

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

R.J. Reynolds Vapor Company
Petitioner

v.

Healthier Choices Management Corp.
Patent Owner

U.S. Patent No. 9,538,788

DECLARATION OF KELLY R. KODAMA

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

By: 
Kelly R. Kodama

I, Kelly Kodama, do hereby declare:

1. My name is Kelly Kodama. My opinions, as set forth herein, are based on my education and background in the fields discussed below.

2. I am making this declaration at the request of R.J. Reynolds Vapor Company (“Petitioner”) in the matter of the Inter Partes Review (“IPR”) of U.S. Patent No. 9,538,788 (“’788 Patent”). I have been asked to offer my opinions generally regarding the scope and content of the prior art, the level of skill of the person having ordinary skill in the art (“POSITA”), and whether the ’788 Patent is anticipated or would have been obvious to a POSITA at the time of the alleged invention, in view of the prior art.

3. I am being compensated for my work in this matter at my standard hourly rate of \$400 for such consulting services. My compensation in no way depends on the outcome of this proceeding.

4. In preparing this Declaration, I considered the following exhibit materials submitted with the IPR petition:

- EX1001 – U.S. Patent No. 9,538,788;
- EX1002 – File History of the ’788 Patent;
- EX1004 – U.S. Patent No. 3,200,819 to Gilbert (“Gilbert”);
- EX1005 – Korean Patent Pub. No. 10-2012-0080287 to Lee (“Lee”);

- EX1006 – U.S. Patent No. 9,943,107 to Weigensberg et al. (“Weigensberg”);
- EX1007 – U.S. Patent Pub. No. 2011/0036346 to Cohen et al. (“Cohen”);
- EX1009 – U.S. Patent Pub. No. 2013/0298905 to Levin et al.
- EX1010 – U.S. Patent No. 1,934,887 to Robinson
- EX1011 – U.S. Patent No. 2,204,312 to Huxter
- EX1012 – U.S. Patent No. 2,588,471 to Bauer
- EX1013 – U.S. Patent No. 2,694,771 to Cox
- EX1014 – U.S. Patent No. 7,458,374 to Hale et al.
- EX1015 – U.S. Patent Pub. No. 2013/0220316 to Oglesby et al.
- EX1018 – U.S. Provisional Patent Application No. 61/852,336

I. BACKGROUND AND QUALIFICATIONS

5. I am the Chief Executive Officer and founder at Zoe Design Associates, an award-winning product development consultancy with offices in San Francisco and Taipei. Since 1991, we have worked on a wide range of consumer, medical, and communication products for multinational clientele that includes Acer, JTI, Motorola, Plantronics, Samsung, and Siemens. Much of my responsibility is to manage a diverse team of graphic designers and industrial, mechanical, software,

and electrical engineers, as well as being intimately involved in all aspects of the design of our clients' products.

6. I was also the Director of Product Design at Ploom from 2013 to 2014. My responsibilities at Ploom included building and managing a rapidly-expanding product team, including industrial design, product design, QA, product management, product packaging, firmware development, and electrical engineering. At Ploom, I helped develop the Model 3 tobacco pod vaporizer, PAX 2 loose-leaf vaporizer, and JUUL e-cigarette products. I also worked closely with Ploom's R&D department to prototype and test new potential product concepts.

7. After I completed my employment at Ploom, JTI purchased the IP and product rights to Ploom's Model 2 & 3 vaporizer business. JTI contracted with my firm, Zoe Design Associates, to improve the performance and design of the Model 3 vaporizer. Subsequently, we worked closely with JTI on rebranding and redesigning the E-Lites and Logic product lines, including the CURV, Logic Pro, Logic Power, and Logic LQD. In addition, we were involved in redesigns of the Ploom TECH hybrid vaporizer.

8. I received a B.S. (1988) in Product Design Engineering from Stanford University. I have over 35 years of experience product design, development and consulting expertise covering a wide range of industries and products, including e-cigarettes. *See, e.g.,* <http://zoepd.com/> (Exhibit B). Over that time, I have had a

consistent focus on the design, mechanical engineering, and production of various devices, including e-cigarettes. *See, e.g.,* <http://zoepd.com/projects/logic-e-cigarette-product-family/> (Exhibit C). In addition to doing engineering, design, and production work, my responsibilities have included assembling and managing teams to develop new consumer, industrial and professional products. My CV is attached to the Petition as Exhibit 1008.

9. In addition to my work at Zoe Design Associates and Ploom, I have held various engineering leadership positions at technology and product development companies. In 1992, I was an Applications Engineer for Parametric Technology Corporation, where I provided pre- and post-sales technical support for PTC customers. From 1990-1992, I was a senior mechanical engineer at Siemens Ultrasound, Inc., where I designed ultrasound equipment. From 1988 to 1990, I was a staff mechanical engineer at Watkins-Johnson, where I designed military communications electronics and semiconductor processing equipment. At both Siemens Ultrasound and Watkins-Johnson I was responsible for a range of mechanical design engineering tasks, including conceptual design, implementation, design for manufacturing (DFM), 2-D and 3-D computer aided design (CAD), and documentation. For a full list of my employment history, see my CV, attached as Exhibit 1008 to the Petition.

10. I have also performed services in other patent disputes as an independent technical expert and consultant. I have consulted as an expert in matters involving the design of a variety of e-cigarette devices. See Exhibit 1008 for a representative list of matters in which I have consulted over the last 4 years as well as all matters involving e-cigarettes.

11. I also have experience as an innovator and inventor. I am a named inventor on more than thirty-five U.S. patents, on new products and designs. I have also received numerous design awards for my work.

II. LEGAL PRINCIPLES

12. It is my understanding that in determining whether a patent claim is anticipated or obvious in view of the prior art, the Patent Office must apply the *Phillips* standard to construe the claim by giving the claim its plain and ordinary meaning, consistent with the specification and prosecution history. For the purposes of this review, I have construed each claim term in accordance with its plain and ordinary meaning under the *Phillips* standard except where particular constructions are discussed.

A. Anticipation

13. I am advised that if each and every element or step of a claim is found in a prior art publication or a commercially available product on sale prior to the invention or more than a year before the earliest filing date to which the claims are entitled (i.e., a “device” as used in this declaration), then the claim is said to be

“anticipated” by that prior art publication or device and is invalid or unpatentable under 35 U.S.C. § 102 because the claimed invention is not new or novel.

B. Obviousness

14. I understand that a claim may be invalid or unpatentable under 35 U.S.C. § 103(a) if the claimed subject matter as a whole would have been obvious to the hypothetical POSITA in view of a prior art publication or device or in view of a combination of publications and devices at the time the claimed invention was made. I further understand that a POSITA is assumed to have knowledge of all relevant and analogous prior art in the field of endeavor covered by the '788 Patent.

15. I also understand that an analysis of whether a claimed invention would have been obvious should be considered in light of the scope and content of the prior art, the differences (if any) between the prior art and the claimed invention, and the level of ordinary skill in the pertinent art involved. I also understand that a prior art publication or device should be viewed as a whole.

16. I understand that in considering whether an invention would have been obvious, I may assess whether there are reasons to combine known elements in the prior art in the manner claimed in view of the teachings of multiple prior art references and devices, the effects of demands known to the design community or present in the market place, and/or the background knowledge possessed by a POSITA. I also understand that other principles may be relied on in evaluating

whether a claimed invention would have been obvious, and that these principles include:

- A combination of familiar elements according to known methods to yield predictable results;
- A simple substitution of one known element for another to obtain predictable results;
- When a device or technology is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or in a different one, so that if a POSITA can implement a predictable variation, the variation is likely obvious;
- If a technique has been used to improve one device, and a person of ordinary skill in the art would have recognized that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill;
- An explicit or implicit teaching, suggestion, or motivation to combine two prior art references or devices to form the claimed combination may demonstrate obviousness, but proof of obviousness does not depend on or require showing a teaching, suggestion, or motivation to combine;
- Market demand, rather than scientific literature, can drive design trends and may show obviousness;

- In determining whether the subject matter of a patent claim would have been obvious, neither the particular motivation nor the avowed purpose of the named inventor controls;
- One of the ways in which a patent's subject can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims;
- Any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed;
- "Common sense" teaches that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents or devices together like pieces of a puzzle;
- A POSITA is also a person of ordinary creativity, and is not an automaton;
- A patent claim can be proved obvious by showing that the claimed combination of elements was "obvious to try," particularly when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions such that a person of ordinary skill in the art would have had good reason to pursue the known options within his or her technical grasp; and

- One should be cautious of using hindsight in evaluating whether a claimed invention would have been obvious.

III. A POSITA

17. I understand that the factors that may be considered in determining the ordinary level of skill in the art include: (1) the level of education and experience of persons working in the field; (2) the types of problems encountered in the field; and (3) the sophistication of the technology. I understand that a POSITA is not a specific individual, but rather is a hypothetical individual having the qualities reflected by the factors above.

18. In my opinion, a POSITA with respect to the technology described in the '788 Patent would be a person with at least a Bachelor's degree in mechanical engineering, electrical engineering, industrial design or product design or product design engineering, chemistry, or physics, or a related field, and at least three to four years of industry experience; alternatively, a POSITA would have had a Master's degree in mechanical engineering, electrical engineering, industrial design or product design or product design engineering, chemistry, or physics, or a related field, and at least one to two years of industry experience, and a POSITA would have been familiar with electrically powered smoking articles and their components and underlying technologies or similar components and technologies. A higher level of education may substitute for a lesser amount of experience, and vice versa.

19. For purposes of this Declaration, unless otherwise noted, my statements and opinions below, such as those regarding my experience and the understanding of a POSITA generally (and specifically related to the references I consulted herein), reflect the knowledge that existed as of and prior to March 15, 2013, with respect to the '788 Patent. As of the foregoing date, I would have qualified as one having at least ordinary skill in the art according to the above definition.

IV. THE SCOPE AND CONTENT OF THE PRIOR ART

A. '788 Patent – Background

20. I understand that the '788 Patent claims priority to a provisional application (No. 61/852,336) filed on March 15, 2013.

21. For the purposes of this Declaration, I have assumed that March 15, 2013 is the invention date for the '788 Patent.

22. The '788 Patent includes 13 claims, two of which are independent claims (claims 1 and 12). I understand that Petitioner challenges the validity of claims 1, 7, 8, and 11 of the '788 Patent.

23. Generally speaking, all of the challenged claims require a casing comprising a first chamber and a second chamber, a battery located in the first chamber, a fluid containing member located in the second chamber, a heating assembly comprising a bulb containing a heating wire located in the second chamber, a fluid passageway communicating between the fluid containing member and the heating assembly, a tube element communicating between the first and second

chambers, a sealing element forming a partition between the first and second chambers, and an air inlet on an external wall of the casing.

24. Additionally, all of the challenged claims require that the heating wire heats the bulb, and the bulb then heats fluid that comes in contact with the bulb through the fluid passageway.

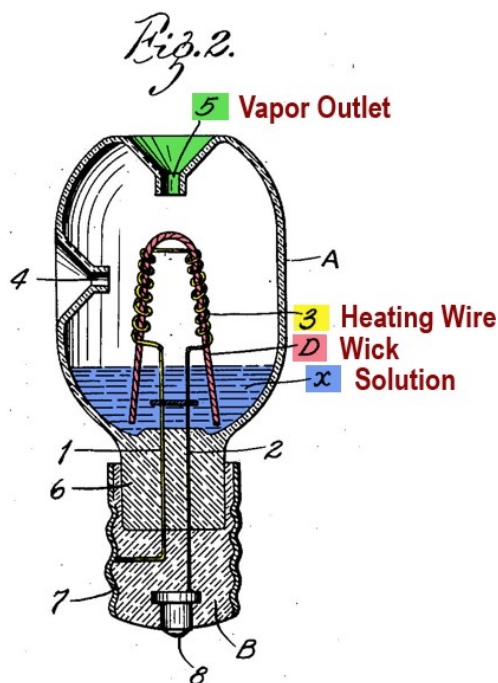
B. Background and State of the Industry of E Cigarettes

1. Basic Concepts of E-Cigarettes

25. Electronic vaporizing devices generally serve as alternatives to combustible cigarettes for adult tobacco consumers. In addition to providing nicotine, e-cigarettes generally maintain at least some of the rituals of traditional smoking, such as inhaling an aerosol or vapor.

26. Vaporizer devices have been widely known and available in the United States for decades. They are based upon concepts dating back to the 1930s such as, for example, an aerosol forming liquid reservoir, an electric heating element, a wick for transporting the liquid from the liquid reservoir to the heating element by capillary action, an airflow passageway, and a power source including a battery. *See, e.g.,* U.S. Patent No. 2,057,353 (“Whittemore”) at 1:19-2:7, Figs. 1- 3 (EX1019). As illustrated in the reproduced and annotated FIG. 2 below, Whittemore discloses storing a solution to be vaporized, transporting the stored solution via a wick to a battery-powered heating wire where the solution is vaporized, and flowing air over

the heating wire to transport the vaporized solution through an aperture for inhalation by the user.



27. These concepts have been implemented into vapor products, including e-cigarettes, using various product designs disclosed in the literature over the past 90 years, and improvements in battery technology and microprocessors, and the miniaturization of these components have made their incorporation in e-cigarettes more practical.

