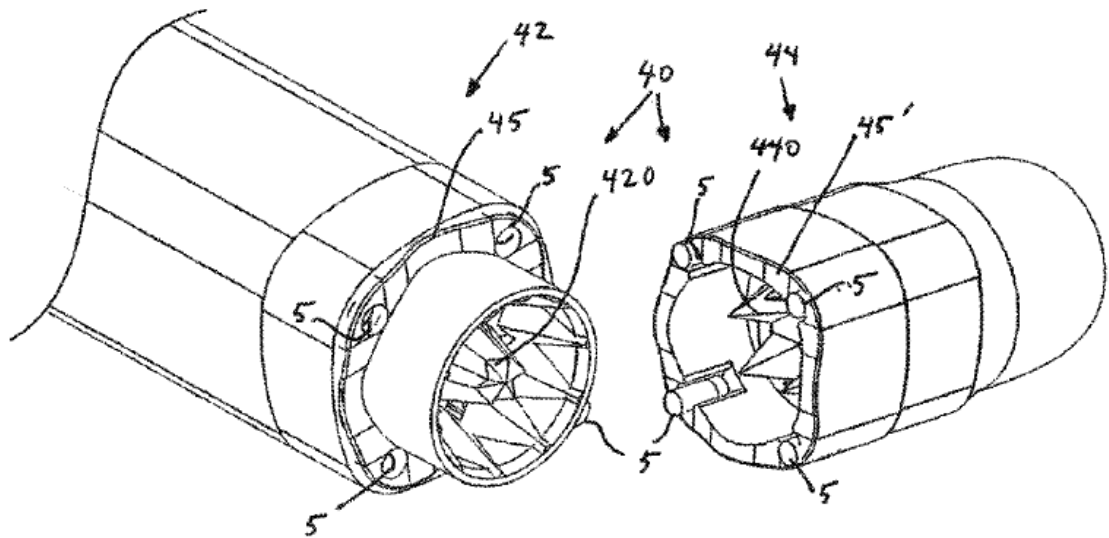


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Id. at Fig. 2A. The end cap includes gaps or openings 8 to allow airflow into the passageway extending through the device for inhalation by the user. *Id.* at 11:41-49.

57. Levin further teaches that the end of the device could include a connector receptable or port, such as for use with a USB connector. When it does, the end cap 38 covers the end of the device when attached so as to protect the light source 36, as well as any connector, when in use. *Id.* at 13:30-35. The end cap can be easily removed to give the user access to the plug and reattached after recharging the batteries. *Id.* at 13:46-49.

58. As shown in Figures 9A-9B, the proximal (mouth) end of Levin's device may include a grinder for grinding tobacco leaves or other plant matter into minute particles suitable for vaporization of the selected substance for inhalation by a user:

PUBLIC VERSION**FIG. 9A**

Id. at Figs. 9A, 9B; 19:29-35. The grinder has a distal grinder portion 42 and a proximal grinder portion 44. *Id.*

3. Thorens788

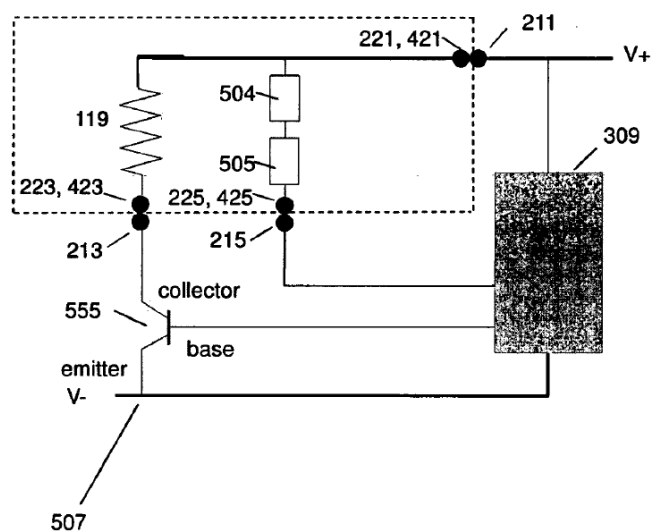
59. WO 2011/160788 A1 (Ex. 1004) (“Thorens788”) is entitled “An improved Aerosol Generator and Liquid Storage Portion for Use with the Aerosol Generator” and was filed on June 15, 2011.

60. 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

JLI Ex. 2001, Page 30

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signals to pass between the processor 309, which may be mounted in circuitry 109, and liquid storage portion 113:

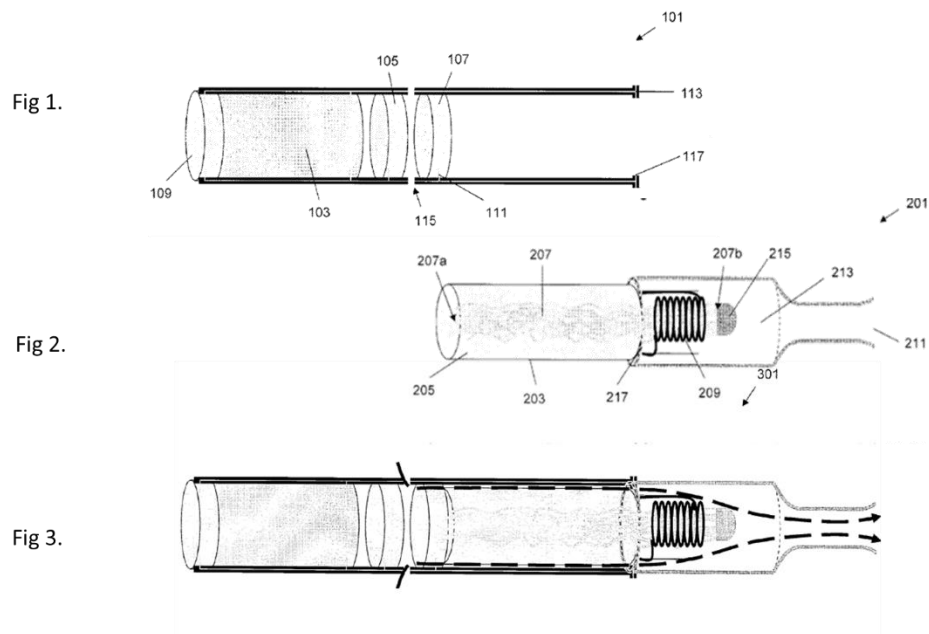
Figure 7

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

64. 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.

PUBLIC VERSION4. Thorens231

65. 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. Specifically, 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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66. 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.

67. 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.

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

69. 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.

70. 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

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a pulse of electricity to the heating coil and switches on the puff indicator 109. *Id.* 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.

71. 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

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

73. 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.

74. 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.

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

VI. GROUND 1: THE PETITION FAILS TO DEMONSTRATE A REASONABLE LIKELIHOOD THAT INDEPENDENT CLAIMS 1, 3, 7, 9-13, 15-16, OR 18-21 ARE OBVIOUS BASED ON PAN IN VIEW OF LEVIN

76. It is my opinion that Petitioner and Dr. Janet have not established that the primary reference Pan teaches the claim limitations “wicking element” and “the wicking element is configured to deliver the vaporizable liquid to the heating

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element.” They have also not established a motivation for a person of ordinary skill in the art to combine Pan with Levin to achieve the challenged independent claims and even if they did, the combination would not address the two missing claim limitations. Further, it is my opinion that Petitioner and Dr. Janet have not established a reasonable expectation of success for a person of ordinary skill in the art to combine Pan with Levin to achieve the challenged independent claims.

A. Petitioner and Dr. Janet Have Not Established that Pan Discloses a “Wicking Element”

77. I understand that Petitioner and Dr. Janet identify Pan’s heat equalizer 269 as the claimed “wicking element.” Pet. 40-41; Ex. 1005 ¶ 130. However, it is my opinion that Petitioner and Dr. Janet have not established that Pan discloses a claimed “wicking element.”

78. In particular, Pan does not state that the heat equalizer “transports liquid by capillary action,” as required by the agreed-upon construction of “wicking element.” Indeed, Pan fails to mention “capillary action” or “wicking” at all.

79. Regarding the composition of heat equalizer 269, Pan states that it is “made of a special fiber,” but that fiber is only special because it “can withstand temperature as high as 2000 degrees centigrade,” not because it wicks liquid. Pan at 4:53-55. In my view, a person of ordinary skill in the art would have expected a conventional wick to be in contact with the electric heaters, which are known to

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reach temperatures of between 200 °C and 440 °C during use. So, a person of ordinary skill in the art would indeed consider a fiber capable of reaching 2000 °C as being special. In my opinion, Pan would have mentioned any wicking ability of heat equalizer 269, or any application of capillary action, had its heat equalizer actually behaved as a claimed “wicking element.”

80. In my opinion, a liquid-absorbent fiber does not necessarily transport liquid by capillary action. Absorbing fluid in a fiber bundle just requires that there be voids which can hold the liquid and allow passage. Wicking requires that the material of the fiber be wetted by the vaporizable liquid. There are hydrophobic fibers that have voids (and are thus absorbent) but are not wetted. If Pan’s special fiber that can withstand 2000 °C is hydrophobic (*i.e.*, is not wetted by the vaporizable liquid) it will absorb fluid but will not transport liquid by capillary action.

81. Moreover, a person of ordinary skill in the art would have understood that the ability of a fiber to draw liquid by capillary action depends on the wetting angle between the fiber and the liquid due to the interplay of adhesive and cohesive forces. The wetting angle, also known as the contact angle, is the angle formed between the liquid-solid interface and the liquid-vapor interface when a liquid comes in contact with a solid surface. It is a measure of the wettability of the solid surface by the liquid. Adhesive forces are the attractive forces between the molecules of the

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liquid and the molecules of the solid surface. Cohesive forces, on the other hand, are the attractive forces between the molecules of the liquid itself. When the adhesive forces between the liquid and the fiber are stronger than the cohesive forces within the liquid, the liquid spreads out on the fiber surface, resulting in a smaller wetting angle (less than 90°). This condition is known as high wettability or hydrophilicity. When the cohesive forces within the liquid are stronger than the adhesive forces between the liquid and the fiber, the liquid tends to minimize its contact with the fiber surface, resulting in a larger wetting angle (greater than 90°). This condition is known as low wettability or hydrophobicity. Capillary action is the ability of a liquid to flow through narrow spaces without the assistance of, or even in opposition to, external forces like gravity. It occurs when the adhesive forces between the liquid and the surrounding solid surface are stronger than the cohesive forces within the liquid. A smaller wetting angle (high wettability) indicates that the adhesive forces between the liquid and the fiber are strong. In this case, the liquid tends to spread along the fiber surface and is easily drawn into the spaces between fibers by capillary action. A larger wetting angle (low wettability) indicates that the adhesive forces between the liquid and the fiber are weak compared to the cohesive forces within the liquid. In this case, the liquid tends to minimize its contact with the fiber surface and is less likely to be drawn into the spaces between fibers by

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capillary action. Thus, the ability of a fiber to draw liquid by capillary action depends on the wetting angle, because it reflects the balance between adhesive and cohesive forces. A smaller wetting angle indicates strong adhesive forces and promotes capillary action, while a larger wetting angle indicates weak adhesive forces and hinders capillary action. Nothing in Pan offers any indication that the interaction between the liquid in the liquid-storage media and the heat equalizer 269 produce a suitable wetting angle, which is another indication that the heat equalizer 269 does not employ capillary action.

82. I have reviewed Dr. Janet's declaration, where he states that "[b]ecause the heat equalizer comprises a fiber material for absorbing liquid, it is my opinion that a POSA would have understood that the heat equalizer draws liquid via capillary action through its fibers" and that "wicking elements made of fiber were well known in the art as of 2013." Ex. 1005 ¶ 131. I disagree with Dr. Janet. First, he does not provide any analysis or explanation for his opinions. Second, that "wicking elements made of fiber were well known in the art as of 2013" appears to be an argument for obviousness of the "wicking element" limitation, but Petitioner and Dr. Janet have alleged that the "wicking element" is literally present in Pan, not that it is obvious. For the reasons given above, I disagree that a person of ordinary skill in the art would have understood Pan's heat equalizer 269 to necessarily employ capillary action.

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83. Accordingly, it is my opinion that Pan does not disclose that its heat equalizer 269 transports liquid by capillary action. Pan thus does not disclose a “wicking element” as specified by the agreed-upon claim construction.