28. Prior to the presumed invention date of the '788 Patent in March 2013, numerous e-cigarette designs were reported in the literature and dozens of e-cigarettes brands were commercially available in the United States. These commercial products, as well as the e-cigarette designs reported in the literature, while they differed in some respects, all operated in a similar manner using well-

known vaporizing principles and technology. For example, the devices were battery operated; the battery was used to power an electric heating element, usually made of wire; a nicotine solution of aerosol-forming substance was contained within the device and transported to or near the heating element; the heating element vaporized the nicotine solution or aerosol-forming substance; and then vapor mixed with air in an airflow to form an aerosol that was inhaled by the user.

29. As a POSITA would have readily appreciated well before the presumed invention date of the '788 Patent in March 2013, there were a variety of known design options for implementing these basic concepts of storing a solution or other aerosol forming material, positioning the aerosol-forming material in close proximity to, or in contact with, a battery-powered heating element for vaporization, and then mixing the resulting vapor with airflow through the device to deliver an aerosol to a user. *See, e.g.*, WO 2009/132793 (“Thorens ’793”) (EX1020); U.S. Patent No. 8,314,591 (“Terry”) (EX1021).

2. Use of Electronics in E-Cigarettes

30. By the alleged invention date of the '788 Patent in March 2013, it was also well-known and a state of the art for electronic cigarettes to include various electronic components. These components might be used, for example, to regulate the current flow to the heater, to power an indicator LED, or to charge and protect rechargeable batteries.

31. For example, U.S. Patent Pub. No. 2011/0036346 to Cohen, which was published in 2011, personal inhalation device – which may be an “electronic cigarette” – that includes three principal components: an electronics section 12, an atomization unit 14, and a cartridge 16. Figure 2 of Cohen depicts one device according to the invention. EX1007 at [0004]. As can be seen in Figure 2 of Cohen, “the electronics section 12 is connected to one end of the atomizing unit 14 by means of a screw-on connection, and the cartridge 16 is connected to the other end of the atomizing unit 14 by an interference fit,” and when assembled “defines an elongated, cylindrical shape having a length-to-diameter ratio that is similar to the length-to-diameter ratio of a standard cigarette.” EX1007 at [0018]

32. “[T]he cartridge 16 stores a deliverable-containing medium which is atomized in the atomizing unit 14 when a user draws or puffs on the cartridge end of the inhalation device 10,” thus creating a vapor that the user inhales. *Id.* The Cohen embodiment also includes an indicator light 20 at the end of the electronics section 12 that illuminates when the user draws on the device, as well as a display 22 for outputting additional information to the user. *Id.* Operation of the device is controlled by micro-electronic components contained in the electronics section. *Id.*

33. The electronics section includes a pressure transducer, an electronic circuit board, and a power source. *Id.* at [0021]. “The pressure transducer 38 is designed to react to a pressure increase due to air flowing through the first housing

24 to actuate the control electronics on the electronic circuit board 40 and other electric components of the inhalation device 10.” *Id.* The electronic circuit board includes a “logic circuit” that is used for controlling the electronics in the device. The logic circuit is connected to “one or more input devices 124, as well as the atomizing device 108, the indicator light 20, and the display 22.” *Id.* at [0032]. “The control electronics are programmable such that a user is able to selectively determine the operation of the inhalation device 10.” *Id.* at [0033].

34. As another example, U.S. Patent Pub. No. 2005/0016550 to Katase, published in 2005, describes another electronic cigarette that has a “casing having a inhalation hole and having a substantially bar-like configuration as a whole, ejection means which is provided in the casing and has at least one ejection head and which changes a pressure in a cavity filled with a liquid flavor generating medium by driving an actuator to eject the flavor generating medium as droplets from a nozzle in communication with the cavity; and control means which is provided in the casing and which controls the driving of the ejection means.” Ex. 1022 at [0013].

35. Katase describes an electronic “detection means” that can detect the quantity of air or gaseous mixture flowing through the casing, and an electronic “control means” that can control how much of the flavor generating medium is ejected in response to the results of the detection means. *Id.* at [0036]. Katase explains that this approach can help make the smoker “feel as if he or she was

inhaling the smoke of a cigarette.” *Id.* at [0037]. Katase also describes a “CPU (Central Processing Unit)” that can be used for controlling the first ejection means, the second ejection means, the heating means, the gas quantity sensor, the light-emitting means, and the power supply. *Id.* at [0099]. This allows the device to create individualized patterns of operation that are tailored to a particular user. *Id.* at [0100]-[0107].

36. Similarly, U.S. Patent No. 9,408,416 to Monsees et al., which was filed in August 2012, describes an electronic vaporization device that utilizes various electronic components to enhance the experience of the user. For example, Monsees describes a resistive heating element and thermistor that can be used, along with a PCB, “to monitor and precisely control vaporization temperature.” Ex. 1023 at 1:42-55. Monsees describes a controller that can be used to select a variety of temperature settings based on the type of cartridge being used. *Id.* at 15:45-54.

37. As of 2013, the state of the art for essentially all electronic vaporizer devices included the use of at least some amount of electronic components.

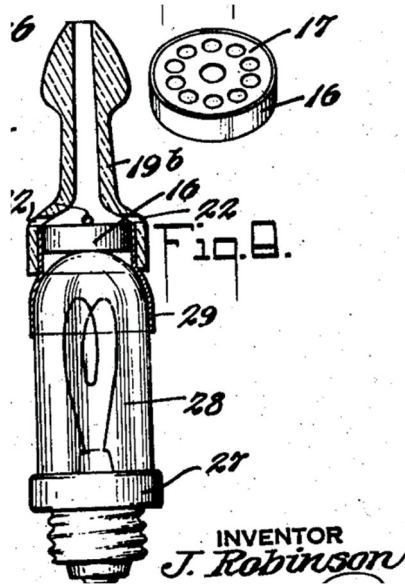
3. Use of Heating Elements to Vaporize Aerosol-Forming Materials and the Location and Configuration of Said Heating Element

38. By the presumed invention date for the ’788 Patent in March 2013, heating elements were also well-known in vapor products including e-cigarettes, and a POSITA would have understood that the placement and configuration of the heating element was a design option dictated by trade-offs amongst various factors

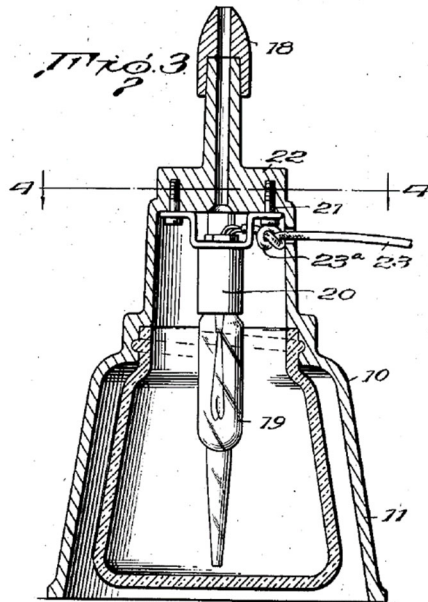
including ease of manufacturing, energy efficiency and performance criteria including the amount and rate at which vapor is generated when a user draws upon the device.

39. There were several well-known techniques for creating vapor from a liquid in e-cigarettes and personal vaporizers, including a heating wire or heating filament resistance heating element. *See, e.g.*, EX1021 at 10:17-39; U.S. Patent No. 7,920,777 (“Rabin”) (EX1024) at 7:59-8:4. Additionally, the use of a heating element inside a bulb, such as that claimed in the ’788 patent, was also well-known as of 2013. The concept itself dates back to the 1920s, almost one hundred years ago.

40. U.S. Patent No. 1,934,887 (“Robinson”), which was filed in 1928, describes an “electric vaporizer” that provides “for the generation of fumes from volatile medicinal preparations or substances,” and that can include a “lamp bulb type of heating element.” EX1010 at 1:1-3, 1:88-90. Figure 8 shows that the “medicament unit 16” is directly contacting the bulb:



41. U.S. Patent No. 2,204,312 (“Huxter”), filed in 1936 (EX1011), depicts a vaporizer device that includes a bulb with a heating element that is placed in direct contact with vapor-yielding jelly that is volatilized into a vapor to be inhaled:



42. U.S. Patent No. 2,588,471 (“Bauer”) (EX1012), filed in 1951, describes “a vaporizer of the type which is applicable to an electric light bulb from which it

obtains the necessary heat required to volatilize the substance to be evaporated.” *Id.* at 1:1-5.

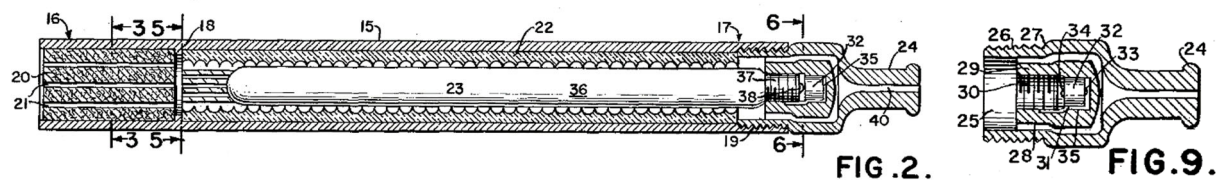
43. U.S. Patent No. 2,694,771 (“Cox”) (EX1013), also filed in 1952, describes “a novel vaporizer attachment for a conventional electric light bulb whereby the radiant heat emitted from a light bulb may be utilized for heating and vaporizing a vaporizable substance in any desired form.” *Id.* at 1:15-19.

44. And U.S. Patent No. 7,458,374 (“Hale”) (EX1014), filed more recently in 2002, describes a device for vaporizing a drug that includes a “glass bulb” with a “combustible element” inside, whereby the drug to be vaporized is coated directly onto the glass bulb. *Id.* at 6:4-45, Figs. 7-8. Similarly, U.S. Patent Application Publication No. 2013/0220316 (“Oglesby”) (EX1015), filed in 2011, describes “a portable handheld vaporising device for vaporising a liquid to produce a vapour thereof” that may use a “halogen lightbulb” as the electrically powered heat source. *Id.* at [0001], [0080].

45. As of 2013, using a bulb with a heating wire to heat fluid coming into contact with the bulb was known even in the field of electronic cigarettes. U.S. Patent Pub. 2013/0298905 to Levin (EX1009), which was cited during prosecution of the ’788 patent, describes such a device. Specifically, Levin described a device that “includes a bulb heater mounted on a lamp holder within a bulb chamber,” and that “[t]he bulb may be any bulb suitable for sufficiently heating the substance to

vaporize an active ingredient therein for inhalation by the user.” *Id.* at ¶ [0056]. Levin also explains that “[i]n an embodiment utilizing conductive heating in combination with radiative and convective heating, the bulb heater may protrude directly into the cavity or into the grinding cavity so that the glass bulb directly contacts the contents of the grinder.” *Id.*

46. In addition to Levin, U.S. Patent No. 3,200,819 (“Gilbert”), which was not before the Examiner, illustrates such a configuration. Specifically, Gilbert discloses a bulb heating element where the bulb is “similar to a light bulb.” EX1004 at 2:46-50. The “tip end” of the bulb “engage[s] the inner battery contact 33 and complete[s] the circuit through the filament of the bulb 36.” *Id.* at 2:71-3:1.



47. While Gilbert does not explicitly use the words “heating wire,” a person of ordinary skill in the art would have understood that a “filament of the bulb” that causes the bulb to “be illuminated or energized” is a “heating wire.” *See id.* at 3:1-3 (“Thus the bulb 36 will be illuminated or energized before assembly to the external tube”). Additionally, Gilbert discloses that the bulb is “similar to a light bulb.” *Id.* at 2:50. Therefore, it would have been known or obvious to a person of ordinary

skill in the art that Gilbert's bulb that is "similar to a light bulb" included a suitable "heating wire," like a standard light bulb.

48. Additionally, in the Gilbert device, the liquid is introduced into the air before it is drawn into contact with the heating bulb. And as Gilbert explains, an "object of the invention is to provide a smokeless non-tobacco cigarette in which provision is made for circulating the fluid around the heating element in a turbulent manner to suitably raise the temperature of the inhalant [sic] mixture." EX1004, 1:23-27. Therefore, the fluid, which is part of the "inhalent [sic] mixture" has its "temperature" "raise[d]" as it contacts the bulb.

V. PRIOR ART REFERENCES EMBODYING THE CLAIMED FEATURES

49. As described above, by the time of the alleged invention of the '788 Patent in March 2013, the various features recited in the '788 Patent claims were well-known in the prior art, including in the references further discussed below.

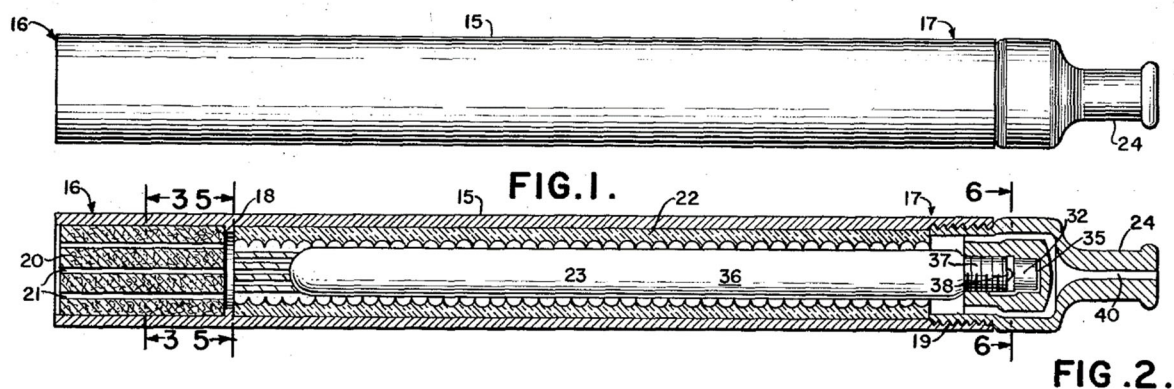
A. Prior Art References to the '788 Patent

1. Gilbert (US3200819)

50. Gilbert was filed on filed on April 17, 1963 and issued on August 17, 1965. Gilbert was not of record during prosecution of the '788 patent. It is my understanding that Gilbert is prior art to the '788 patent.

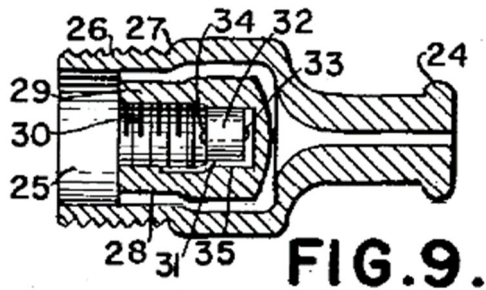
51. Gilbert is titled "Smokeless Non-Tobacco Cigarette" and is directed to an electronic cigarette. EX1004 at p. 1.

52. The Gilbert vaping device includes an external tube 15 that is divided into multiple chambers. *Id.* at 1:62-71. The chambers are separated by an internal shoulder 18. *Id.* The device has an outer end portion 16 containing a detachable flavor cartridge 20. *Id.* at 2:3-5. The device also has an inner end portion 17 with internal threads 19 that are used to affix a mouthpiece 24 to the tube. *Id.* at 1:72-2:2. These features are in shown in Figures 1 and 2 of Gilbert:



53. As shown in Figures 9 and 10, the device has a battery 32 and a heating element that “is preferably a vacuum tube or bulb 36” that is “similar to a light bulb.” *Id.* at 2:46-50. When the bulb 36 is mounted to a socket 30, the tip end of the bulb engages an “inner battery contact 33” to complete the circuit “through the filament of the bulb 36 by the contact strip 35.” *Id.* at 2:72-3:2.





54. A POSITA would understand Gilbert’s references to a “light bulb” and “filament” as disclosing a bulb with a metal heating wire inside. At the time of Gilbert (1965), most traditional light bulbs included a coiled wire made of tungsten. Tungsten is a metal that was typically chosen specifically for its high melting point, high electrical resistivity, and durability. *See, e.g.,* <https://home.howstuffworks.com/light-bulb2.htm>. When energy is supplied through the filament, the metal lights up and gets hot.

55. Gilbert explains that when the user inhales through the mouthpiece 24, air is drawn into the passages 21 of the cartridge 20 which have “been impregnated with suitable flavoring material.” *Id.* at 3:8-12. After the air passes into the heating chamber and around the heating bulb, this “heated and flavored air” then passes through the mouthpiece and into the mouth of the user. *Id.* at 3:12-16.

2. Lee (CN10-2012-0080287)

56. Lee is a Korean patent publication of an application that was filed on January 7, 2011 and published on July 17, 2012. Lee was not of record during

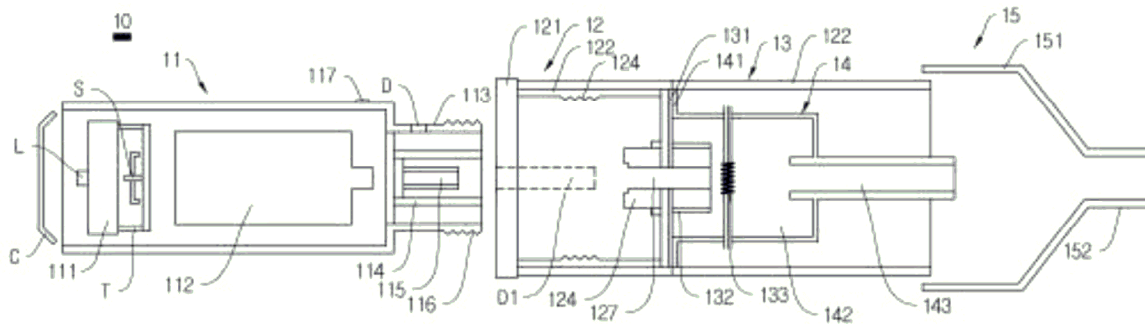
prosecution of the '788 patent. It is my understanding that Lee is prior art to the '788 patent.

57. Lee is titled “External Air Inlet Structure Applied To An E-Cigarette” and is directed to an electronic cigarette.

58. The Lee device includes a storage housing (13) and a guide chamber (12). EX1005 at [0028] The housing and chamber are physically separated by a separating plate (131). *Id.* The device contains a battery assembly (11) that is connected to the guide chamber (12) through a connection chamber (113). *Id.* at [0023]. Lee explains that air flows into the device through an inlet hole (D) along a guide groove (D1) through the connection chamber (113) into the guide chamber (12) and then flows into the storage housing (13) through an air conduit (127a). *Id.* at [0024], [0029].

59. Lee describes a vaporization unit (14) coupled to the inside of the storage housing (13) that includes a vaporization chamber (142) and a supply passage (143). *Id.* at [0030], [0032]. The vaporization chamber (142) accommodates a heating element (133). *Id.* at [0032]. The vaporization chamber also accommodates the supply passage (143) which has “a shape of a through-hole formed in the circumferential surface of the vaporization chamber (142)”. *Id.* at [0032]. This supplies a nicotine solution to the heating element (133) from the storage housing (13). *Id.* at [0032]. After air flows into the storage housing (13),

the air then flows to the heating element (133). *Id.* at [0029]. The heating element vaporizes the nicotine solution with the air which is then discharged through a discharge tube (144) and sucked through an inhalation piece (15). *Id.* at [0029]. The inhalation piece (15) consists of a coupling portion (151) and a discharge portion (152). *Id.* at [0033]. Many of these features of Lee are demonstrated in the embodiment depicted in Figure 1a of Lee:



3. Weigensberg (US9943107)

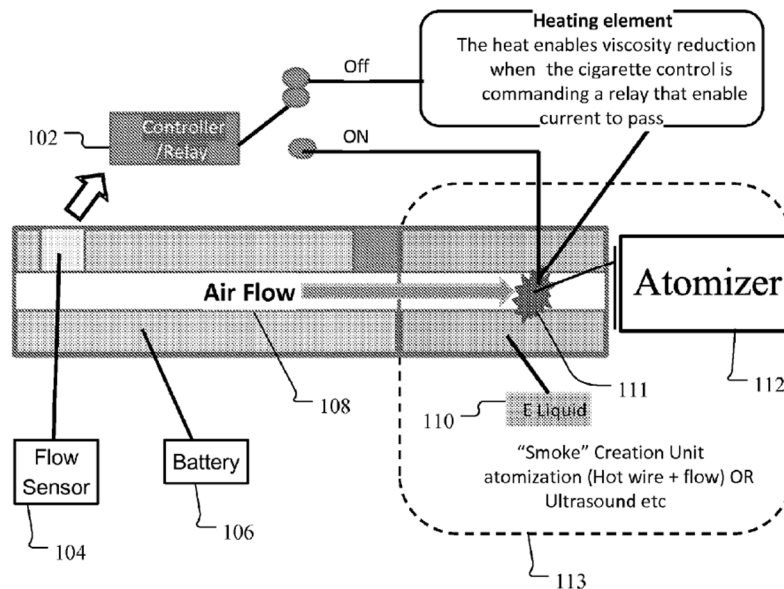
60. Weigensberg is a U.S. patent that issued on April 17, 2018, and claims priority to a provisional application filed on December 17, 2012. Weigensberg was not of record during prosecution of the '788 patent. It is my understanding that Weigensberg is prior art to the '788 patent.

61. Weigensberg is titled “Cartomizer Flavor Enhancement” and is directed to a cartomizer for enhancing the flavor of an electronic cigarette. EX1006 at Abstract.

62. Weigensberg describes an electronic cigarette with a battery 106 that powers a cartomizer 113. *Id.* at 3:43-4:11. The cartomizer contains an atomizer 112

and e-liquid 110 and the e-liquid is heated in the cartomizer to generate a vapor or mist through the atomization process. *Id.* at 2:29-45. One embodiment of the Weigensberg device is pictured at Figure 1:

Figure 1



63. Figures 4 and 6 of Weigensberg demonstrate flavor enhancements, such as flavor shells 404, 406 or flavor booster 602 (among others), that can be added to the cartomizer 113. *Id.* at 6:45-64; 7:23-40.

Figure 4

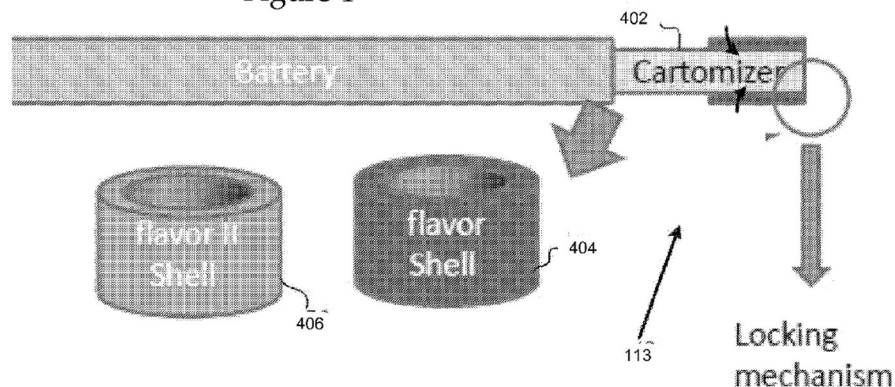
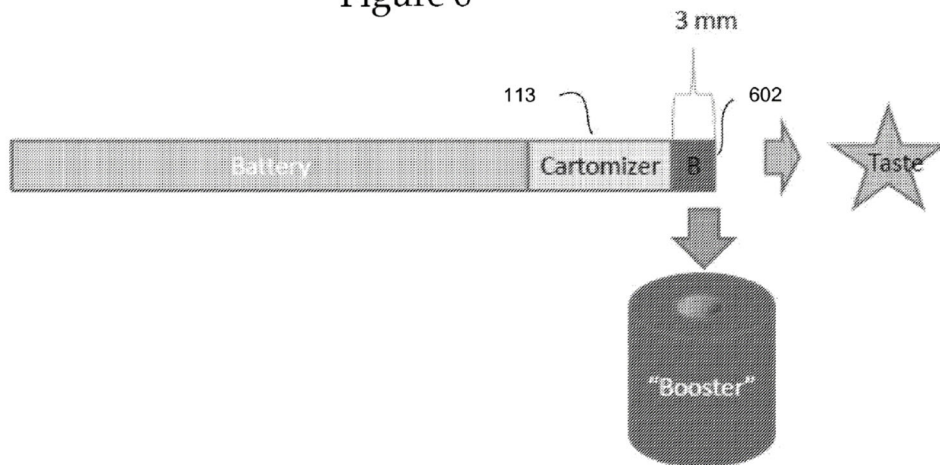


Figure 6



64. In addition, the Weigensberg device can also include a “special external (removable) wrap or container or packaging for the flavor booster 602 or for the cartridge” that is designed to “seal in and preserve the flavor during storage or between uses.” *Id.* at 7:41-51.

65. I have been asked to provide my opinion regarding whether the provisional application to which Weigensberg claims priority provides written description support for claims 1, 3, 8, and 10 of the Weigensberg publication. In my opinion, the claim chart that I provide below demonstrates that the specification of the provisional application, which is attached as EX1018, provides support for claims 1, 3, 8, and 10 of the Weigensberg publication.

Weigensberg (9,943,107)	Provisional Application (61/737,847)
1[a] An electronic vaping device comprising:	“This invention relates to smoking articles. More particularly, this invention relates to improvements in electronic cigarettes .” Ex. 1018 at 4.

	“According to disclosed embodiments of the invention, methods and apparatus provide gustatory and olfactory enhancements to an electronic cigarette by addition of flavoring agents.” <i>Id.</i> at 5. “Fig. 1 is a semi-schematic exploded view of a smoking device in accordance with an embodiment of the invention;” <i>Id.</i> at 6. “Fig. 2 is a schematic view of a cartomizer of the electronic cigarette shown in Fig. 1, in accordance with an embodiment of the invention;” <i>Id.</i> at 6.
1[b] a battery portion configured to provide power to the electronic vaping device;	“The device 10 has a barrel comprising a battery section 12. The battery section 12 may include power control circuitry 14, which is typically encased as a unit with a pressure differential sensor 24, and which may be enclosed in a plastic holder.” <i>Id.</i> at 7. “The electronic power control circuitry 14 linked to the sensor 24 activates the atomizer in the section 16, which is powered, typically by a lithium ion battery 26 that is housed in a barrel 28 of the battery section 12.” <i>Id.</i> at 8.
1[c] a cartridge coupled with the battery portion, the cartridge configured to generate a mist; and	“The device 10 has a barrel comprising a battery section 12. The battery section 12 may include power control circuitry 14 . . . The device 10 includes a cartridge section 16, including an atomizer having a high resistance electrical wire, which heats a liquid or gel when the atomizer is powered. . . . The components of the section

16 may be integral . . . In such case, the section 16 is known as a “cartomizer”. In some embodiments the power control circuitry 14 may be disposed in the section 16 rather than the battery section 12 as shown in Fig. 1.”