B. Petitioner and Dr. Janet Have Not Established that Pan Discloses “the Wicking Element Is Configured to Deliver the Vaporizable Liquid to the Heating Element”

84. I understand that Petitioner and Dr. Janet identify Pan’s heat equalizer 269 as the claimed “wicking element” and Pan’s heating wire 265 as the claimed “heating element.” Petition at 40-42; Ex. 1005 ¶¶ 130, 134.

85. However, in my opinion, even if the heat equalizer 269 were a “wicking element,” Petitioner and Dr. Janet have not established that Pan discloses “the wicking element is configured to deliver the vaporizable liquid to the heating element.”

86. Fundamentally, a person of ordinary skill in the art would not perceive any disclosure that Pan’s heating wire 265 vaporizes any liquid. Similarly, a person of ordinary skill in the art reading Pan would also find no disclosure that Pan’s heat equalizer 269 “deliver[s] the vaporizable liquid to the heating element [*i.e.*, heating wire 265]” for vaporization, as explicitly required by the claim language.

87. To the contrary, Pan states that heating wire 265 provides heat to heat equalizer 269, and in turn, the heat equalizer “ensures that the heat generated by the

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electric wire is uniform.” Pan at 6:55-56. Pan directly and unequivocally states that heat equalizer 269, not heating wire 269, vaporizes any liquid. *Id.* at 2:57-62 (“This electric current preferably flows through the electric heat wire inside the atomizer tube, which then heats up the heat equalizer with absorbed liquid from the liquid-container. The heated equalizer converts the liquid into a form of vapor mist, which is finally drawn into the mouth of the user.”).

88. I understand that Petitioner also cited to Figure 3 and 8:43-45 of Pan for this claim element. Petition at 42. I disagree that these portions of Pan disclose or support the disclosure of “the wicking element is configured to deliver the vaporizable liquid to the heating element.” Figure 3 of Pan does not relate to what component vaporizes liquid. 8:43-45 of Pan describes “a heat equalizer coupled with an electric heating wire.” However, in my opinion, that does not address what component vaporizes liquid either.

89. I have also reviewed Dr. Janet’s declaration, where he states in relevant part:

As I explained above with respect to claim limitation [1.H], Pan discloses that the heat equalizer 269 absorbs liquid from the liquid container and is twined with the heating wire 265 to allow the heating wire to vaporize the liquid. See also EX1024, 2:58-60 (“the electric heat wire...heats up the heat equalizer with absorbed liquid from the liquid-container.”). Therefore, the wicking element is configured to deliver the vaporizable liquid to the heating element.

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Ex. 1005 ¶ 137. I disagree with Dr. Janet. Pan simply does not disclose that the heating wire vaporizes the liquid, and actually says that the heat equalizer 269 does so instead. Thus, the plain language of Pan contradicts Dr. Janet's conclusion. A person of ordinary skill in the art would heed Pan's own disclosure of which component does what. Dr. Janet also does not provide any analysis or explanation for his opinion.

90. Therefore, it is my opinion that Pan does not disclose that its heat equalizer 269 delivers any vaporizable liquid to heating wire 265 for vaporization, and therefore I conclude that Petitioner and Dr. Janet have not established that the limitation "the wicking element is configured to deliver the vaporizable liquid to the heating element" is disclosed by Pan.

C. Petitioner and Dr. Janet Have Not Established that Pan in View of Levin Renders Obvious Electrical Contacts at the End of the Battery Portion Opposite the Cartomizer

91. I understand that Petitioner and Dr. Janet agree that a "plurality of charger electrical contacts disposed at a first end of the battery portion" and similar limitations are not disclosed by Pan, but contend that it would have been obvious to adapt Pan to include Levin's micro-USB charging port. Petition at 20-25, 35-36; Ex. 1005 ¶¶ 97-105. I disagree.

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92. It is my opinion that a person of ordinary skill in the art would not have found it obvious to combine Pan and Levin in the manner suggested by Petitioner and Dr. Janet. In particular, first, a person of ordinary skill in the art would not have had a motivation to combine Pan with Levin. Second, a person of ordinary skill in the art would not have had a reasonable expectation of success in making Petitioner and Dr. Janet's suggested combination.

93. As an initial matter, Pan teaches that the batteries can be either rechargeable or non-rechargeable. Pan at 2:32-35, 5:47-48. As such, a person of ordinary skill in the art would understand that if the batteries are non-rechargeable, they would be easy to replace. A person of ordinary skill in the art would also understand that if the batteries are rechargeable, such as commodity rechargeable AAA or AA batteries, they are to be recharged outside of Pan's device. Pan contains no discussion of charging a battery in situ, inside the device, much less electrical contacts that would allow such charging, and would have no need to recharge a battery inside the device if non-rechargeable batteries are used. Notably, Pan's disclosed rechargeable batteries have several advantages, such as being able to be charged by any commodity battery charger, and allowing depleted batteries to be swapped with charged batteries to immediately bring the device to full power.

1. *Petitioner and Dr. Janet Have Not Established a Motivation to Combine Pan with Levin to Achieve Electrical Contacts at the*

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*End of the Battery Portion Opposite the Cartomizer, or a
Reasonable Expectation of Success in Doing So*

94. I disagree with Petitioner and Dr. Janet’s articulated motivations to combine Pan with Levin to achieve electrical contacts at the end of the battery portion opposite the cartomizer.

95. First, I understand that Petitioner argues that “[a] POSA would have recognized the advantages of including charger contacts on the device, such as the ability to recharge the battery without having to remove the battery from the device, thereby making it more convenient for the consumer.” Petition at 22; *see also* Ex. 1005 ¶ 101 (“In my opinion, a POSA would have found it ideal to include charger contacts on the exterior of the vaporizer such that adult consumers can recharge the device without removing the battery.”). However, a person of ordinary skill in the art would have recognized that neither Pan nor Levin discuss this supposed advantage. Further, I note in particular that Pan does not identify the capacity of its batteries compared to the power draw from normal usage. In my opinion, Pan’s batteries could have a high enough capacity to enable usage for weeks or months without recharging. This would, in turn, reduce the benefit to a user of easier recharging. Moreover, there is an advantage to charging batteries outside the device, as Pan’s existing rechargeable batteries would allow. A fully-charged set of batteries can be swapped in to replace depleted batteries, and thus allowing the device to be

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used without ever connecting it to a power supply. Using the non-replaceable micro-USB charging system suggested by Petitioner and Dr. Janet would, in my view, negate this advantage.

96. Second, I understand that Petitioner argues that “[a] POSA would have been motivated to include charger contacts on the device because it would have enabled a consumer to use the device while the batteries are charging. It is not uncommon for a consumer to run the battery down but still continue to want to use the device.” Petition at 22-23; *see also* Ex. 1005 ¶ 101 (“This also allows an adult consumer to use the device while charging which is a commonly sought-after benefit.”). Again, neither Pan nor Levin discuss this purported advantage, and the advantage is minimized if Pan’s existing batteries are high enough capacity compared to the device’s power draw. Additionally, I understand that this advantage is discussed in the ’722 patent itself. ’722 patent at 15:23-29 (“In some of these embodiments where the cartomizer portion is not removed from the vaporizer to expose the electrical connector, the charging contacts are incorporated into the device such that the vaporizer or electronic cigarette may be operated in its typical fashion during the recharging of the battery (‘pass-through’ charging).”). I am informed that using the listed advantages of a patent as a roadmap to the purported invalidity of the patent constitutes impermissible hindsight bias. Further, a person

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of ordinary skill in the art would have understood that Pan's device is not intended to be operated with cigarette cap 13 removed. Pan teaches that the cap 13 has small holes for air inflow. As such, a person of ordinary skill in the art would understand that the cap is part of the airflow path and needs to be in place when the device is used to provide the correct resistance to airflow. Therefore, this purported benefit is not applicable to Pan's device, including as modified as suggested by Petitioner.

97. Third, I understand that Petitioner argues that “[a] POSA would have been further motivated to include charger contacts on the device because it would have enabled the consumer to recharge the batteries anywhere having a compatible charging cord, *e.g.*, at a friend's house. Without charging ports, *e.g.*, a micro-USB port, a consumer would need to bring their own battery charging station with them so that they could remove their batteries and charge them.” Petition at 23; *see also* Ex. 1005 ¶ 103 (“Third, micro-USB connections have long been standardized and a POSA would have been motivated to use widely-adopted charger contacts rather than developing proprietary charger contacts because it provides convenience to adult consumers, and maximizes consumer product safety. . . . Further, a consumer can use the same USB cable for multiple devices. This makes it possible to easily borrow one from another person in the event that a consumer wishes to charge the device while away from their own cable.”). As with the previous purported

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advantages, the magnitude of the benefit depends on the capacity of Pan’s batteries versus the power draw of Pan’s device, which are not discussed in Pan and which are also not addressed by Petitioner or Dr. Janet.

98. Fourth, I understand that Petitioner argues that “[a] POSA would have been motivated to include USB charger contacts to enable additional features in the device – *i.e.*, provide access to the internal electronics. A micro-USB receptacle, for example, enables data transmission in addition to charging.” Petition at 23; Ex. 1005 ¶ 104 (“[A] POSA would have been motivated to use a USB port because in addition to charging, USB ports enable data transmission, opening up possibilities for additional features.”). In my opinion, the additional burdens for these unspecified “additional features” would outweigh any potential benefit. The incorporation of USB data transmission capabilities would lead to a meaningfully more complex device, thereby escalating both the associated costs and the challenges faced during the manufacturing process. Such an integration would necessitate supplementary firmware to be embedded within the device itself, as well as mandate the development of compatible software for the external device tasked with establishing a connection to the inhaler. A person of ordinary skill in the art would have understood that these additional requirements would contribute to increased complexity and potential points of failure. Moreover, Petitioner and Dr. Janet fail

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to identify or justify the “additional features” that would be made possible through the implementation of USB data transmission. To a skilled artisan, the absence of a compelling justification for the inclusion of such functionality would raise doubts about its necessity and practical utility in the context of an inhaler device. In addition, Pan teaches to avoid having complexity and a high manufacturing cost, which made prior art devices difficult to commercialize. Pan at 1:55-57.

99. Fifth, I understand that Petitioner argues:

A POSA would have known to place the charger contacts at the distal end of the device because it is an ergonomic location for charger contacts. Specifically, the consumer can grip the device in one hand along the longitudinal axis and easily insert the charger cable (and possibly continue to use the device). If the charging contacts are along the length of the device, it would be more difficult for a consumer to insert the charger cable because there would be torque on the device during insertion. Moreover, there are a finite number of places to put the charger contacts, and the distal end is a typical location.

Petition at 24. Similarly, Dr. Janet writes:

[I]t is my opinion that a POSA would have been motivated to incorporate Levin’s charger contacts such that they are placed at the distal end of the Pan’s device. Such a design is ergonomically preferred because the adult consumer may grip the device in one hand along the longitudinal axis and insert the charger cable with ease. Placing the charging port along the length of the device would make it more difficult for an adult consumer to insert the charger cable because of resulted torque on the device during insertion. Take a mobile phone, for instance. Mobile phones almost universally have the charger port at the bottom of the phone. This provides the most stable location for inserting the charging cable because the user is able to comfortably grip the phone along the narrower part of the phone while plugging in the

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charging cable. Further, this arrangement could facilitate use of the device while charging, allowing an extra degree of flexibility and convenience for the consumer.

Ex. 1005 ¶ 102.