Id. at 7-8.

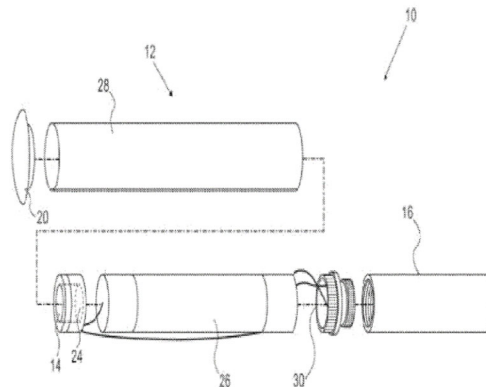


FIG. 1

Id. at Fig. 1.

“The electronic power control circuitry 14 linked to the sensor 24 activates the atomizer in the section 16, which is powered, typically by a lithium ion battery 26 that is housed in a barrel 28 of the battery section 12.”

Id. at 8.

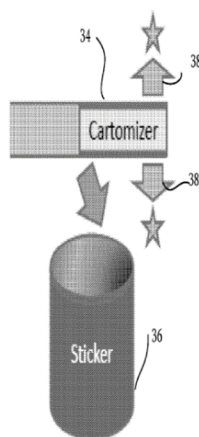
“An adaptor 30 connects the section 16 and the battery section 12, and may comprise a threaded connector.”

Id. at 8.

“During use, gentle warming of the impregnated material facilitates release of the flavoring agent into the cartomizer, and thence to the heating coil where vapor is produced, having an enhanced

	flavor as a result of the addition of the flavoring agent.” <i>Id.</i> at 9.
1[d] a flavor enhancement mechanism separate from and coupled with the cartridge, the flavor enhancement mechanism including one of a flavor sticker coupled with the cartridge and a flavor shell coupled to one of an inside of the cartridge ad an outside of the cartridge.	“A layer of flavoring is added to the cartomizer of an electronic cigarette and optionally to other parts of the electronic cigarette.” <i>Id.</i> at 5. “In one embodiment, to flavoring is incorporated in a sticker that wraps around the cartomizer. In another embodiment the flavoring agent is added to the actual cartomizer itself. The flavor is noticeable on the user’s lips after using the electronic cigarette, and via olfactory experience. This provides enhanced dimensions of flavor and scent experience for the user.” <i>Id.</i> at 5. Reference is now made to Fig. 2, which is a schematic view of a cartomizer 34 of the section 16 (Fig. 1) , in accordance with an embodiment of the invention. A sticker 36 is impregnated with a flavoring agent, and is adhered to the interior wall of the cartomizer 34, where it is exposed to air flow. <i>Id.</i> at 8.

FIG. 2

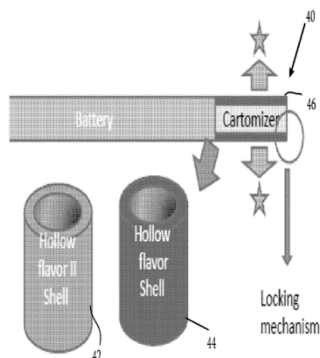


Id. at Fig. 2.

“Reference is now made to Fig. 3, which is a schematic view of a cartomizer 40 of the section 16 (Fig. 1) , in accordance with an alternate embodiment of the invention. In this embodiment, **shells 42, 44 are impregnated with flavoring agent. . . . As shown in Fig. 3, the shells 42, 44 extend along the entire length of interior wall 46 cartomizer 40, providing maximum area for release of flavoring agent.**”

Id. at 9-10.

FIG. 3



Id. at Fig. 3.

3 The electronic vaping device of claim 1, wherein the flavor enhancement mechanism include[s] the flavor shell, and the flavor shell is coupled to the outside of the cartridge.

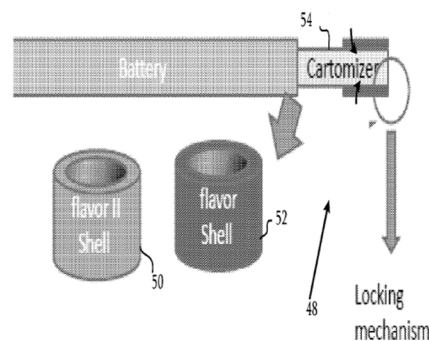
“Reference is now made to Fig. 3, which is a schematic view of a cartomizer 40 of the section 16 (Fig. 1) , in accordance with an alternate embodiment of the invention. In this embodiment, **shells 42, 44 are impregnated with flavoring agent**. . . . As shown in Fig. 3, the shells 42, 44 extend along the entire length of interior wall 46 cartomizer 40, providing maximum area for release of flavoring agent.”

Id. at 9-10.

Reference is now made to Fig. 4, which is a schematic view of a cartomizer 48 of the section 16 (Fig. 1) , in accordance with an alternate embodiment of the invention. In this embodiment selected **shells 50, 52 are mounted on the exterior of wall 54 of the cartomizer 48**, and release flavoring agent through the wall 54.

Id. at 10.

FIG. 4



Id. at Fig. 4.

10 The electronic vaping device of claim 8, wherein the

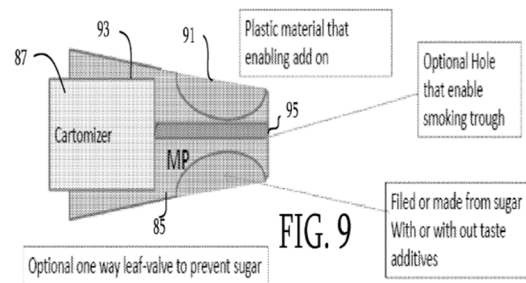
“In this embodiment a mouthpiece extension is added to the exterior of the cartomizer and

mouthpiece is attached to an end of the electronic vaping device and is removable from the cartridge.

[Claim 8 The electronic vaping device of claim 1, wherein the flavor enhancement mechanism comprises a mouthpiece.]

becomes a point of contact with the lips of the smoker. This variant further enhances the flavor as experienced by the smoker.”
Id. at 11-12.

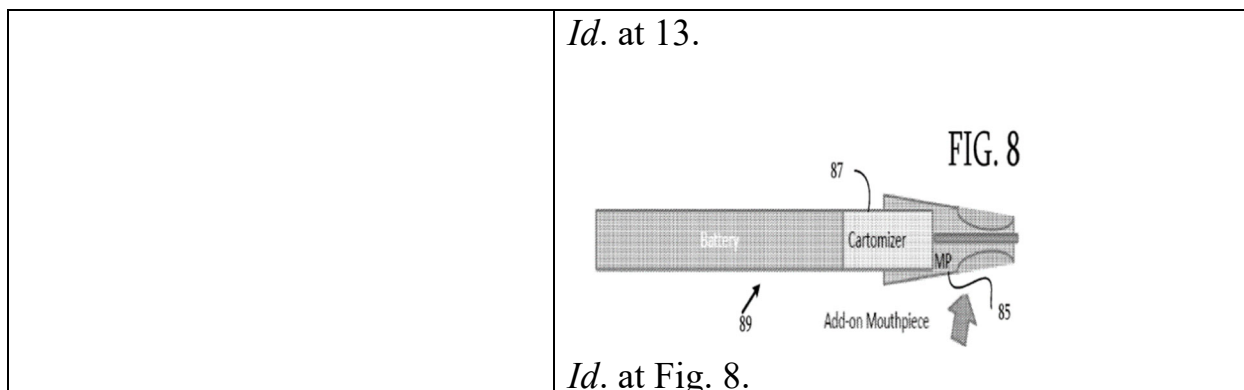
“Reference is now made to Fig. 9 which is a detailed sectional view of a portion of the electronic cigarette 89. A **chamber 91** is **formed in the mouthpiece 85** as shown, and is **filled with an agent, such as candy**. The candy could include sugar or an artificial sweetener. Caffeine may be added to create additional effect to the nicotine or other e-liquid in the cigarette.”
Id. at 13.



Id. at Fig. 9.

“The mouthpiece 85 is made of plastic with a recess 93 formed therein such that its inner diameter fits over the cartomizer 87 and enables fast **mounting and dismounting** from the cartomizer 87. It should be flexible enough to create a firm hold on the cartomizer 87 to enable smoking the cigarette without being dislodged.”
Id. at 13.

“Reference is now made to Fig. 8 which is a schematic sectional view of an electronic cigarette 89, in accordance with an alternate embodiment of the invention. A mouthpiece 85 is attached to a cartomizer 87.”



4. Cohen (US2011/0036346)

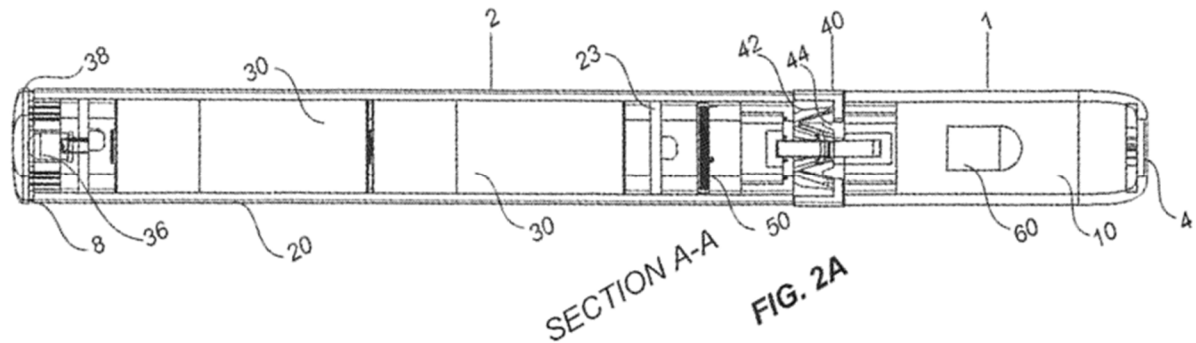
66. Cohen is a publication of a U.S. patent application published on February 17, 2011, and claims priority to an application filed on April 21, 2009. Cohen was not of record during prosecution of the '788 patent. It is my understanding that Cohen is prior art to the '788 patent.

67. Cohen is entitled “Personal Inhalation Devices” and is described in ¶¶ 31-33 above.

5. Levin (US2013/0298905)

68. Levin is a publication of a U.S. patent application published on November 14, 2013, and claims priority to an application filed on March 12, 2013. It is my understanding that Levin is prior art to the '788 patent.

69. Levin is entitled “Electronic Vaporizing Device and Methods For Use” and is directed to an electronic vaporizing device that includes a portable power source, a heating portion, an inhalation sensor, a temperature sensor, a distal light source, and a grinding portion. Figure 2A depicts one device according to the invention.



70. Levin explains that “the invention provides a portable electronic vaporizing device having an outer shell housing internal components that facilitate heating and vaporizing of the selected substance disposed within for inhalation by a user.” Ex. 1009 at [0033]. Levin further explains that the device “allow[s] for an enhanced ‘smoking’ experience, similar to actual traditional smoking using combustion without the associated drawbacks.” *Id.*

71. Levin explains that the device can include a power source such as rechargeable or replaceable batteries, an inhalation sensor for sensing airflow, and a heating unit to heat and vaporize the selected substance. *Id.* at [0038-0041]. Levin explains that the heating unit comprises “a heating element 51, such as a coil, and a reflector 52, distal of the coil so as to reflect and direct radiant heat so as to increase the efficiency of heating the air drawn through the device.” *Id.* at [0049]. Levin further explains that “[t]he heating element may be a Nickel Chromium alloy wire, which may be miniaturized and optimized for maximum surface area and minimized mass, or may be a heater bulb, such as a Tungsten filament in quartz bulb.” *Id.* Levin

explains that “[t]hese configurations allow relatively high energy dissipation per unit time with relatively low energy input to achieve a desired operating temperature, when compared to conventional devices.” *Id.* Further, as explained in Section IV(B)(3) above, Levin also describes that the heater may be a bulb heater that functions as a conduction heater.

VI. THE ’788 PATENT

A. Overview of the ’788 Patent

72. The ’788 patent generally relates to “an electronic cigarette” comprising “a cylindrical casing, or tube” that includes two or more chambers located within the cylindrical casing. EX1001 at 2:60-66; 4:61-65. The ’788 specification describes various embodiments of the cylindrical casing that include, among other features, a battery, fluid, a sealing element that forms a partition between the chambers, a tube element providing air passage between the chambers, and a fiber element that transfers fluid to a heating assembly. *Id.* at 4:61-5:44.

73. Figures 1-3 are representative of the patent disclosure. Figure 1 shows the electronic cigarette comprising “a cylindrical casing, or tube” with “three chambers located sequentially within the cylindrical casing.” *Id.* at 2:60-67. The figure shows “[a] battery 35 is located in the first chamber 20,” “a liquid, or fluid 40 is located in the second chamber 25,” and “heating element 45 is located in the third chamber 30.” *Id.* at 3:1-3. The figure further shows a “first seal 50 forms a partition between the first 20 and second 25 chambers” and a “second seal 60 forms a partition

between the second 25 and third 30 chambers.” *Id.* at 3:12-13, 19-20. A “tube 55 extends substantially the length of the second chamber 25 allowing passage of air from the first chamber 20 into the third chamber 30.” *Id.* at 3:16-18. Also shown is a “fiber material 65 that has a first segment in contact with the heating element 45, and a second segment located in the second chamber 25” to allow the fiber material to carry or transfer the fluid 40 from the second chamber 25 to the heating element. *Id.* at 3:27-32.

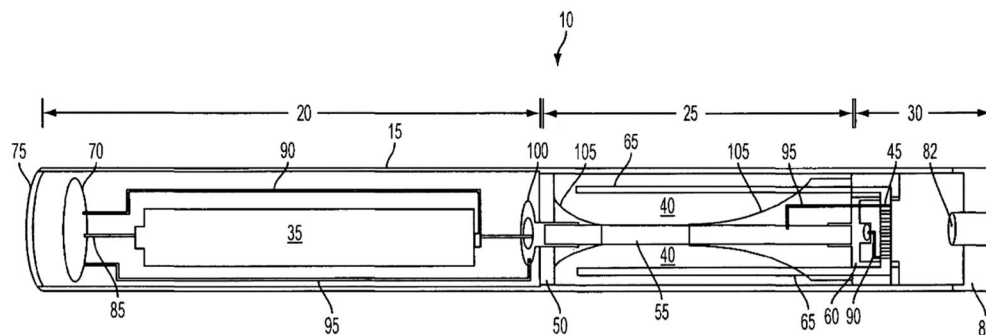


FIG. 1

74. Figure 2 shows another embodiment of the electronic cigarette with only two chambers located within the cylindrical casing. EX1001 at 4:61-67. The figure shows a “battery 35 is located in the first chamber 20, and a fluid container 205 is located in the second chamber” with a “seal 50 form[ing] a partition between the first 20 and second 25 chambers.” *Id.* at 5:1-2, 5:8-9. A heating assembly is located between the first and second chambers and a “tube 55 extends into a heating assembly 220 and allows passage of air from the first chamber 20 into the second chamber 25.” *Id.* at 5:12-14.

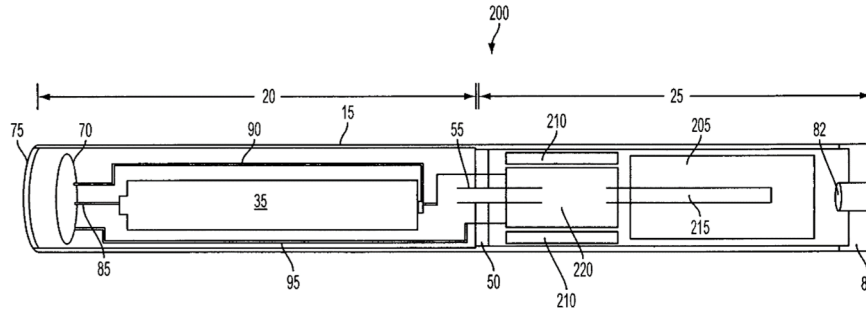


FIG. 2

75. Figure 3 shows the air passage tube shaped into a “T” where the “leg” of the “T” forms the “hollow cylinder that comprises one end of the tube 55” and the “top” portion of the “T” forms “two arms that hold, or fix a tempered glass bulb 230 [shown in yellow below] in position in the heating assembly 220.” EX1001 at 5:15-21. The tempered glass bulb contains “a heating wire 225 [shown in red below] that heats the glass bulb 230” which further “heats the fluid that is introduced into the heating assembly 220 through fiber element 215.” *Id.* at 5:21-24.

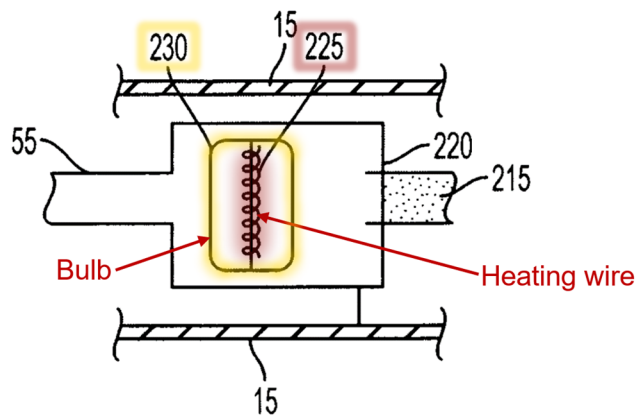


FIG. 3

76. Figure 3 depicts the two “bulb” limitations from claim 1: (i) “a bulb containing a heating wire” and (ii) “wherein the heating wire heats the bulb, and

wherein the bulb heats fluid introduced to and coming in contact with the bulb.” Ex. 1001 at claim 1. It was these limitations upon which the Examiner relied to find the ’788 patent claims allowable.

B. Prosecution History

77. I have reviewed the prosecution history leading up to the issuance of the ’788 Patent. I understand that the primary reason for allowance of the patent was the applicant’s amendment of the claims to include the claim limitations relating to the “bulb” heating assembly.

VII. ANALYSIS OF PRIOR ART

78. I have analyzed the patentability of the claims in view of Gilbert, Cohen, Lee, and Weigensberg.

A. Claims 1 and 11: Gilbert in View of Cohen

79. Gilbert discloses or suggests all of the elements of claims 1 and 11, including the “bulb” limitations. To the extent Patent Owner may argue, however, that any limitation is not explicitly disclosed or suggested by Gilbert, in my opinion any such limitation was within the general knowledge of a POSITA, and/or would have been obvious in view of Cohen.

1. Independent Claim 1

(a) Preamble: “An electronic cigarette comprising:”

80. It is my understanding that preamble language is not generally treated as limiting. However, to the extent the preamble of claim 1 is limiting, it is disclosed,

or at least rendered obvious, by Gilbert. Gilbert describes a smokeless non-tobacco cigarette that uses a heating element that is preferably a vacuum tube or bulb (36), similar to a light bulb. The instrument in Gilbert uses a battery and heating element to heat air that has been impregnated with a fluid flavoring material. EX1004 at 3:9-18. A POSITA would have understood that the device in Gilbert would be commonly referred to as an electronic cigarette. *See, e.g.*, EX1006 at 1:19-24 (“An electronic cigarette (‘e-cigarette,’ ‘e-Cig,’ or ‘eCig’) is a device that emulates tobacco cigarette smoking, by producing smoke replacement that may be similar in its physical sensation, general appearance, and sometimes flavor (i.e., with tobacco fragrance, menthol taste, added nicotine etc.”).

81. To the extent that Gilbert does not expressly disclose an electronic device, it would have been obvious to a POSITA at the time of the invention to modify Gilbert to include standard electronic components that were well known at the time, at least in view of Cohen. Cohen discloses an electronic cigarette that includes a logic circuit and various electronic controls that can be used to improve the electronic cigarette and customize the user’s experience. In particular, Cohen describes the use of control electronics in combination with a pressure sensor that is “designed to react to a pressure increase due to air flowing through the first housing 24 to actuate the control electronics on the electronic circuit board 40 and other electric components of the inhalation device 10.” EX1007 at [0021].

82. A POSITA would have been motivated to modify the Gilbert device to include such a pressure sensor, including the associated circuit board and electronics, at least because the Gilbert device does not have the ability to start or stop the heating element other than by unplugging the bulb. Modifying Gilbert to only heat up when a user draws on the device would provide numerous benefits, including ease of use for the user, prolonging the life of the heating element, controlling the amount of the deliverable that is vaporized, and protecting the user. As Cohen explains, the control electronics can be programmed to not only turn on the device when the pressure transducer is activated, but it can also be used to control and/or vary the metering of the deliverable such as by limiting the “on” time or controlling the temperature of the heating element. EX1007 at [0040]-[0041]. The device can also be programmed to only activate the atomization device a certain number of times for a given period of time. *Id.* at [0043]. The electronic technology described in Cohen can also increase the life of the electronic cigarette and prevent overheating by limiting the amount of time that the heating element is energized. *Id.* at [0054]. In the Gilbert device, this can only be achieved by removal of the bulb.

83. To the extent it was not already an “electronic” device, the addition of such circuitry and controls would make the Gilbert device an “electronic cigarette.” Given the ubiquitous nature of such pressure sensors and associated controls, not

only would a POSITA have been motivated to make such a change, it would have had a high probability of success in doing so.

(b) Element 1a: “a casing comprising a first chamber and a second chamber, the two chambers located sequentially within the casing;”

84. Gilbert discloses a “casing.” The casing is highlighted in red in the annotated image below. See EX1004 at Figure 1.

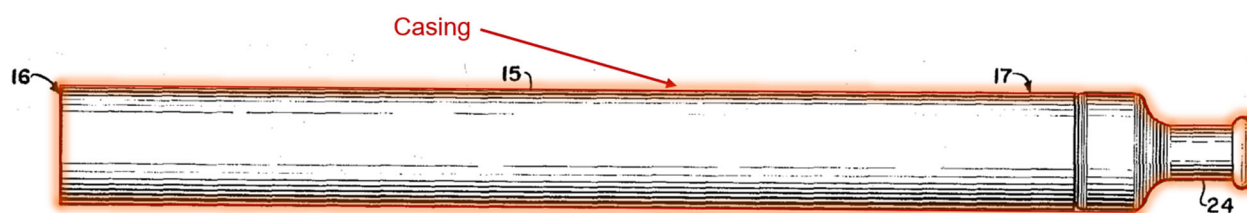
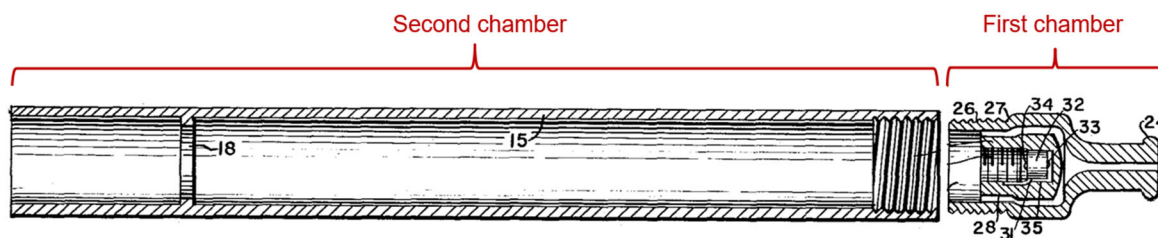
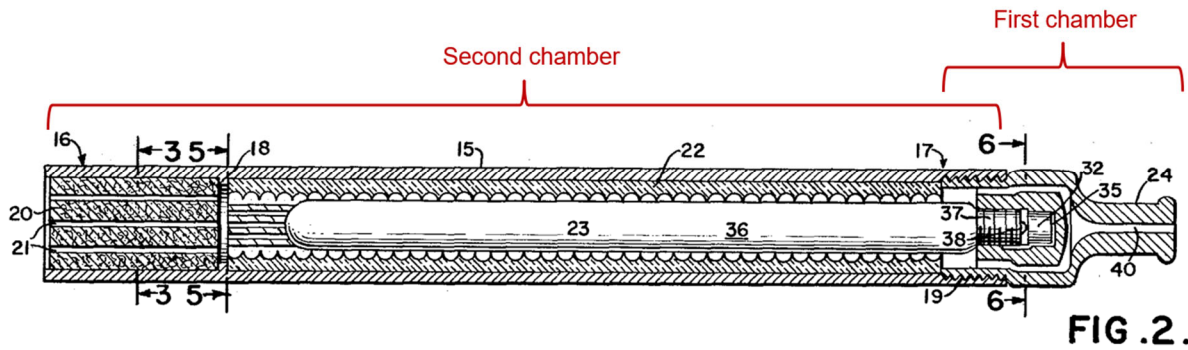


FIG. 1.

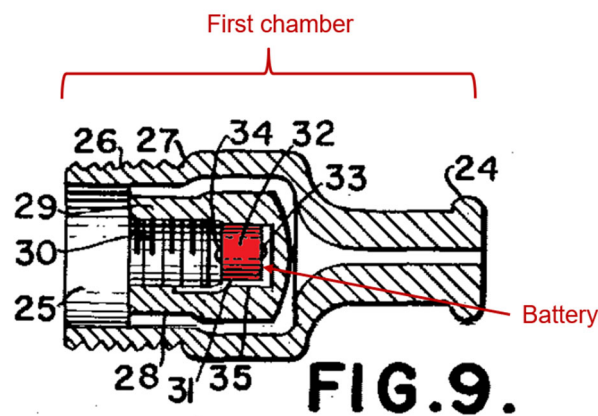
85. Gilbert further discloses “an external tube . . . having an outer end portion 16 and an inner end portion 17.” *Id.* at 1:62-65. The tube 15 has internal threads 19 on the inner end portion 17 used to affix a mouthpiece 24 to the tube 15. *Id.* at 1:72-2:2, 2:16-17. As shown in annotated Figure 2 below, the mouthpiece 24 represents a “first chamber” and the tube 15 represents a “second chamber”, and these two chambers are “located sequentially within the casing.” See *id.* at Fig. 2.