100. I disagree with Petitioner and Dr. Janet that any ergonomic considerations would have led a person of ordinary skill in the art to place additional contacts at the distal end of the device. First, placing the micro-USB port at the distal end would require a user to remove a cap before it could be charged. From an ergonomics perspective, this is an extra step that should be avoided and it adds risk and high likelihood that the cap would be lost. However, if a person of ordinary skill in the art were so motivated (and I do not believe one would, given the circuitry already present in Pan), they would have used the existing contacts in the cartridge receiving (proximal) end of Pan's atomizer (*i.e.*, the middle of the assembled device), not added new ones to the distal end of the assembled device. Pan teaches a connection for a DC circuit between the device and the cartomizer to energize the heater. Pan discloses a first electric connector 17 of a DC plug-socket type to electrically connect the device and cartomizer. The electronic inhaler includes an inhaler tube 10, cigarette cap 13 with small holes for air inflow, LED indicator 12, electric power source 5, seal piece 25, sensor supporter 61, electric airflow sensor 6, integrated circuit board with a CPU processor 14, and the first electric connector 17

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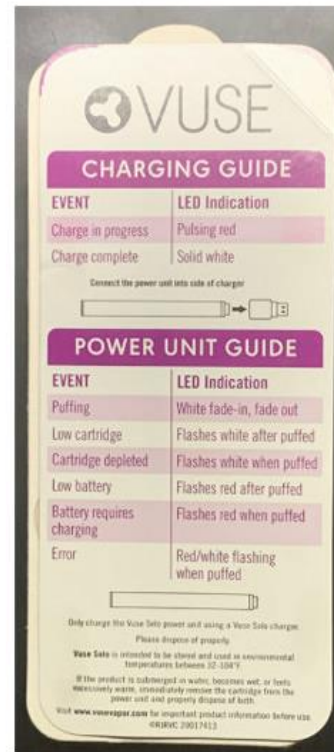
located on the DC socket seat 28. Pan at 5:29-36. Because this first electric connector 17 is located in the middle of the assembled device, it is not “disposed at a first end of the battery portion opposite the insertion end of the chamber of the cartomizer receiving segment,” as required by the claims. In my opinion, even assuming for the sake of argument that a person of ordinary skill in the art would have been motivated to add recharging connections for some reason, they would use reuse the same, existing contacts in the middle of the device. Placing charging contacts in the middle of the device was a typical configuration. As just one example, I have personal knowledge that the VUSE Solo inhaler device employed a standard USB charger that the inhaler device plugged into using the same end that the cartridge plugs into the device:

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VUSE Package:



VUSE Package Insert



VUSE Cartridge plugged into VUSE Device next to USB Charger



VUSE Device plugged into USB Charger next to VUSE Cartridge



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101. Rather than introducing new contacts, leveraging the contacts already present in Pan's device would simplify the redesign process and minimize the need for extensive modifications. This approach recognizes the importance of working within the existing framework and capitalizing on the established electrical connections. I additionally note that Dr. Janet assumes that locating the charging contacts in the middle of the device would necessarily mean that the charging cable is inserted perpendicular to the assembled device. But as the VUSE Solo shows, another configuration is to place the charging contacts at the junction of the battery and the cartomizer and to insert the charging cable parallel to the assembled device. This configuration would obtain Dr. Janet's listed "ergonomic" and "torque" benefits while being entirely different from the claimed configuration. Additionally, I note that neither Pan nor Levin discuss any such benefits, and in my opinion they would be minor. Moreover, inserting a charging cable perpendicular to the assembled device could be considered "ergonomic" as well because it adds a location to firmly grasp the device. Finally, Dr. Janet analogizes to mobile phone charge points. But electronic vaporizers and mobile phones are different devices, and Dr. Janet fails to explain why the charger position in phones is applicable to vaporizer. In most mobile phones, users cannot easily replace the batteries

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themselves. Because of this, it is crucial to prioritize battery life when designing these devices. The battery is usually limited to a specific area within the phone due to space constraints. As a result, the placement of the charging port is often determined by where the battery is located, rather than simply putting it at the bottom of the device for convenience.

102. Sixth, regarding reasonable expectation of success, I understand that Petitioner argues:

A POSA would have had a reasonable expectation to successfully incorporate a micro-USB receptacle with electrical contacts at the distal end of Pan's inhaler. Micro-USB receptacles were standardized, well-known in the art, and specifically disclosed in prior art e-vapor devices. . . . Moreover, Levin's micro-USB charger contacts are installed at its end cap; Pan likewise has an end cap 13. Thus, a POSA would have expected Levin's micro-USB charger contacts to work equally well at Pan's end cap.

Petition at 24; *see also* Ex. 1005 ¶ 105 (“In my opinion, a POSA would have had a reasonable expectation of incorporating a micro-USB receptacle at the distal end of Pan's device. As I have explained, Micro-USB receptacles had been standardized and well-known in the art. Also, prior art e-vapor devices specifically disclose using USB receptacles. . . . Moreover, Levin's micro-USB charger contacts are installed at its end cap. . . . Pan likewise has an end cap 13. . . . Therefore, a POSA would have had a reasonable expectation that Levin's micro-USB charger receptacle would work equally well when placed at Pan's end cap.”). I disagree with Petitioner and

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Dr. Janet. Although Petitioner and Dr. Janet assert that micro-USBs were well-known at the time of the invention, they do not address the cost of micro-USB ports. A person of ordinary skill in the art would have understood that they were high, particularly compared to other potential and actual components in Pan's device. I note that Pan itself states that "due to its extreme complexity in structure and very high manufacturing cost," "electronic cigarettes were difficult to commercialize." Pan at 1:55-57. Pan also states that "the existing electronic cigarette devices have several major drawbacks: (1) too complex to be implemented as ordinary consuming product and (2) too costly for manufacturing and maintenance." *Id.* at 2:4-7. According to Pan, the main point of its invention was to "overcome at least some of the above-described problems." *Id.* at 2:16-18. In my opinion, a person of ordinary skill in the art would not exacerbate the issues surrounding cost, and unnecessarily make the device in Pan more expensive. A person of ordinary skill in the art would have recognized that adding an additional costly micro-USB component would be contrary to the expressed purpose of Pan's invention. In this context, a person of ordinary skill in the art would have understood that Pan teaches away from the addition of a micro-USB port via its repeated emphasis on simplicity, cost-effectiveness, and ease of manufacturing.

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103. Additionally, I do not agree with Petitioner and Dr. Janet's assertion that a person of ordinary skill in the art would have had a reasonable expectation of success in modifying Pan's device to add Levin's micro-USB contacts because both devices allegedly have an end cap. Neither Petitioner nor Dr. Janet explain why the alleged common presence of an end cap would lead to a reasonable expectation of success, and it simply does not follow that it would. In particular, Pan's cigarette cap 13 is not designed for charging. Pan's cigarette cap 13 is designed for air intake instead, and hence is used for an entirely different purpose than Levin's end cap. *E.g.*, Pan at 5:31-32 ("cigarette cap 13 with small holes for air inflow"). Pan's cigarette cap 13 would have to be replaced in the combination, and in doing so would compromise the airflow function. In this context, the presence of different structures with different purposes at the distal ends of the devices would counsel against the combination, and would certainly not indicate a reasonable expectation of success.

2. *A Person of Ordinary Skill in the Art Would Not Have Been Motivated to Combine Pan with Levin to Achieve Electrical Contacts at the End of the Battery Portion Opposite the Cartomizer, and Would Not Have a Reasonable Expectation of Success in Doing So*

104. In my opinion, there are several additional reasons why a person of ordinary skill in the art would not have been motivated to modify Pan's device to

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add Levin's micro-USB port, and would not have a reasonable expectation of success in doing so.

105. First, there are several negative implications of incorporating a micro-USB connector from Levin in Pan's device, which include additional component cost, complexity, and how to modify the air flow of the system given that the micro-USB receptacle would modify or displace the cigarette cap 13 in Pan that has small holes for air inflow. It is important to note that adding the micro-USB port from Levin into Pan's device would require more than just the visible external connector. The internal circuitry needed to support the micro-USB port, such as the printed circuit board (PCB) described in Levin, would also have to be incorporated. However, Petitioner and Dr. Janet do not address the placement of this additional circuitry within Pan's device or consider the cost and complexity of integrating these components. In my opinion, the cost and complexity would be high. Accommodating the micro-USB connector would necessarily reduce the available space for other essential components, such as the e-liquid container or the battery, due to the connector's length.

106. Second, the differences in form factor of Levin's device versus that of Pan's device would decrease the motivation for a person of ordinary skill in the art to perform Petitioner's suggested modification of Pan's device. Petitioner and Dr.

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Janet do not explain how, given the dimensions of Levin's micro-USB connector, it could fit into Pan's device—and it would not. I note that Levin's device has a "main body housing having a non-circular" which is "advantageous as it allows sufficient space for the power source (e.g., cylindrical batteries) within defining air passageways 6 outside the batteries to allow flow of air through the device." Levin at 11:7-11. In my opinion, the micro-USB connector from Levin would not fit within Pan's device. The extra circuitry that is required, like the PCB from Levin, would not be able to fit inside Pan's device as-is. Thus, the micro-USB connector and associated circuitry would need additional space, which would reduce the amount of space available for holding the liquid or the battery. To make the suggested combination work, certain components like the battery would have to be made smaller, while other components like the housing would need to be made larger. This would be necessary to make the proposed changes to the structure and electrical system. However, Petitioner and Dr. Janet do not provide any information about the width or overall size of a micro-USB connector. They also do not discuss the size of Pan's device. At the time of the invention of the '722 patent, people with ordinary skill in the art would have known that the industry strongly preferred to make products that were similar in height, weight, appearance, and feel to a real cigarette, which has a typical diameter of 7.5-8 mm. Consistent with this, Pan's device is

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specifically designed to look like a cigarette. The abstract of Pan states: “An electronic cigarette has two tubes that resemble a cigarette: an electronic inhaler and an electronic atomizer.” In my opinion, the Petitioner and Dr. Janet have not addressed or shown that the micro-USB port from Levin would be able to fit inside Pan’s device while retaining its cigarette-like form factor. Indeed, it is my opinion that a person of ordinary skill in the art would not have been able to accomplish the suggested modification of Pan’s device without compromising its form factor.

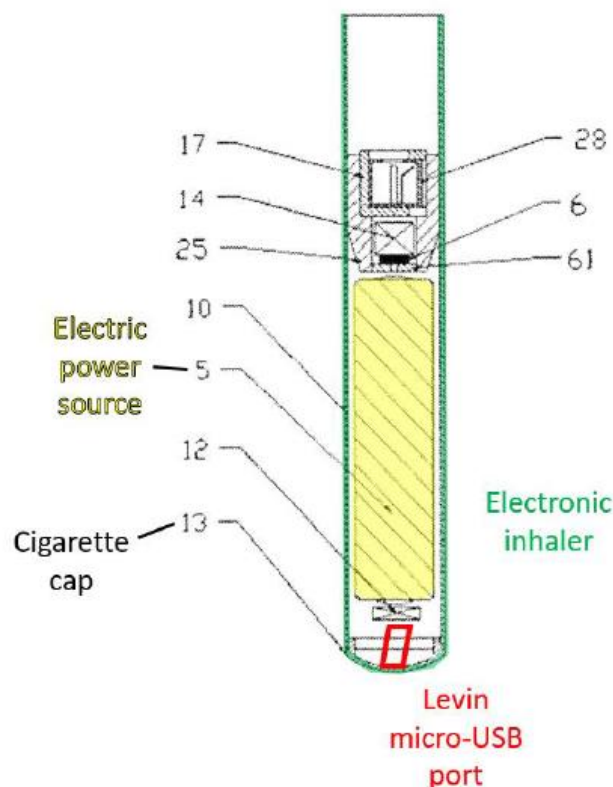
107. Third, in my opinion a person of ordinary skill in the art would not want to place the micro-USB connectors from Levin at the bottom of Pan’s device because the device already has holes at the bottom for air inflow. In my opinion, blocking or otherwise restricting this airflow will impact the performance and functionality of Pan’s device, and adding Levin’s micro-USB connector will naturally affect the airflow. The air inflow is critical to the operation of Pan’s device. Pan teaches that “the user inhales through the air-puffing hole at the end of the electronic cigarette to create an air inflow, which triggers the atomization process.” Pan at Abstract. Pan also teaches that there is a “cigarette cap 13 with small holes for air inflow.” *Id.* at 5:10-11. Petitioner and Dr. Janet do not discuss the airflow impact of modifying Pan’s device in the proposed manner, and the modification would invariably interfere with the existing airflow, necessitating a costly redesign. Additionally, a

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person of ordinary skill in the art would have known that things like changes in pressure inside the device, friction force, the volume and speed of the airflow, and how hard it is to draw air could all affect how well the device works. Therefore, the micro-USB port from Levin could not just be transplanted at the end of Pan's device without affecting the air inlet holes and the overall way air flows through the device. I note that Petitioner and Dr. Janet also ignore the impact on Pan's LED indicator 12, which is also present at the distal end of Pan's device, from adding a charger contact.

108. Below, I reproduce Petitioner's annotation of Pan's Figure 5:

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EX1010, Fig. 5

Petition at 25. Elements 12 and 13 are an LED indicator and the cigarette cap with small holes for air inflow, respectively. However, as shown in the image, Petitioner simply ignores these components when arguing that a POSITA would place the electrical contacts at this location, and superimposes a “Levin micro-USB port” on top of the existing components. In my opinion, this configuration is not physically possible.

109. Fourth, a person of ordinary skill in the art would have known that it would be cheaper to use the contacts for a cartridge that were already there instead

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of adding more parts like a micro-USB port. This is because the device already had a way to connect the cartridge. Also, the circuit board with the processor 14 in Pan's device is in the middle of the device. To add a micro-USB port, circuit board 14 would have to be moved, or another circuit board would need to be added at the tip of the device. The new circuit board would be needed to hold the micro-USB connector. Additional connecting wires would need to be added between the two circuit boards. Doing this would make the device more expensive and complicated to make. Therefore, a person of ordinary skill in the art would have recognized that Pan teaches away from being modified with Levin micro-USB port.

110. Fifth, Petitioner's proposed modification of Pan would result in having two parts that do the same thing, which is not desirable. Incorporating the micro-USB port from Levin into Pan's device would also entail adding the associated internal circuitry necessary to support the externally-visible micro-USB connector, such as Levin's PCB. The printed circuit board (PCB) 32 in Levin already has LEDs mounted to it, along with the micro-USB connector. *E.g.*, Levin at 13:12-20. These LEDs "may be configured so as to fade up and down so as to vary in illumination intensity in proportion to an air flow velocity through the device to as to simulate the glowing tip of a cigar." *Id.* Pan also teaches that its LED indicator, "which is connected to both the CPU processor 3 and electric power source 5, lights up when

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the electric current flows and it is turned off when the electric current stops flowing.” Pan at 4:23-26. Indeed, like Levin, Pan’s “process closely mimics the process of cigarette smoking.” *Id.* Levin also describes PCB 32 “having a memory module with firmware recorded thereon, for use in activating and/or controlling the heating unit and distal light source described above in response to various inputs from a user or various sensors or components of the device.” Levin at 18:58-63. Like Levin, Pan also teaches that “the present invention is the use of an electric airflow sensor instead of a mechanical device in detecting an airflow generated by the user’s puffing and creating an airflow generated by the user’s puffing and creating a signal for the microprocessor to activate the electric circuit.” Pan at 3:25-28. Indeed, “once the circuit is activated, the electric power source sends an electric current to the system and the connected integrated atomizer, and the process begins.” *Id.* at 3:28-31. The key point is that Pan’s device already has the same functions that Levin’s device has, but in a separate component that Petitioner and Dr. Janet do not consider. Adding Levin’s micro-USB port would result in having two parts that do the same thing in the Petitioner’s proposed combination. This suggests that a person with ordinary skill in the art would not combine the teachings from these two references.

111. Sixth, changing the design of Pan’s device to recharge a battery inside the device has some major drawbacks compared to simply replacing the battery.

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Replacing a battery is a very quick process. In contrast, recharging a battery takes a significant amount of time. The user would need to plug the device in or place it on a charging pad and wait for it to recharge. Also, if the device has a replaceable battery, the user doesn't need to carry around a separate recharging unit. They can simply carry some spare batteries with them and swap them in as needed. With a replaceable battery, the user also has the choice between using rechargeable batteries or disposable single-use batteries, depending on their preference and what's most convenient for them in a given situation. For example, rechargeable batteries can be cost-effective and environmentally friendly if the user is able to easily recharge them regularly. Disposable batteries may be preferred if the user needs to quickly replace the battery without access to a charger, or if they want the long shelf life of a fresh disposable battery. Using standard disposable batteries also allows the user to buy them almost anywhere if they run out, instead of needing a specialized rechargeable battery. Giving users the flexibility to quickly and easily swap batteries as they prefer has significant benefits in terms of convenience and being able to adapt to different situations and preferences. The ability to use standard commodity batteries that are readily available everywhere is also a plus.

112. Seventh, a person of ordinary skill in the art would not have a reasonable expectation of success in making the suggested changes to Pan's e-

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cigarette device. None of the changes are straightforward. Instead, these modifications would require completely redesigning the device from scratch, including changing the electrical connections of the battery and the airflow connections to the sensor. These changes would need significant analysis and design work focused on the airflow inside the device. Getting the airflow right in an e-cigarette is extremely complex and the subject of much research. Having the correct airflow, connections, and fit are crucial. The draw resistance—how hard you have to pull to inhale the vapor—is a key factor and hard to get right. Among other things, the draw resistance affects how much effort the user needs to inhale; how much vapor is produced; the size of the visible vapor cloud exhaled; the “throat hit” sensation; and the particle size of the inhaled aerosol. All of these factors have to be carefully balanced to provide a satisfying user experience. But the proposed changes to Pan’s device would disrupt all of these interrelated factors. In the worst case, it could ruin the user experience. Even in the best case, it would need significant analysis to rebalance everything properly after any design changes. As a result, a person of ordinary skill in the art would understand that the changes are challenging. So they would not expect to be able to make the suggested changes successfully. Instead, they would expect that any change, even a small one, would

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require a lot of additional work to fully evaluate the impact on the device's functioning and user experience.

VII. GROUND 2 FAILS FOR THE SAME REASONS AS GROUND 1

113. Ground 2 of the petition challenges claims that are dependent on the independent claims challenged in Ground 1, and uses the same base references as Ground 1. Thus, they rely on the analysis of Ground 1. In my opinion, Ground 2 fails for the same reasons I discussed above with respect to Ground 1.

VIII. GROUND 3: THE PETITION FAILS TO DEMONSTRATE A REASONABLE LIKELIHOOD CLAIMS 1, 5, 7, 9-13, 15-16, OR 18-21 ARE OBVIOUS BASED ON THORENS788 IN VIEW OF THORENS231 AND LEVIN

114. 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 Thorens231, or to combine Thorens788 with Levin, or to combine all three references, in order to modify Thorens788's device to achieve the challenged independent claims. Petitioner and Dr. Janet have also not established a reasonable expectation of success in making the proposed combination.

D. Petitioner and Dr. Janet Have Not Established that Thorens788 in View of Levin Renders Obvious Electrical Contacts at the End of the Battery Portion Opposite the Cartomizer

115. I understand that Petitioner and Dr. Janet concede that Thorens788, the base reference for Ground 3, does not meet the "plurality of charger electrical

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contacts disposed at a first end of the battery portion” and similar limitations. Petition at 65 (“Thorens788 discloses a rechargeable battery, but it does not disclose charging contacts on the housing 101.”). I understand that Petitioner and Dr. Janet instead contend that it would have been obvious to adapt Thorens788 to include Levin’s micro-USB charging port. Petition at 65-68, 75-76; Ex. 1005 ¶¶ 206-10. I disagree.

116. It is my opinion that a person of ordinary skill in the art would not have found it obvious to combine Thorens788 and Levin in the manner suggested by Petitioner and Dr. Janet. In particular, first, a person of ordinary skill in the art would not have had a motivation to combine Thorens788 with Levin. Second, a person of ordinary skill in the art would not have had a reasonable expectation of success in making Petitioner and Dr. Janet’s suggested combination.

1. *Petitioner and Dr. Janet Have Not Established a Motivation to Combine Thorens788 with Levin to Achieve Electrical Contacts at the End of the Battery Portion Opposite the Cartomizer, or a Reasonable Expectation of Success in Doing So*

117. I understand that both Petitioner and Dr. Janet rely primarily on their write-up of the proposed combination of Pan and Levin from Ground 1, for their motivations to combine Thorens788 with Levin in Ground 3:

A POSA would have been motivated to modify Thorens788 to include the micro-USB charging contacts at the distal end of Thorens788 housing 101 for the reasons articulated for Pan: e.g., convenience,

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compatibility, use of the device while charging, possibility of additional features, and ergonomics. See IX.A.1. Further, locating the charging contacts at the distal minimizes the risk of the consumer touching the contacts during use.

Petition at 67. Similarly, I understand that Dr. Janet wrote:

In my opinion, a POSA would have been motivated to modify Thorens788 to include the micro-USB charging contacts for the reasons I articulated above for Pan: *e.g.*, more ergonomic, micro-USB chargers were ubiquitous, micro-USB chargers permit additional features to be added to the device. See Section VIII.C.1.a. Moreover, a POSA would have been further motivated to locate the charging contacts at the distal end as shown below because the consumer would be less likely to touch the contacts during use. Placing the contacts on the side could lead to premature corrosion of the contacts (oil from the consumer's fingers, increased dirt on the contacts, and possible shorting of the device if the consumer was wearing jewelry).

Ex. 1005 ¶ 209.

118. This is all that Petitioner and Dr. Janet wrote concerning combining Thorens788 with Thorens231 and Levin to achieve the claimed electrical contacts. I disagree, and in my opinion this material is insufficient to establish a motivation to combine. This is simply a recitation of generic advantages without recognizing any of the many disadvantages. The advantages are not articulated in the prior art references themselves. Petitioner and Dr. Janet do not address the different structures and configurations of the different base references, Pan and Thorens788. A person of ordinary skill in the art would have recognized that the nature of the device described in the base reference is crucial, and that a motivation to combine

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would need to address and recognize the relevant differences—which Petitioner and Dr. Janet have not done.

119. The Petition and Dr. Janet’s only additional analysis is that “locating the charging contacts at the distal [sic] minimizes the risk of the consumer touching the contacts during use.” Pet. 67; *see also* Ex. 1005 ¶ 209 (“Placing the contacts on the side could lead to premature corrosion of the contacts (oil from the consumer’s fingers), increased dirt on the contacts, and possible shorting of the device if the consumer was wearing jewelry.”). I note that neither Thorens788 nor Thorens231 mention this purported advantage. I further note that this motivation only applies to the location of the contacts, not to why to add contacts in the first place. Additionally, this analysis assumes that the contacts are on the exterior of the device, but the contacts could be placed at the middle of the assembled device, at the junction between the battery and the cartomizer, and only exposed when the device is not assembled, such as with the VUSE Solo that I reviewed earlier in this declaration. Finally, Thorens788 discloses existing contacts that are at the base of the aerosol forming chamber 127 within the housing 101, so are well protected from a user’s touch. Thorens788 at 15:5-13. As such, a person of ordinary skill in the art would not be motivated to make the proposed combination, at the distal end of the device or otherwise, based on any concern for corrosion, dirt, or shorting.

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120. I understand that Petitioner’s articulated reasonable expectation of success is even more brief. Petition at 68 (“A POSA would have had a reasonable expectation of success incorporating a micro-USB receptacle at the distal end of Thorens788’s housing 101. Micro-USB receptacles were standardized, well-known in the art, and regularly used in e-vapor devices for charging and other purposes. EX1005 ¶210; *see, e.g.*, EX1026, 6:26-32; EX1042, 5:57-60; EX1003, 23:58-60.”). I understand that Dr. Janet’s declaration adds little to the Petition on this issue. Ex. 1005 ¶ 210 (“It is my opinion that a POSA would have had a reasonable expectation of incorporating a micro-USB receptacle at the distal end of Thorens788’s aerosol generating system. Micro-USB receptacles were standardized, well-known in the art, a regularly used in e-vapor devices.”). I disagree with Petitioner and Dr. Janet. There is no analysis or explanation here for me to rebut. And my opinions in the immediately-following section establish that a person of ordinary skill in the art would not have had a reasonable expectation of success in making the proposed modification to Thorens788’s device. To the extent it is applicable, I incorporate by reference here all of my analysis above in the context of the Ground 1.

2. *A Person of Ordinary Skill in the Art Would Not Have Been Motivated to Combine Thorens788 with Levin to Achieve Electrical Contacts at the End of the Battery Portion Opposite*

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the Cartomizer, and Would Not Have a Reasonable Expectation of Success in Doing So

121. 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 Levin's micro-USB port, and would not have a reasonable expectation of success in doing so.