(c) Element 1b: “a battery located in the first chamber;”

86. Gilbert discloses a battery located in the first chamber, as shown below. Gilbert describes “a battery cavity 31” designed for “detachably receiving a battery 32” that has “an inner contact 33 and an outer contact 34 with a contact strip 35 between the inner contact 33 and the socket 30.” *Id.* at 2:41-45.

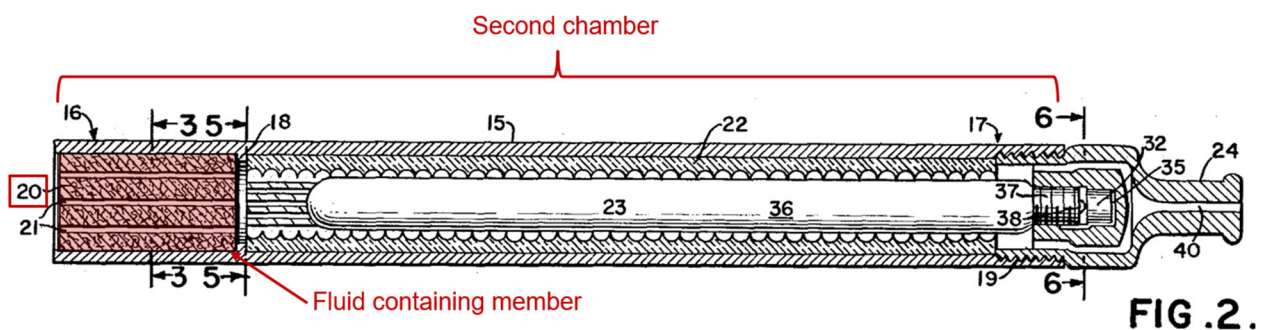


(d) Element 1c: “a fluid containing member located in the second chamber;”

87. Gilbert discloses a detachable flavor cartridge 20 composed of a “porous, moisture-holding substance” that is located on the outer end portion of the tube. EX1004 at 2:3-4, 3:23-25. Gilbert discloses that after the user inhales, air is

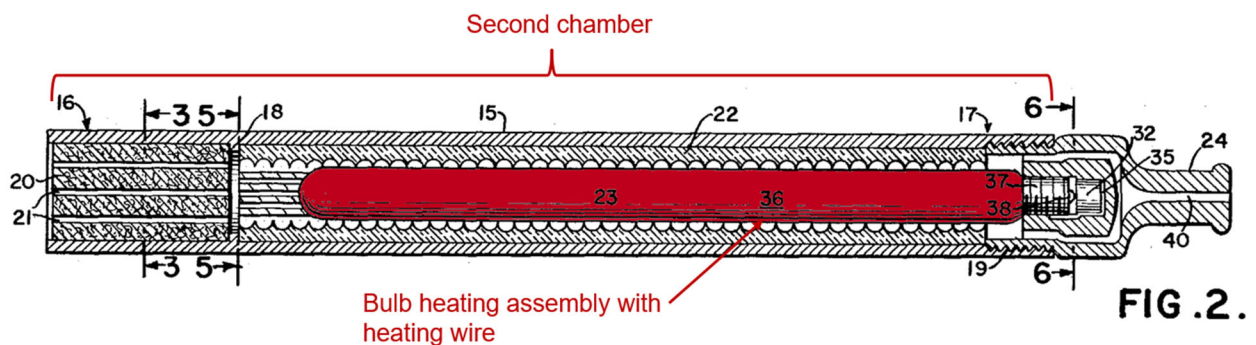
“drawn in through the passages 21 of the cartridge 20 which has been impregnated with suitable flavoring material” and “is picked up by the inhaled air” *Id.* at 3:9-14. After mixing with the flavoring material, the air “then passes into the heating chamber and is caused to flow around the heating bulb 36.” *Id.* at 3:14-15.

88. One advantage of the Gilbert device is that “changing the liquid employed to moisten the cartridge 20” allows “a variety of tastes may be imparted to the warm moist air which serves to duplicate the smoking sensation.” *Id.* at 3:56-59. Another object of this invention is to provide a device capable of “circulating the fluid around the heating element in a turbulent manner to suitably raise the temperature of the inhalant mixture”. *Id.* at 1:23-27. Therefore, as also shown in annotated Figure 2 below, Gilbert discloses a “fluid containing member” (the flavor cartridge) “located in the second chamber” (the tube).



- (e) **Element 1d: “a heating assembly located in the second chamber, the heating assembly comprising a bulb containing a heating wire in communication with the battery;”**

89. Gilbert discloses a heating assembly that “is preferably a vacuum tube or bulb 36” and is “similar to a light bulb.” EX1004 at 2:45-46, 2:50. Gilbert explains that “[w]hen the bulb 36 is assembled to the socket 30 its tip end 38 will engage the inner battery contact 33.” *Id.* at 2:71-72. This “complete[s] the circuit through the filament of the bulb 36 by the contact strip 35.” *Id.* at 2:72-3:2. Therefore, the heating wire (“filament”) described in Gilbert is in communication with the battery 32 through battery contact 33 and contact strip 35. Figure 2, as shown below, depicts the bulb located in the second chamber.



90. As explained above, a POSITA would understand that a “filament” that is typically used inside a “bulb” or “light bulb,” is a “heating wire.” At the time of Gilbert (1965), most traditional light bulbs included a coiled wire made of tungsten. Tungsten is a metal that was typically chosen specifically for its predisposition to heat and its high melting temperature. When energy is supplied through the filament,

the metal lights up and gets hot, and thus is a “heating wire” as contemplated by the ’788 Patent.

(f) Element 1e: “a fluid passageway communicating between the fluid containing member and the heating assembly;”

91. Gilbert discloses a tubular liner 22 with an internal wall 23 used to “tumble the air or create turbulence” within the liner. EX1004 at 2:11-14; *see also*, *id.* at Fig. 8.

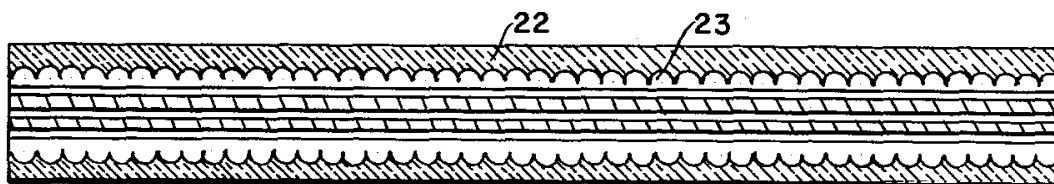
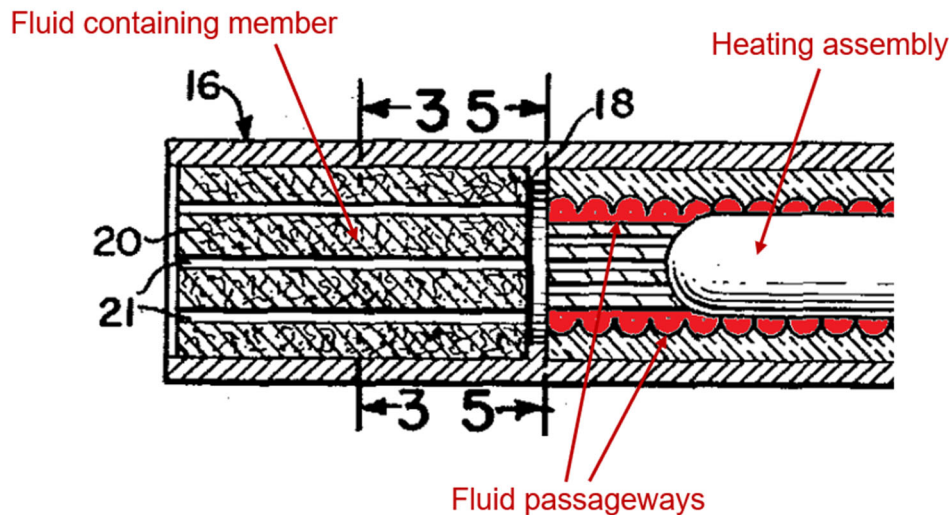


FIG. 8.

92. Gilbert discloses that the bulb 36 is “preferably elongated and of a diameter to fit within the insert 22” in order to “provide an elongated heating passage throughout the length of the bulb and around the complete circumference of the bulb 36”. *Id.* at 2:50-54. Air is “drawn in through the passages 21 of the cartridge 20” after the user inhales and the passages have “been impregnated with a suitable flavoring material.” *Id.* at 3:11-14. The flavoring material (i.e., the “fluid”) “is picked up by the inhaled air” and “then passes into the heating chamber and is caused to flow around the heating bulb 36.” *Id.* at 3:13-15. Figure 2 shows the fluid passageways between the fluid containing member and the heating assembly:



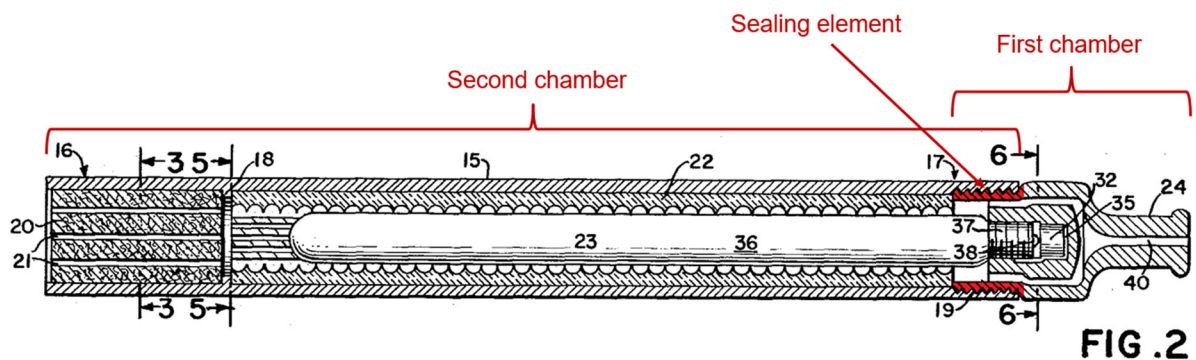
93. Gilbert also discloses that the insert 22 insulates the tube 15 and “[t]he tumbling of the air around the heat source provides for uniformity of heat transfer.” *Id.* at 3:19-22.

- (g) **Element 1f: “a tube element communicating between the first and second chambers, with a first distal end of the tube element located in the first chamber, and a second distal end of the tube element located in the second chamber and affixed to the bulb, the tube element providing an air passage between the first and second chambers;”**

94. The Gilbert device also contains a hollow shank 25 that communicates between the two chambers. As shown in Figures 6 and 9, the hollow shank portion 25 of the mouthpiece 24 (the first chamber) communicates with the tube 15 (the second chamber) through “air draft spaces 28 between the hollow shank 25 and an inner ring 29 spaced inwardly from the hollow shank 25 and connected therewith by radial arms 39.” EX1004 at 2:31-36. Gilbert further discloses that “[t]he air draft

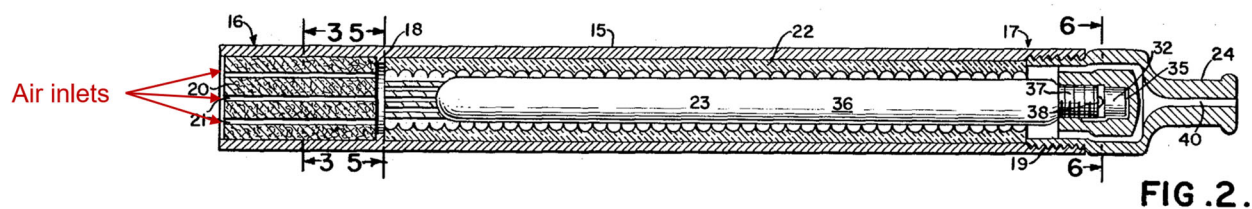
FIG. 9. Cross-sectional view of a medical device. The device features a central tube element (31) surrounded by a tube element (35). The device is divided into two chambers: the First chamber (top) and the Second chamber (bottom). The Second chamber contains a second distal end in the second chamber (29). The First chamber contains a first distal end in the first chamber (33). The device is labeled with various components: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

shank 25 with threads 26 and shoulder 27 act as a sealing element forming a partition between the first chamber and the second chamber.



(i) **Element 1h: “an air inlet provided on an external wall of the casing;”**

97. Gilbert discloses that when the user inhales through the mouthpiece 24, “air from the ambient atmosphere is drawn in through the passages 21 of the cartridge 20 which has been impregnated with suitable flavoring material which is picked up by the inhaled air and such air then passes into the heating chamber and is caused to flow around the heating bulb 36.” EX1004 at 3:10-15. The heated and flavored air then passes “through the mouth piece 24 into the mouth and also, if desired, into the lungs.” *Id.* at 3:16-18. The air inlets are shown in annotated Figure 2 below, and would open to the ambient air through the external wall of the casing.



(j) Element 1i: “wherein the heating wire heats the bulb, and wherein the bulb heats fluid introduced to and coming in contact with the bulb through the fluid passageway.”