122. First, Petitioner and Dr. Janet do not address the consequences of adding a micro-USB connector from Levin into the e-cigarette described in the Thorens788. They do not consider the cost of the additional components, the added complexity to the device, or the potential impacts on the airflow inside the device. Most importantly, adding the micro-USB port from Levin into the Thorens788 device would also require adding the internal electronic circuits that are needed to connect to the micro-USB port, like the printed circuit board (PCB) from Levin's device. The Petitioner and Dr. Janet do not explain where they would put these additional electronic components inside Thorens788's device. Petitioner's argument for combining these two devices does not address some key practical issues. Adding a micro-USB port is not as simple as just making a hole in the housing. Petitioner and Dr. Janet do not sufficiently explain how this would be done or consider the added cost and complexity involved in integrating these components into the Thorens788 device.

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123. Second, the differences in form factor of Levin's device versus that of Thorens788's device would decrease the motivation for a person of ordinary skill in the art to perform Petitioner's suggested modification of Thorens788's device. Petitioner and Dr. Janet do not explain how, given the dimensions of Levin's micro-USB connector, it could fit into Thorens788's device—and it would not. I note that Levin's device has a "main body housing having a non-circular" which is "advantageous as it allows sufficient space for the power source (e.g., cylindrical batteries) within defining air passageways 6 outside the batteries to allow flow of air through the device." Levin at 11:7-11. In my opinion, the micro-USB connector from Levin would not fit within Thorens788's device. The extra circuitry that is required, like the PCB from Levin, would not be able to fit inside Thorens788's device as-is. Thus, the micro-USB connector and associated circuitry would need additional space, which would reduce the amount of space available for holding the liquid or the battery. To make the suggested combination work, certain components like the battery would have to be made smaller, while other components like the housing would need to be made larger. This would be necessary to make the proposed changes to the structure and electrical system. However, Petitioner and Dr. Janet do not provide any information about the width or overall size of a micro-USB connector. They also do not discuss the size of Thorens788's device. At the

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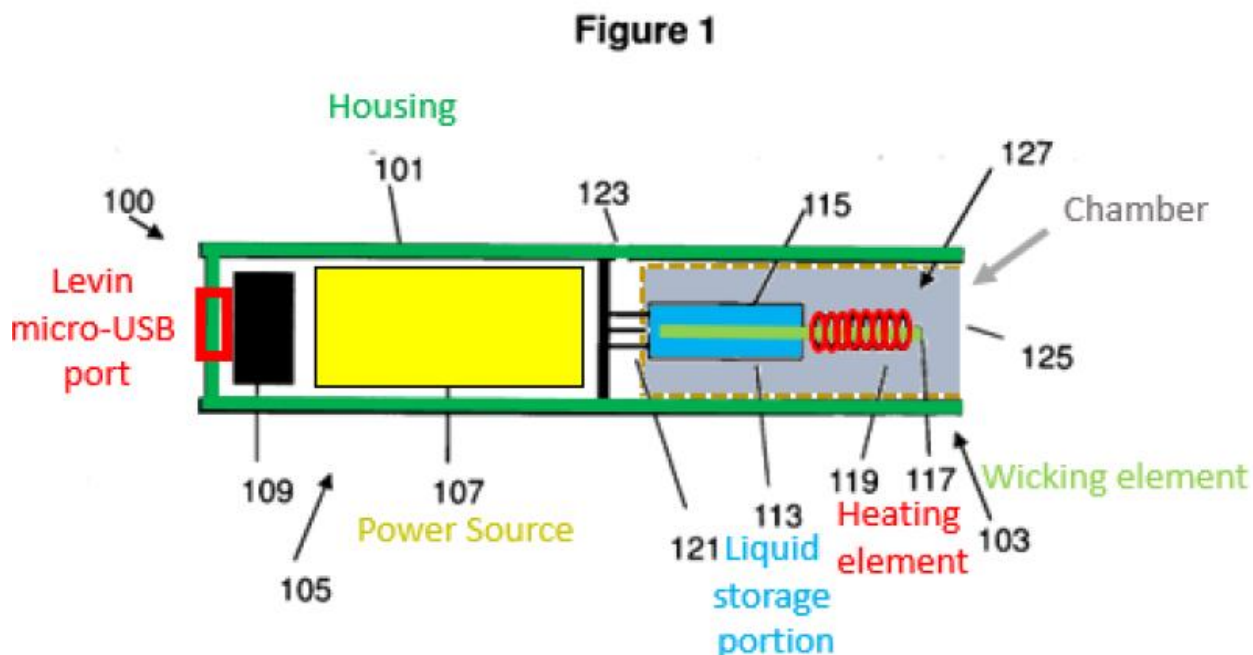
time of the invention of the '722 patent, people with ordinary skill in the art would have known that the industry strongly preferred to make products that were similar in height, weight, appearance, and feel to a real cigarette, which has a typical diameter of 7.5-8 mm. In fact, Thorens788 expressly states that the “smoking system may have a size comparable to a conventional cigar or cigarette,” and that “the smoking system may have a total length between approximately 30 mm and 130 mm,” with “external diameter between approximately 5 mm and approximately 13 mm.” Thorens788 at 11:7-10. In my opinion, the Petitioner and Dr. Janet have not addressed or shown that the micro-USB port from Levin would be able to fit inside Thorens788’s device while retaining its cigar-like or cigarette-like form factor. Indeed, it is my opinion that a person of ordinary skill in the art would not have been able to accomplish the suggested modification of Thorens788’s device without compromising its form factor. In fact, the width of a micro-USB connector is 6.9mm,² so it would obviously not fit in the small end of the diameter range Thorens788 teaches.

124. Third, in my opinion, a person of ordinary skill in the art would not be motivated to place the micro-USB connectors from Levin at the bottom of

² www.usb.org/sites/default/files/CabConn20.pdf, accessed 3/10/2024

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Thorens788's device because that part already has electronic circuitry 109. *Id.* at Fig. 1; 12:10-11. I have reproduced below Petitioner's annotated Figure 1 of Thorens788:



EX1002, Fig. 1

Petition at 68.

125. Electric circuitry 109 is shown directly next to the new micro-USB port, but Petitioner and Dr. Janet do not discuss how adding this port would affect the existing circuitry. Specifically, they do not explain how the new port would connect to the power source 107 through the existing electric circuitry 109 or if there is enough room for a micro-USB connector plug. Indeed, Petitioner's annotated figure

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indicates there is not enough space. The dimensions in Petitioner's annotated figure are also incorrect. The misleadingly-annotated figure shows the micro-USB receptacle much smaller than it would actually be relative to an 8 mm diameter device, and shows the aspect ratio of the micro-USB port such that its contacts are extending from the side and not the end of the device. Moreover, Petitioner and Dr. Janet do not explain how the micro-USB receptacle will be attached to the device. Furthermore, modifying the device in Thorens788 to include charging contacts will create holes in the device, which would necessarily alter the pressure or air flow within the device. In fact, if this is not taken into account, it will affect the device's performance and functionality, such as the sensitivity of any puff detection sensor. A person of ordinary skill in the art would understand that factors like pressure changes within the device, friction force, airflow, airflow velocity, draw resistance, and similar variables could all affect the functionality and performance of the device, and that these factors could all be impacted even if the air inlet 123 in Thorens788's device is positioned at the midpoint of the assembled inhaler. Therefore, Levin's micro-USB port could not be simply added to the distal end of Thorens788's device without potentially harmful side effects and additional necessary engineering changes, which Petitioner and Dr. Janet disregard.

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126. Fourth, Petitioner and Dr. Janet argue that micro-USB ports were widely known when the invention was made, but the cost of producing and using them was high. A person of ordinary skill in the art would be aware that micro-USB connections were not intended for devices where cost was a major consideration, as there were less expensive connectors available on the market. A skilled artisan would not worsen the problems related to cost and needlessly increase the expense of the device described in Thorens788.

127. Fifth, Petitioner's proposed modification of Thorens788 would result in having two parts that do the same thing, which is not desirable. Incorporating the micro-USB port from Levin into Thorens788's device would also entail adding the associated internal circuitry necessary to support the externally-visible micro-USB connector, such as Levin's PCB 32. Levin describes PCB 32 "having a memory module with firmware recorded thereon, for use in activating and/or controlling the heating unit and distal light source described above in response to various inputs from a user or various sensors or components of the device." Levin at 18:58-63. Like Levin, Thorens788 also has numerous memory modules, such as "in the embodiment in which the electric circuitry comprises a sensor a sensor to detect air flow indicative of a user taking a puff, the indicator may be activated when the sensor senses air flow indicative of the user taking a puff." *E.g.*, Thorens788 at 10:17-19.

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The key point is that Thorens788's device already has the same functions that Levin's device has, but in a separate component that Petitioner and Dr. Janet do not consider. Adding Levin's micro-USB port would result in having two parts that do the same thing in the Petitioner's proposed combination. This suggests that a person with ordinary skill in the art would not combine the teachings from these two references.

128. Sixth, in my opinion a person of ordinary skill in the art would not have a reasonable expectation of success in making the suggested changes to Thorens788's e-cigarette device. None of the changes are straightforward. Instead, these modifications would require completely redesigning the device from scratch, including changing the electrical connections of the battery and the airflow connections to the sensor. These changes would need significant analysis and design work focused on the airflow inside the device. Getting the airflow right in an e-cigarette is extremely complex and the subject of much research. Having the correct airflow, connections, and fit are crucial. The draw resistance—how hard you have to pull to inhale the vapor—is a key factor and hard to get right. Among other things, the draw resistance affects how much effort the user needs to inhale; how much vapor is produced; the size of the visible vapor cloud exhaled; the “throat hit” sensation; and the particle size of the inhaled aerosol. All of these factors have to

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be carefully balanced to provide a satisfying user experience. But the proposed changes to Thorens788's device would disrupt all of these interrelated factors. In the worst case, it could ruin the user experience. Even in the best case, it would need significant analysis to rebalance everything properly after any design changes. As a result, a person of ordinary skill in the art would understand that the changes are challenging. So they would not expect to be able to make the suggested changes successfully. Instead, they would expect that any change, even a small one, would require a lot of additional work to fully evaluate the impact on the device's functioning and user experience.

E. Petitioner Has Not Established that Thorens788 in View of Thorens231 Renders Obvious a Cartomizer Body Containing the Required Elements

129. I understand that Petitioner and Dr. Janet identify Thorens788's cartridge 113 as the claimed "cartomizer." Petition at 78; Ex. 1005 ¶ 233. I understand that Petitioner and Dr. Janet identify a combination of Thorens788's cartridge 113 and Thorens231's "mouthpiece housing" as the claimed cartomizer "body." Petition at 80; Ex. 1005 ¶ 238.

130. 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.

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1. *Petitioner and Dr. Janet Have Not Established a Motivation to Combine Thorens788 with Thorens231 to Achieve a Cartomizer Body Containing the Required Elements, or a Reasonable Expectation of Success in Doing So*

131. 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.

132. First, I understand that Petitioner argues that “Thorens788 already discussing [sic] a mouthpiece housing and a POSA would have looked to Thorens231, which shares common inventors and is directed to substantially the same invention.” Petition at 64; *see also* Ex. 1005 ¶ 217 (“Specifically, a POSA would have been motivated to incorporate Thorens231’s mouthpiece housing because 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.”). 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.

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133. I understand that Dr. Janet’s declaration devotes three paragraphs to the contention that Thorens788 and Thorens231 “are directed to substantially the same device.” Ex. 1005 ¶¶ 214-16. 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.”

134. Second, I understand that Petitioner argues that “a POSA would have been motivated to provide a mouthpiece housing for Thorens788 because the cartridge is replaceable, and without a housing, a consumer would be forced to grip the heating element to remove the mouthpiece. That could lead to injury if the heating coil is still hot.” Petition at 64; *see also* Ex. 1005 ¶ 217 (“It is my opinion 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 protecting 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 inconvenient and unsanitary.”). However, I note that neither Thorens788 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

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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.

135. 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.

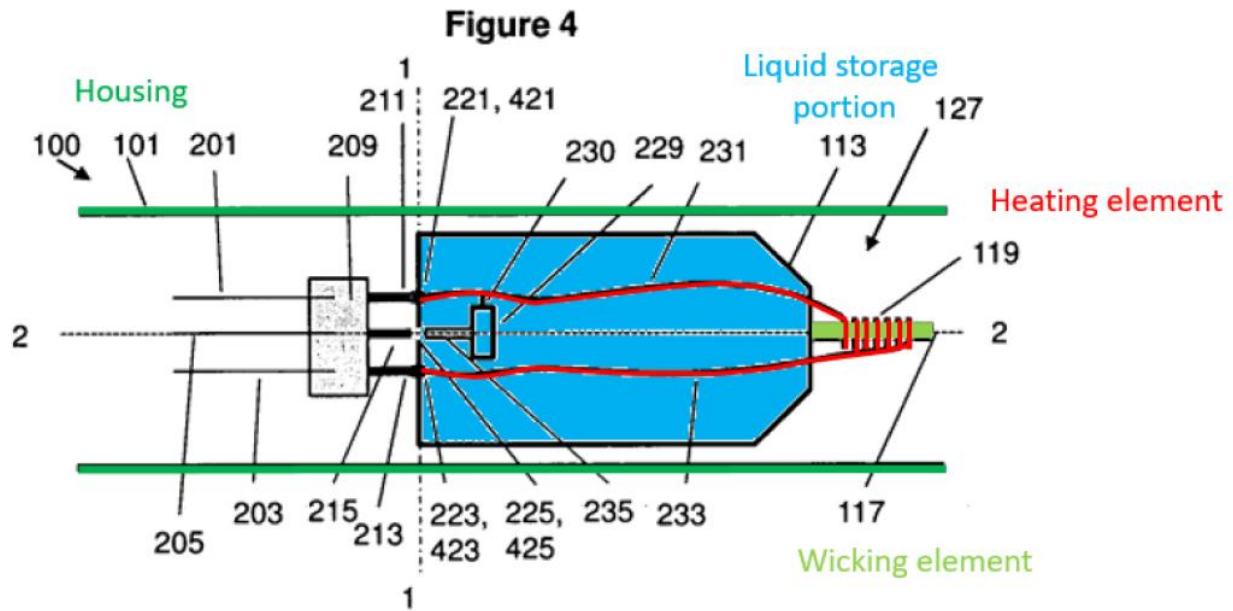
2. *A Person of Ordinary Skill in the Art Would Not Have Been Motivated to Combine Thorens788 with Thorens231 to Achieve a Cartomizer Body Containing the Required Elements, and Would Not Have a Reasonable Expectation of Success in Doing So*

136. 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 body, and would not have a reasonable expectation of success in doing so.

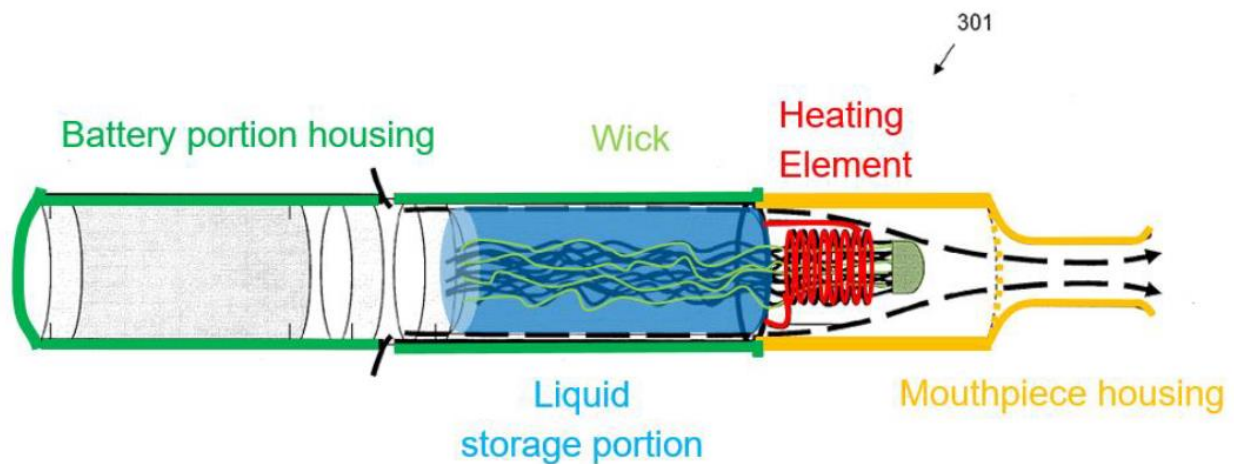
137. First, Petitioner and Dr. Janet do not take into account the different form factors and structural configurations of the separate devices described in Thorens788 and Thorens231. Petitioner and Dr. Janet do not address how modifying Thorens788's device to include a mouthpiece would affect the performance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

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recognized that the two devices have the heating elements located at different 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



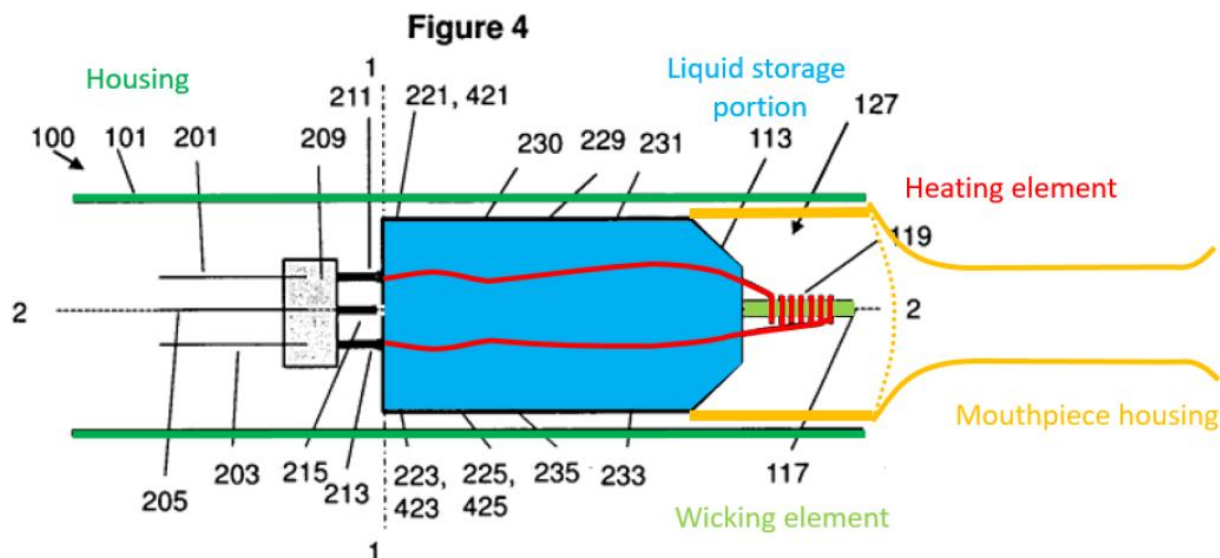
EX1002, Fig. 3.

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Petition at 63-64.

138. 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 liquid storage portion of the device, while the heating element for Thorens231 is located 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.

139. 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

JLI Ex. 2001, Page 84

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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.

140. 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

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resistance influences vapor production, the size of the visible vapor cloud, throat hit, 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.

IX. GROUND 4 FAILS FOR THE SAME REASONS AS GROUND 3

141. Ground 4 of the petition challenges claims that are dependent on the independent claims challenged in Ground 3, and uses the same base references as Ground 3. Thus, they rely on the analysis of Ground 3. In my opinion, Ground 4 fails for the same reasons I discussed above with respect to Ground 3.

X. SECONDARY CONSIDERATION OF NON-OBVIOUSNESS

142. In my opinion, there is strong, objective evidence that the '722 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, JLI Ex. 2001, Page 86

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the '722 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.

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

A. Nexus

144. In my opinion, the JUUL System is coextensive with at least claim 1 of the '722 patent and therefore I understand it is assumed there is a nexus between the '722 patent and the objective evidence relating to the JUUL System. As I show below, the JUUL System embodies claim 1 of the '722 patent.

1. 1[pre]: A vaporizer comprising:

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

[REDACTED]

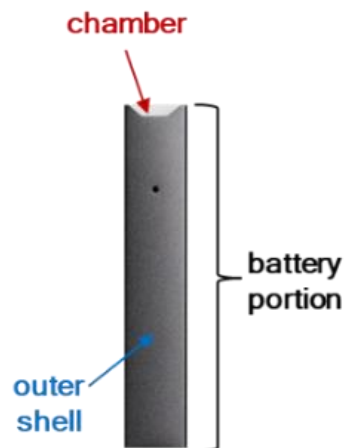
[REDACTED]

[REDACTED]

Ex. 2003, 9, 11.



Ex. 2054 (annotated).



Ex. 2055 (annotated).

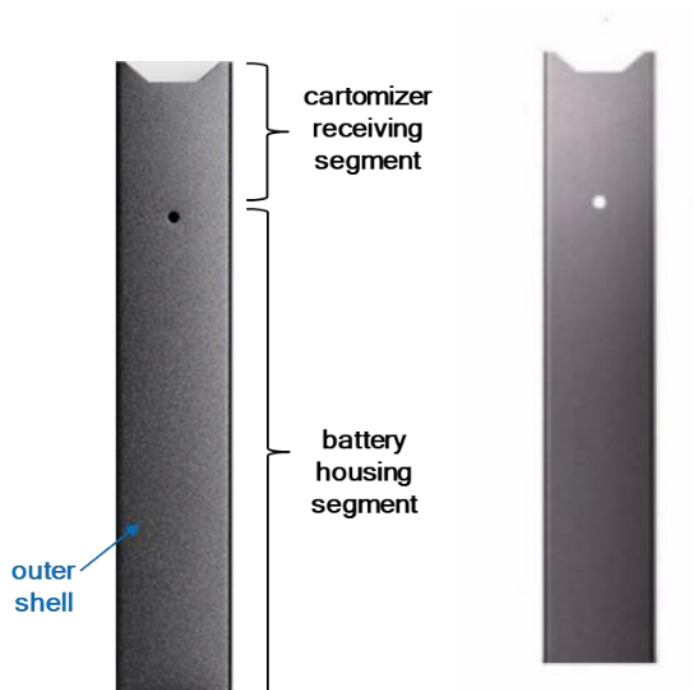
146. In addition, the JUUL System is a vaporizer:

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Ex. 2003, 11.

2. 1[a]: a battery portion comprising a battery housing segment and a cartomizer receiving segment,

147. In my opinion, the JUUL System comprises a battery portion comprising a battery housing segment and a cartomizer receiving segment. The JUUL System's battery portion is shown below:

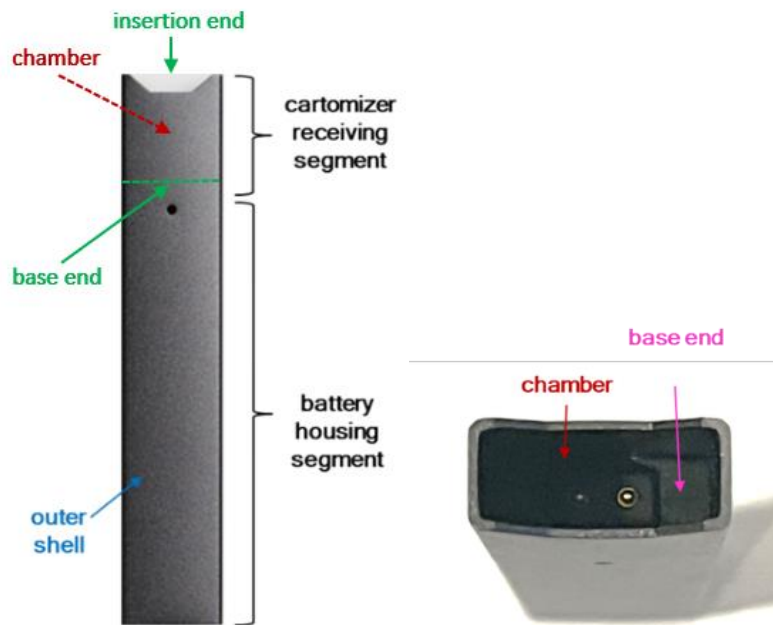


Ex. 2055 (annotated); Ex. 2003, 11.