98. Gilbert discloses that the heating element “is preferably a vacuum tube or bulb 36” that is “energized.” EX1004 at 2:46-47, 3:2-3. Gilbert also discloses that the air mixed with the flavoring material “passes into the heating chamber and is caused to flow around the heating bulb 36.” *Id.* at 3:12-15. Gilbert explains that an object of this invention is to “circulat[e] the fluid around the heating element in a turbulent manner to suitably raise the temperature of the inhalent mixture.” *Id.* at 1:23-29.

99. The device described in Gilbert allows a user to inhale on the device, causing external air flowing into the device to capture fluid stored inside the device, and the air/fluid combination then contacts the bulb and gets heated up before being inhaled by the user.

2. Dependent Claim 11

100. Claim 11 depends from claim 1 and adds the limitation “wherein the fluid is selected from a group consisting of: a glycol fluid, a fluid containing nicotine, a water-based ‘regular’ cigarette flavored fluid, a water-based ‘menthol’ cigarette flavored fluid, and combinations thereof.” Gilbert discloses this limitation and describes a “flavor cartridge 20” that is “impregnated with suitable flavoring material.” EX1004 at 2:3-4, 3:12-13. And Gilbert explains that “[t]he impregnation

will be by a harmless flavored chemical compound” which “may be solutions ranging from slightly mentholated water to a solution which would simulate artificially the flavor of Scotch whisky.” *Id.* at 3:27-32. “Slightly mentholated water” is a “a water-based ‘menthol’ cigarette flavored fluid.”

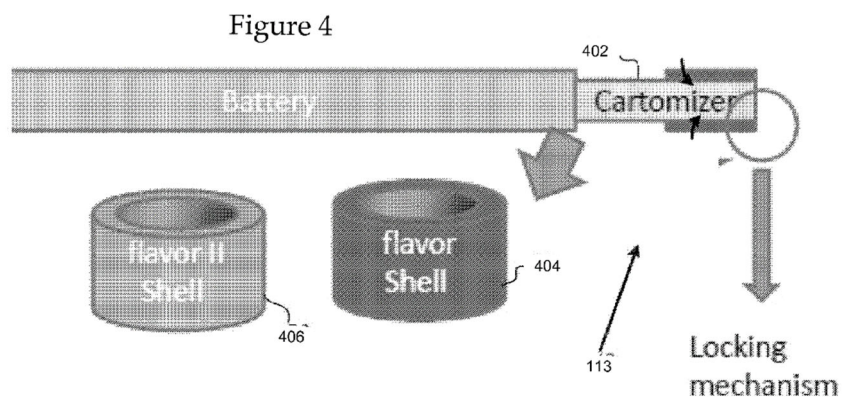
101. In addition, Gilbert discloses that “[b]y changing the liquid employed to moisten cartridge 20, a variety of tastes may be imparted to the warm moist air which serves to duplicate the smoking sensation.” *Id.* at 3:56-59. A POSITA would understand that a “regular cigarette flavored fluid,” as described in Gilbert, would duplicate the smoking sensation.

B. Claims 7 and 8: Gilbert In View Of Cohen And Weigensberg

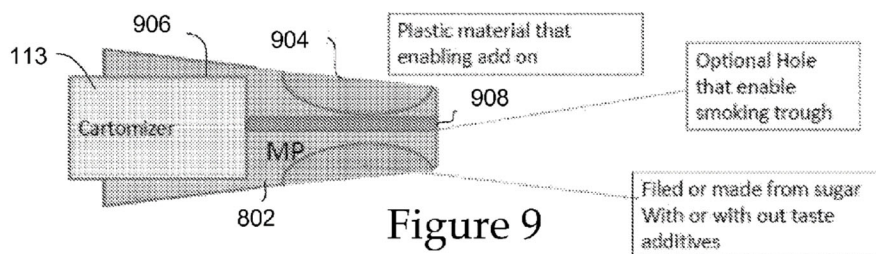
102. Claim 7 depends from claim 1 and adds the limitation “further comprising a removable sleeve positioned about a portion of an exterior 30 of the casing.” Weigensberg discloses that the invention can include “a special external (removable) wrap or container or packaging for the flavor booster 602 or for the cartridge that will seal in and preserve the flavor during storage or between uses. It may insulate against heat, light, moisture, or oxygen, etc.” EX1006 at 7:41-45. A POSITA would understand that the external (removable) wrap or container or packaging described in Weigensberg would most likely be positioned on the exterior of the casing (claimed in ‘788 as comprising a first chamber and a second chamber, of

the device) in order to facilitate removability and as shown in Figures 2, 3, and 4 of Weigensberg.

103. Weigensberg further discloses that cylindrical flavor shells 404, 406 can be placed around the outside of the cartomizer and that these shells are removable (*i.e.*, “removable sleeves”). The cartridges can be switched out and can be used to quickly and easily alter the flavor of the device. This cartridge, which looks and acts as a “sleeve” is depicted in, for example, Figure 4:



104. Weigensberg further disclose a removable mouthpiece that can be placed around the *outside* of the cartomizer. *Id.* at 8:20-23. Weigensberg explains that “[t]he mouthpiece 802 may be made of plastic with a recess 906 formed therein such that its inner diameter fits over the cartomizer 113 and enables *fast mounting and dismounting* from the cartomizer 113” *Id.* (emphasis added). “Mounting and dismounting” indicates that the mouthpiece is removable, and a POSITA would understand that the mouthpiece is a “sleeve” as contemplated by the ’788 patent. The mouthpiece can be seen in Figure 9.



105. Claim 8 also depends from claim 1 and adds the limitation “further comprising a removable sleeve located around an exterior of the casing.” As explained above with respect to claim 7, Weigensberg discloses this limitation.

106. A POSITA would have been motivated to combine the teachings of Gilbert with the “removable sleeve” teachings in Weigensberg because flavored vaping liquids *were* known to improve the user’s experience when using vaping devices. A POSITA would have been motivated to modify the flavor of the vaping liquid according to user preference. In 2013, it was well known to the POSITA that cartridges for electronic vaping devices typically contained chemical additives and flavors, such as various brands of tobacco, chocolate, coffee, mint, or fruit. A POSITA would have had a reasonable expectation of success in modifying the device in Gilbert to include flavored vaping liquid as taught by Weigensberg, as flavored vaping liquids were known in the field of electronic vaping devices at the time and flavorings were routinely incorporated in devices like the one in Gilbert. And Weigensberg itself explains that different flavors and scents provide gustatory and olfactory enhancements to the e-cigarette by, for example, improving the experience

for the user by allowing the user to taste and smell the flavor, and also potentially overcoming any initial burning smell. EX1006 at 4:39-52; 8:36-55. Weigensberg also explains that “[p]roviding a selection of different shells and flavoring agents facilitates tailoring the cartomizer 113 according to the needs of different consumers.” *Id.* at 6:34-36.

107. A POSITA would also have been motivated to use the removable sleeve arrangement disclosed in Weigensberg at least for its simplicity and ease with which a user could alternate between different flavors. The Gilbert flavor cartridge (20) is internal to the device, which could limit the size of the flavor cartridge (and hence the amount of flavoring) due to Gilbert’s goal of making the device similar in size to a cigarette. Alternatively, if the Weigensberg sleeve is used, the sleeve could be made larger without affecting the overall size of the device. Additionally, Gilbert’s flavor cartridge is at the distal end of the device, whereas the Weigensberg shell/sleeve is at the proximal end, next to the cartomizer/mouthpiece. Using the Weigensberg sleeve to deliver flavor would allow the flavoring to be mixed with the vapor, whereas Gilbert’s flavor is introduced before the vapor is created. The Gilbert approach would reduce its effectiveness, as dry air would be less efficient extracting flavoring than wet vapor. Also, the user of a device with the Weigensberg sleeve will better taste the flavoring due to the sleeve’s proximity to the mouth. For at least these additional reasons, a POSITA would have been motivated to combine the

Weigensberg sleeve with the device of Gilbert. A POSA would have been further motivated to use the Weigensberg sleeve because it would provide additional benefits that are not provided by the flavored liquid in Gilbert. Specifically, the Weigensberg sleeve acts as a “booster” that can provide, among things, additional/enhanced flavors (including even multiple flavors in a single sleeve) and/or additional/enhanced scents for the user. *See, e.g.*, Ex. 1006 at 4:39-52, 5:43-6. The sleeve can also be used to provide enhancements such as sweet substances, sugar, or caffeine. *Id.* at 8:6-19. As Weigensberg explains, the benefits that would motivate a POSA to make this modification would be both gustatory and olfactory.

C. Claims 1 and 11: Lee In View Of Gilbert and Levin

108. Lee discloses all of the limitations of claims 1 and 11 except the limitations requiring “the heating assembly comprising a bulb containing a heating wire” and “wherein the heating wire heats the bulb, and wherein the bulb heats fluid introduced to and coming in contact with the bulb through the fluid passageway.” As I explained above, Gilbert teaches these limitations.

1. Independent Claim 1

(a) Preamble: “An electronic cigarette comprising:”

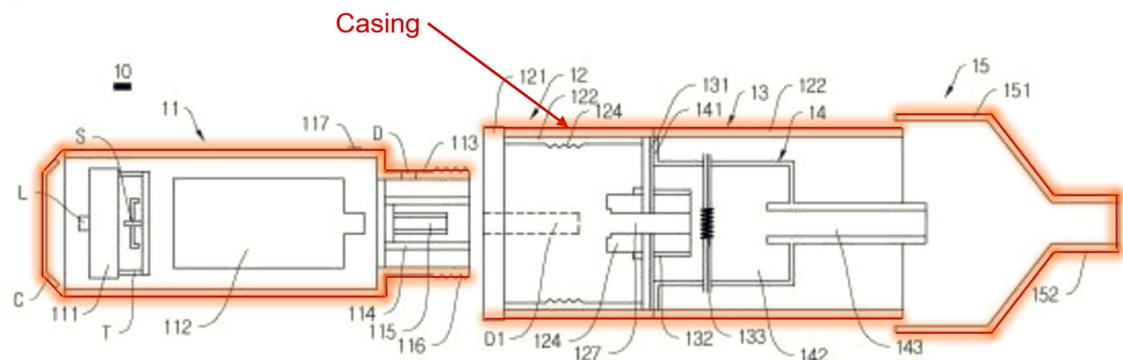
109. As I explained previously, it is my understanding that preamble language is not generally considered limiting. To the extent the preamble of claim 1 is limiting, however, it is disclosed by Lee. For example, Lee discloses that “[t]his

invention is about an external air inflow structure applied to an e-cigarette”. EX1005 at [0001].

(b) Element 1a: “a casing comprising a first chamber and a second chamber, the two chambers located sequentially within the casing;”

110. Lee discloses an electronic cigarette with a casing. The casing is depicted in red highlighting below, in annotated Figure 1a:

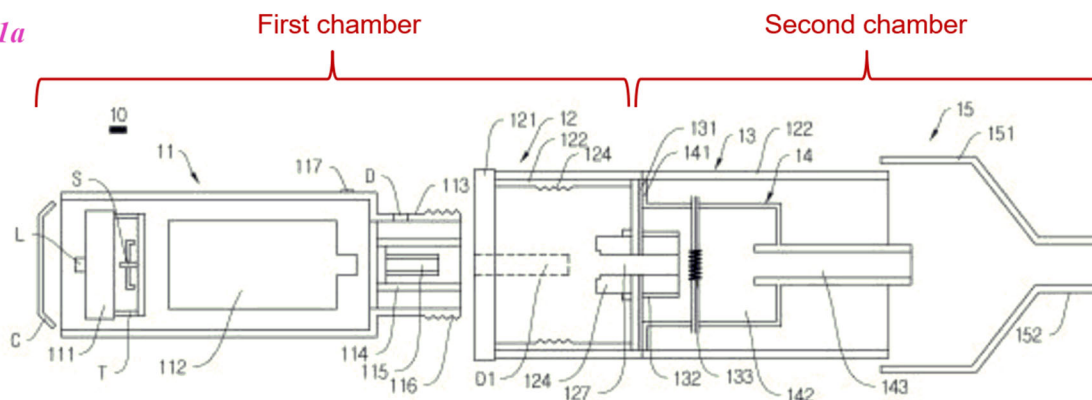
FIGURE 1a



111. Lee further discloses a battery assembly (11) connected to a guide chamber through a connection chamber (113). EX1005 at [0019]. The connection chamber (113) is formed in the battery assembly (11). *Id.* Lee discloses a “switch that controls the electrical connection between the circuit board and the heating element” that “can be activated by sensing the inhaled air or it can be operated manually.” *Id.* at [0036]. Lee also discloses a storage housing (13) that is physically separated from the guide chamber (12) by a separating plate (131). *Id.* at 28. The battery assembly and connected guide chamber together form the “first chamber” and the storage housing is the “second chamber” that is located sequentially in the

casing with the battery/guide chamber assembly, as shown in the annotated image below.