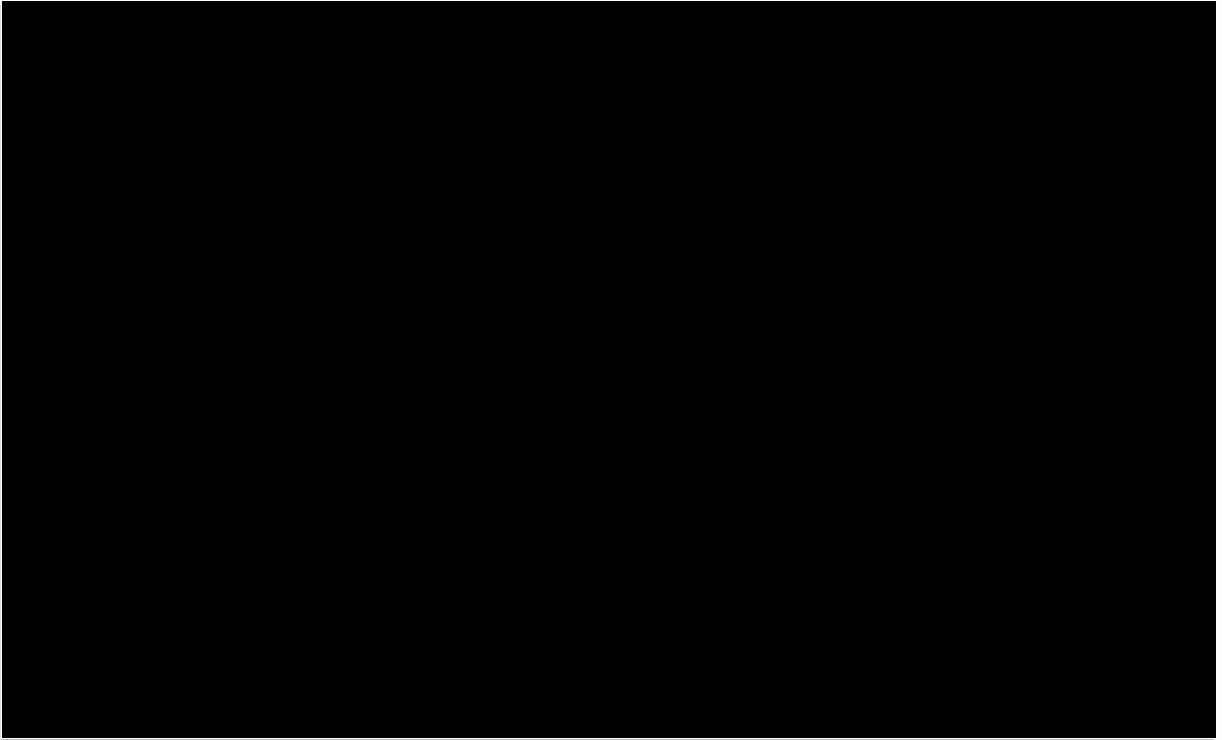
3. 1[b]: the cartomizer receiving segment defining a chamber having an insertion end distal from the battery housing segment and a base end proximate to the battery housing segment,

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148. In my opinion, the JUUL System's cartomizer receiving segment defines a chamber having an insertion end distal from the battery housing segment and a base end proximate to the battery housing segment. The JUUL System's cartomizer receiving segment is depicted below:



Ex. 2055 (annotated); Ex. 2057 (annotated).

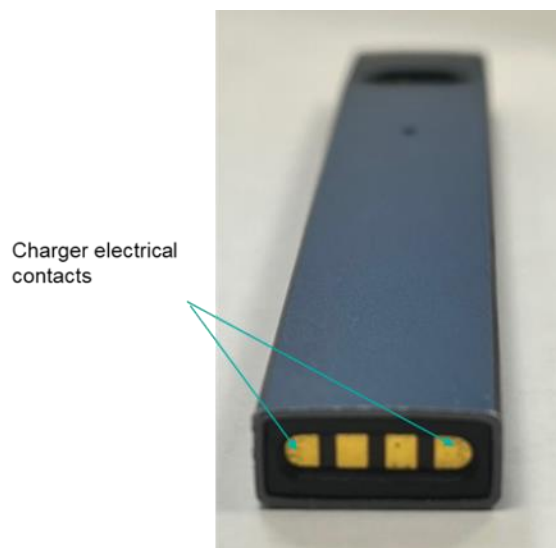
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Ex. 2003, 13.

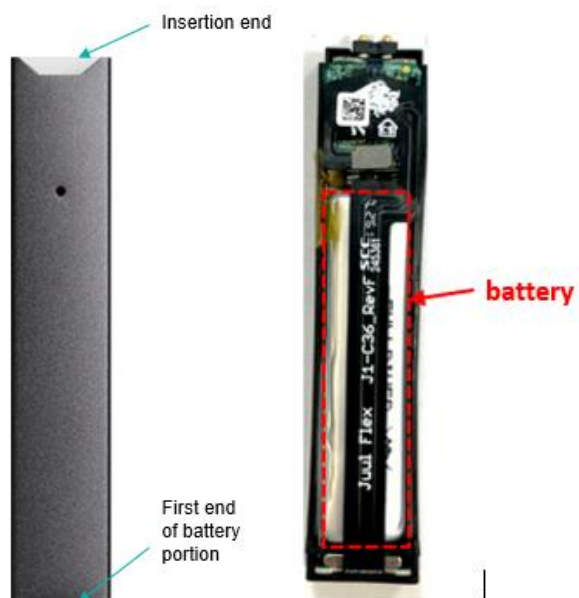
4. 1[c]: the battery portion further comprising a plurality of charger electrical contacts to provide electrical charge to a battery housed in the battery housing segment, the charger electrical contacts disposed at a first end of the battery portion opposite the insertion end of the chamber of the cartomizer receiving segment,

149. In my opinion, the JUUL System's battery portion further comprises a plurality of charger electrical contacts to provide electrical charge to a battery housed in the battery housing segment, the charger electrical contacts disposed at a first end of the battery portion opposite the insertion end of the chamber of the cartomizer receiving segment. The JUUL system's battery portion with charger electrical contacts are depicted below:

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Ex. 2052 (annotated).



Ex. 2058 (annotated); Ex. 2048 (annotated).

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Ex. 2003, 13.

5. 1[d]: wherein an outer shell is commonly shared by the battery housing segment and the cartomizer receiving segment; and

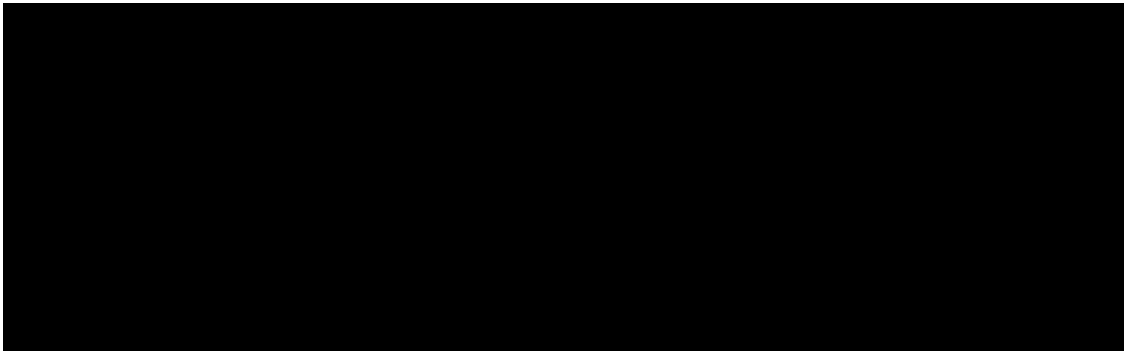
150. In my opinion, JUUL System contains an outer shell that is commonly shared by the battery housing segment and the cartomizer receiving segment, as described earlier in the context of element 1[a], above.

6. 1[e]: a cartomizer insertable into the chamber at the insertion end, the cartomizer comprising:

151. In my opinion, the JUUL System comprises cartomizer insertable into the chamber at the insertion end. The JUUL System's cartomizer is depicted below:

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

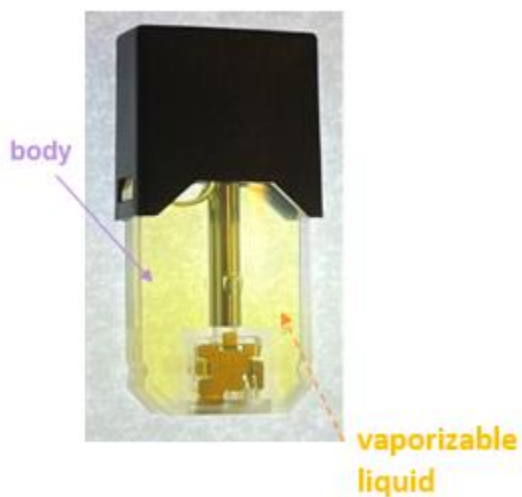


Ex. 2003, 9.

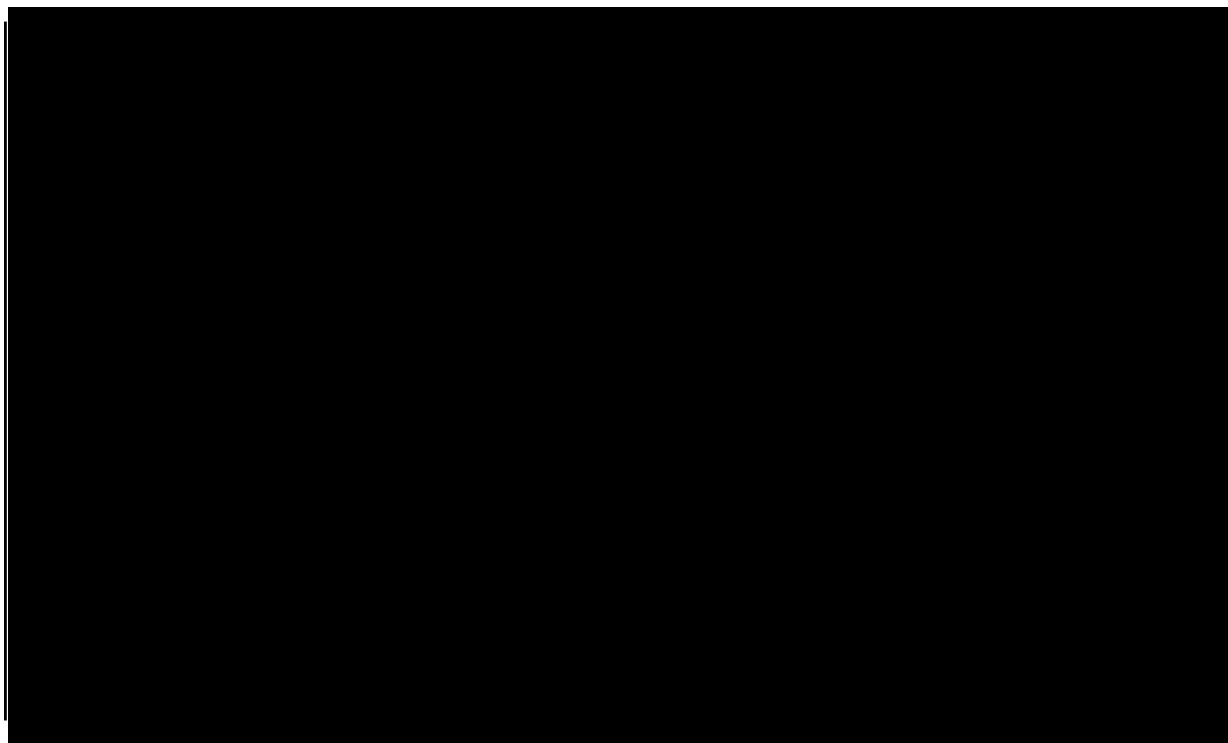
7. 1[f]: a body including a structure configured to hold a vaporizable liquid;

152. In my opinion, the JUUL System's cartomizer comprises a body including a structure configured to hold a vaporizable liquid. The JUUL System's cartomizer body is shown below:

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Ex. 2054 (annotated).

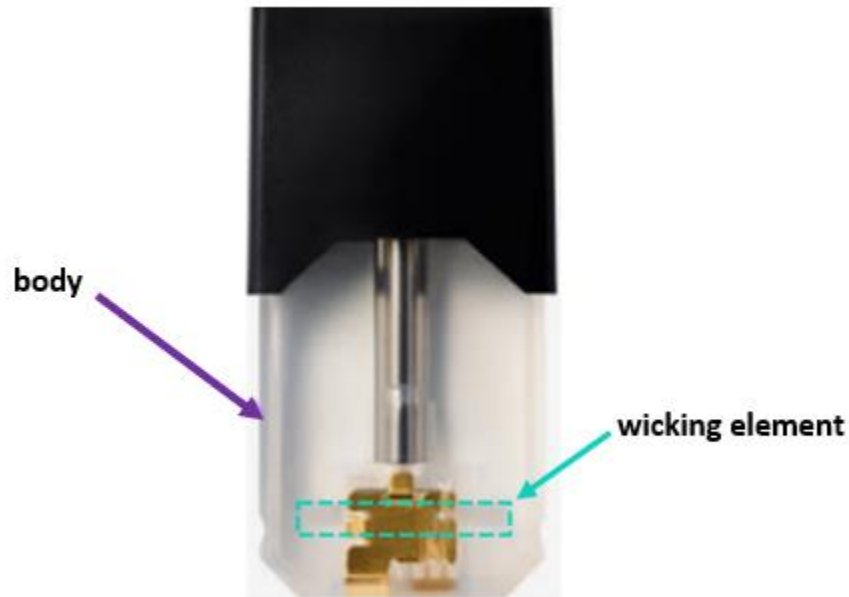


Ex. 2003, 26.

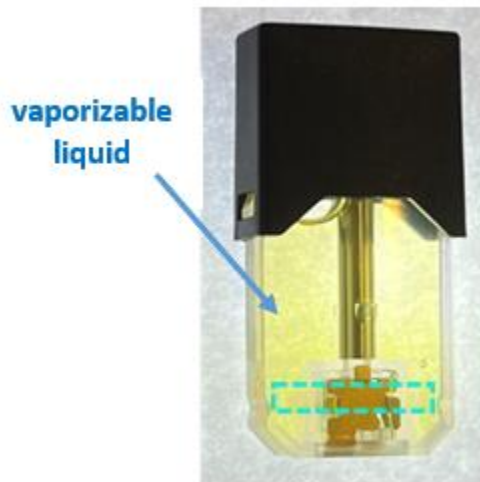
8. 1[g]: a wicking element provided within the body and at least partially in contact with the vaporizable liquid; and

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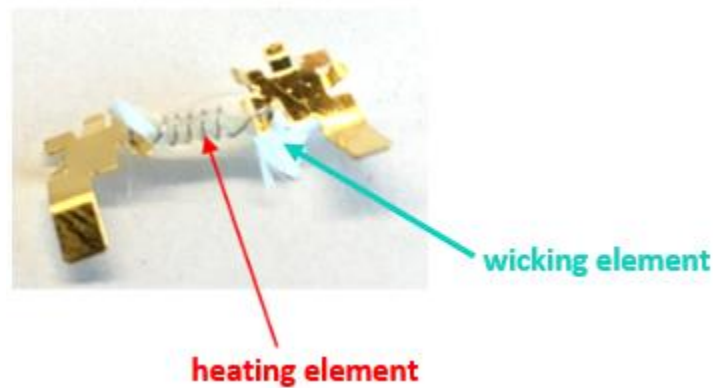
153. In my opinion, the JUUL System's cartomizer comprises a wicking element provided within the body and at least partially in contact with the vaporizable liquid. The JUUL System's wicking element is shown below:



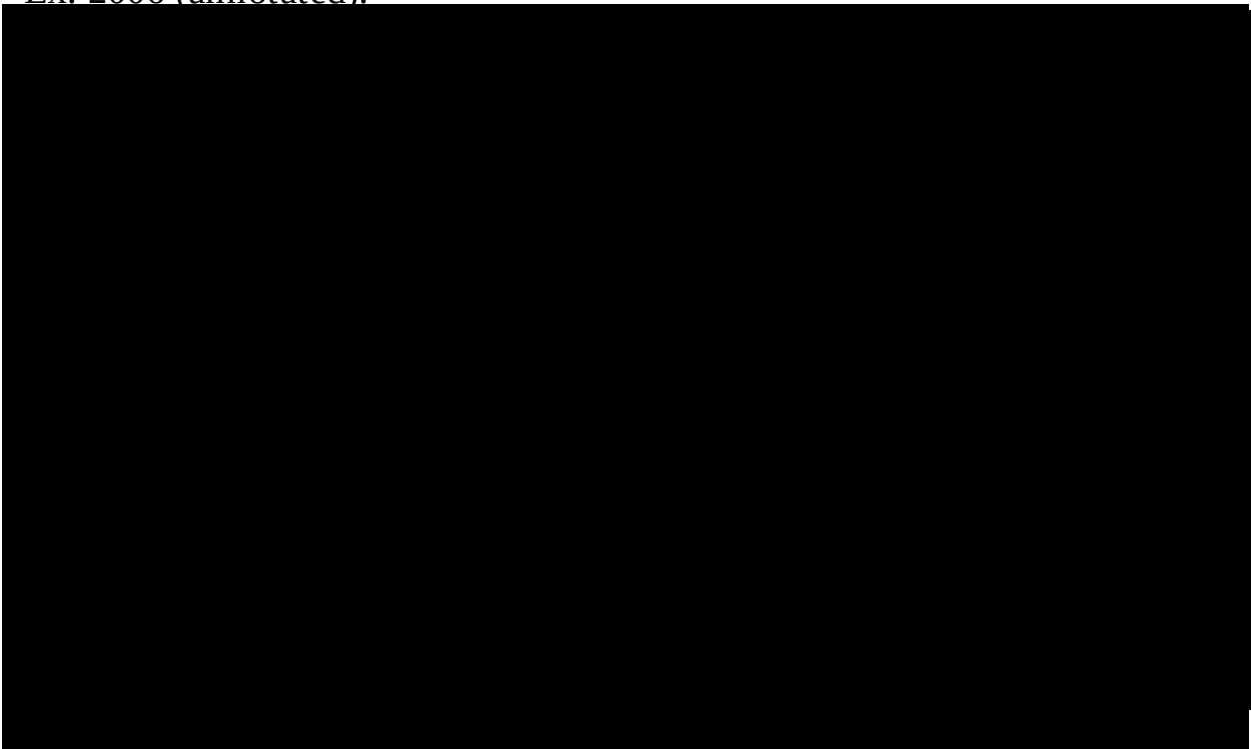
Ex. 2005 (annotated).



Ex. 2054 (annotated).

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Ex. 2006 (annotated).



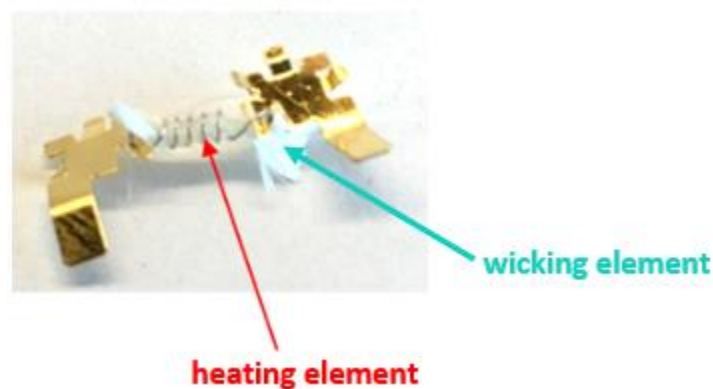
Ex. 2003, 26.

154. Specifically, the wicking element in the JUUL System delivers the vaporizable liquid to the heating element. Liquid is transferred by capillarity (also known as capillary action). The wick draws the atomization liquid to the heating element such that it is contact with the heating element.

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9. 1[h]: a heating element provided within the body in contact with the wicking element and operable to heat the vaporizable liquid, wherein the wicking element is configured to deliver the vaporizable liquid to the heating element, and wherein the entire heating element is disposed between the insertion end of the chamber and the base end of the chamber when the cartomizer is inserted into the chamber such that the outer shell protects the heating element.

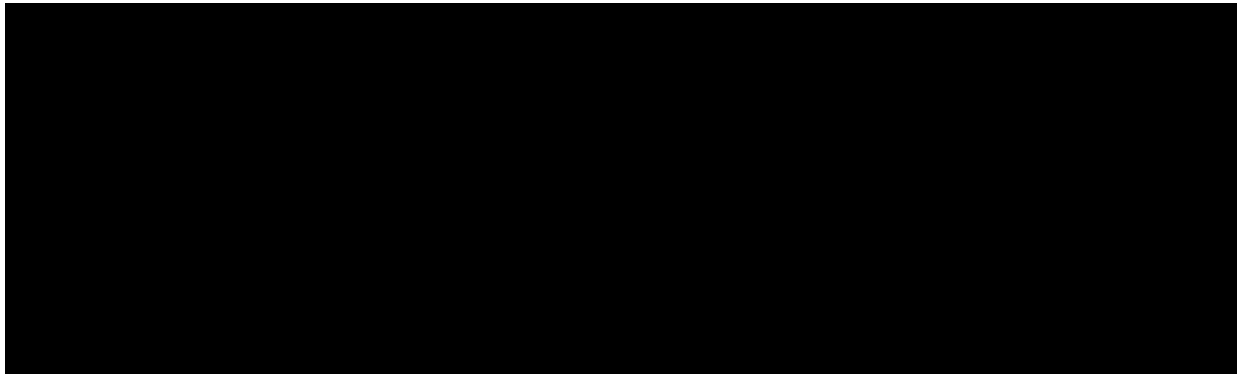
155. In my opinion, the JUUL System's cartomizer comprises a heating element provided within the body in contact with the wicking element and operable to heat the vaporizable liquid, wherein the wicking element is configured to deliver the vaporizable liquid to the heating element, and wherein the entire heating element is disposed between the insertion end of the chamber and the base end of the chamber when the cartomizer is inserted into the chamber such that the outer shell protects the heating element. The JUUL System's wicking element, heating element, cartomizer, and outer shell are shown below:



Ex. 2006 (annotated).

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Ex. 2053 (annotated); Ex. 2056.



Ex. 2003, 9.

156. The heating element is operable to heat the vaporizable material to generate an aerosol that is the combination of the vaporizable material and air. Ex.

2003, 23

PUBLIC VERSION**B. Long-felt Need**

157. 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.

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

159. 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

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costs. Ex. 2014; Ex. 2015 (CDC estimate of \$240 billion increase in health care costs from smoking).

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

161. 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.

162. 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

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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).

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

164. 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 '722 patent. Ex. 2025, 39:8-41:5 ([REDACTED]

[REDACTED]); Ex. 2026, 25:6-30:8 [REDACTED]

[REDACTED]

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[REDACTED]

[REDACTED]

[REDACTED]); *id.*, 137:23-143 ([REDACTED])

[REDACTED]

[REDACTED]

[REDACTED]); *id.*, 33:24-35:6 ([REDACTED])

[REDACTED]

[REDACTED]); *id.*, 116:15-117:14. [REDACTED]

[REDACTED]

[REDACTED]

[REDACTED] Ex. 2025, 39:8-41:5, 65:9-66:19, 81:22-82:18, 84:8-85:4, 87:21-88:2.

165. 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 '722 patent. Within a few years of the JUUL System launch, JLI became

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recognized as a leader in the ENDS device market. Ex. 2028, 1, 4; Ex. 2029; Ex. 2030.

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

C. Unexpected Results

167. 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 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.

168. 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. See Ex. 2025, 39:8-41:5 ([REDACTED])

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[REDACTED]); Ex. 2026, 25:6-30:8 ([REDACTED])
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]); *see also id.*, 137:23-143
([REDACTED])
[REDACTED]
[REDACTED]); *id.*, 33:24-35:6 ([REDACTED])
[REDACTED]
[REDACTED]); *id.*, 116:15-117:14.

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

PUBLIC VERSION**D. Industry Praise**

170. 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.

171. 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, 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

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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

172. 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.”).

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

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174. 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.

175. 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] Ex. 2041, 106:5-107:7.

F. Copying

176. 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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177. 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.

178. 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).

179. 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

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effort was called “Project Panama” and was “in the works for less than a year before 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.

180. 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.

181. 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

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smokers and vapers” and acknowledged that “‘Juul offers key benefits of a hybrid-evaporator system,’ providing cig-a-like users ‘better performance without sacrificing convenience’ and open-system users ‘convenience in a non cigarette form.’” *Id.* ¶307.

182. 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.

183. 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.

PUBLIC VERSION**XI. CONCLUSION**

184. 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 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.

185. 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: March 14, 2024

/s/ John Collins

John Collins, Ph.D.