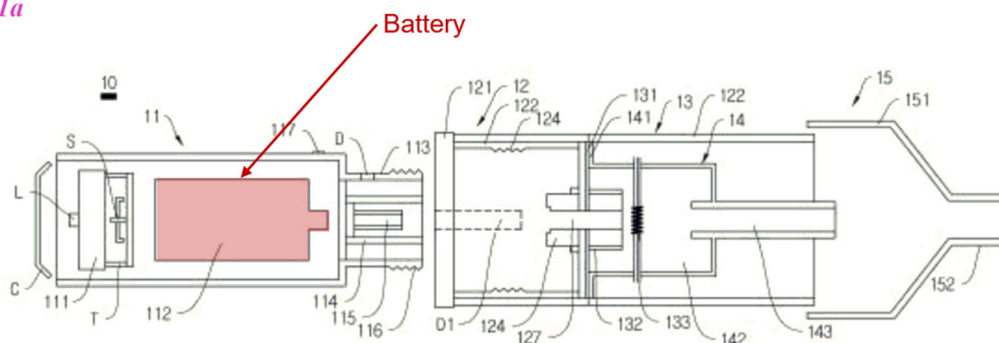
FIGURE 1a



(c) Element 1b: “a battery located in the first chamber;”

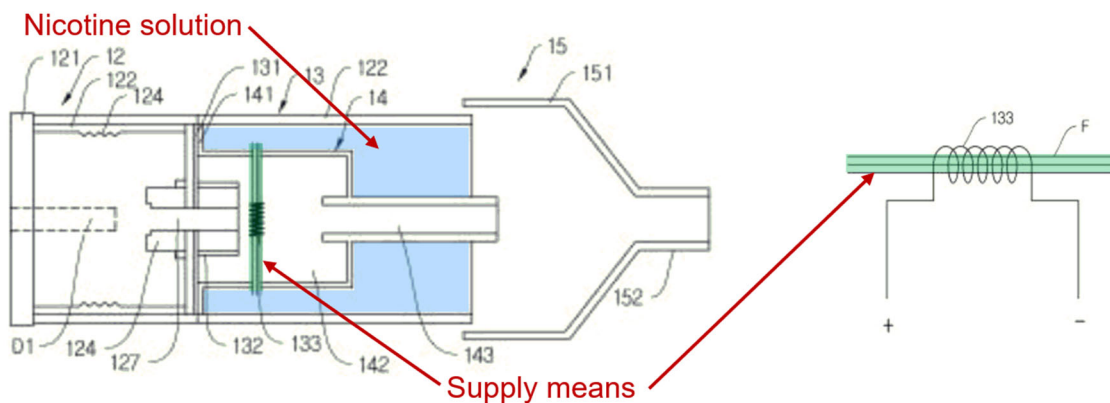
112. As discussed above, the battery assembly is connected to the guide chamber forming the “first chamber” of the casing. Lee discloses that the battery assembly includes “an electric circuit board (111), a battery (112), and a connection chamber (113)”. EX1005 at [0022] (emphasis added). The battery can be seen in red in the annotated figure below.

FIGURE 1a



(d) Element 1c: “a fluid containing member located in the second chamber;”

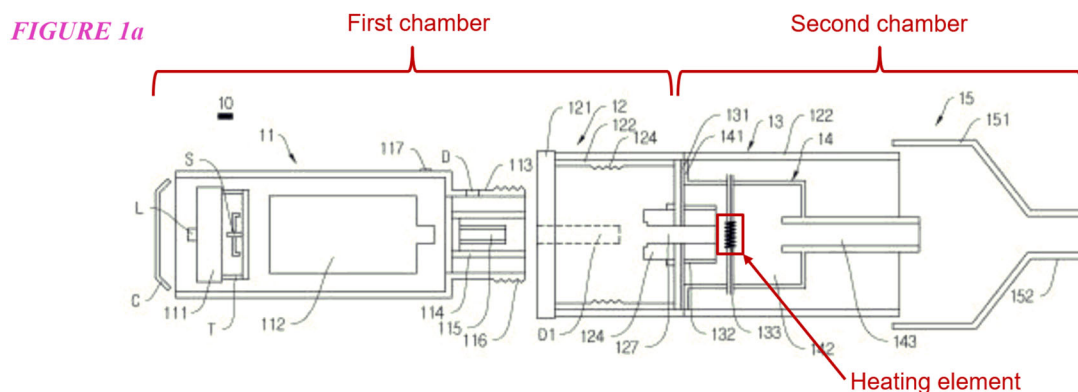
113. Lee discloses that the device “includes a storage housing (13) in which a nicotine solution is contained”. EX1005 at [0020]. As discussed above, the storage housing is the “second chamber” of the casing. Lee discloses that “[t]he nicotine solution stored in the storage housing (13) may be delivered to the heating element (133) through a nicotine solution supply means.” *Id.* at [0029]. Lee further explains that the “nicotine solution supply means may be a fiber aggregate (F) described below, but is not limited thereto, and various nicotine solution supply means may be used according to the structure of the heating element (133).” *Id.* at [0029]. Annotated Figures 1a and 1c, show the nicotine solution (shown in blue) is stored in the storage housing. The nicotine solution is delivered to the heater via supply means “F” (shown in green); both the storage housing and the supply means are fluid containing members:



(e) Element 1d: “a heating assembly located in the second chamber, the heating assembly comprising a bulb

containing a heating wire in communication with the battery;”

114. Lee discloses a heating assembly located in the second chamber. The heating element 133 is shown in the annotated figure below. *See also* Lee [0020].



115. The heating element 133, shown above and in Figures 1b and 1c, may be a wire and Lee describes at least one embodiment where the heating element 133 is a nichrome wire. *Id.* at [0029]. Lee explains that “[i]n the embodiment shown in FIGS. 1a and 1b, the nicotine solution stored in the storage housing (13) has a structure penetrating the inside of the heating element (133) such as nichrome wire, but this invention is not limited thereto.” *Id.* at [0029]. Lee further discloses that the heating element 133 is in communication with the battery. *Id.* at [0024]. (“In the e-cigarette, the wiring for supplying power from the battery (112) to the electric circuit board (111) and the heating element (133) may be made in various ways.”).

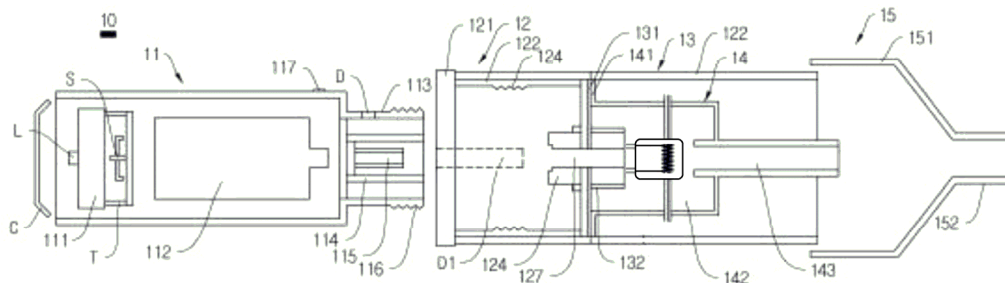
116. While Lee does not expressly describe a “bulb” containing the heating wire, such a structure would have been obvious to a POSITA at least in view of Gilbert. As I described above, Gilbert discloses a heating assembly that comprises

a “bulb containing a heating wire” and it would have been obvious to modify the Lee device to include a bulb structure similar to that of the bulb structure described in the Gilbert device.

117. For example, while Lee identifies a heating element (133) as a nichrome wire, Lee does not limit the heating element to this construction. A POSITA would be motivated to explore other types of heating elements in order to solve user issues with e-cigarettes at the time. One such issue was the “dry hit,” which occurred when insufficient amounts of nicotine liquid were in contact with the heating element. The user would taste a metallic flavor when inhaling a dry hit, which was highly unpleasant. The use of a heat-conducting material to vaporize the nicotine liquid without making direct contact with the heating wire would have been a very desirable feature to prevent this issue. A POSITA would have naturally explored the use of heat-conducting materials that were safe when heated to temperatures required for vaporization, and an obvious material would have been glass, as it is inert, and combined with a heating element has a familiar construction to a light bulb.

118. While a formal study wasn’t conducted until 2017 by Rule et al. (<https://pubmed.ncbi.nlm.nih.gov/27810679/>), users were concerned with possible inhalation risks and metallic taste issues with the use of metal wire heating elements much earlier. (e.g., https://www.reddit.com/r/electronic_cigarette/comments/2jsbdc/

[dangers_of_nichrome/](#); <https://vapingunderground.com/threads/new-builder-kanthal-vs-nichrome-help-i-don't-understand.226/>). A glass covered heating element would solve these issues as well. One example of a possible implementation of the Gilbert bulb heater in the Lee device is pictured below:



119. Additionally, a POSITA would have been motivated to implement a heating element covered by a glass bulb to increase the life of the heating element and prevent failure of the device. *See, e.g.,* EX1009 at [0004] (“Vaporizing the solution by directly contacting the heating element often severely reduces the life of the heating element so that such devices often require frequent replacement. . . . Due to the difficulties associated with these configurations, such devices are prone to premature failure and often don’t work particularly well even when functioning normally.”).

120. In addition to Gilbert, Levin also describes a heating element inside a bulb. Specifically, Levin explains that “[t]he heating element may be a Nickel Chromium alloy wire, which may be miniaturized and optimized for maximum surface area and minimized mass, or may be a heater bulb, such as a Tungsten

filament in quartz bulb.” Ex. 1009 at [0049]. The bulb heater 53 of Levin is depicted in Figures 15A-15D and 16A-16B of Levin, and is most readily seen in Figure 16B shown below.

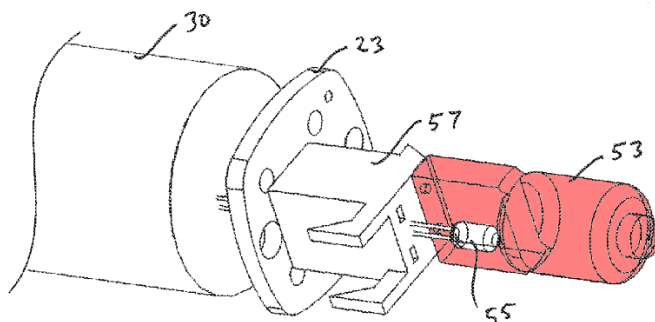


FIG. 16B

121. Levin explains that “[t]he bulb may be any bulb suitable for sufficiently heating the substance to vaporize an active ingredient therein for inhalation by the user.” *Id.* at [0056]. Levin further describes the use of a bulb for conductive heating of an aerosol generating solution. *See* Ex. 1009 at ¶ [0056].

122. A POSITA would have been motivated to implement a heating element within a glass bulb like that described in Levin for all of the reasons described above. In addition, Levin itself explains that using, for example, a halogen tungsten in quartz bulb will “allow for a consistent and reliable heat source that can be controlled to maintain a desired temperature level within a chamber in which the bulb is disposed.” Ex. 1009 at [0056]. Levin further explains that such a configuration “allow[s] relatively high energy dissipation per unit time with relatively low energy

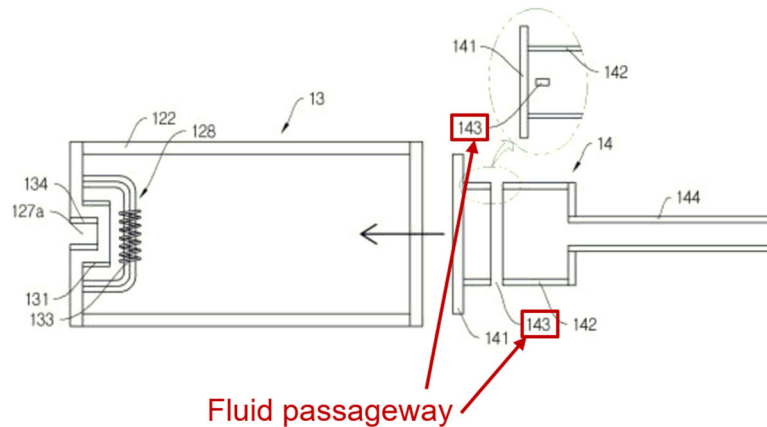
input to achieve a desired operating temperature, when compared to conventional devices.” *Id.* at [0049].

123. A POSITA would have readily implemented a heating element covered by a glass bulb or tube by merely replacing the heating element (133) with this bulb heater inside of the vaporization unit (14). The bulb heater could be connected to the electric circuit board (111) and battery assembly (11) in a very similar fashion to the nichrome wire heater represented in Lee. The implementation of such a heater would have been well within the knowledge and skill of a POSITA, and thus a POSITA would have had a reasonable expectation of success in making such a modification. Implementing a heating element covered by a glass bulb in Lee would render obvious this limitation of the ’788 Patent.

(f) Element 1e: “a fluid passageway communicating between the fluid containing member and the heating assembly;”

124. Lee discloses that “the nicotine solution is supplied to the heating element (133) by the fiber assembly (F)”. EX1005 at [0032]. Lee further discloses that a supply passage (143) with “a shape of a through-hole formed in the circumferential surface of the vaporization chamber (142)” allows the “fiber assembly (F) to pass.” *Id.* Lee explains that “[t]he nicotine solution stored inside the storage housing (13)” (located outside the vaporization unit (14)) “may be

supplied to the heating element (133)” (located inside the vaporization unit (14))
 “through the supply passage (143).” *Id.* at [0032]; *see also id.* at Figure 1c:



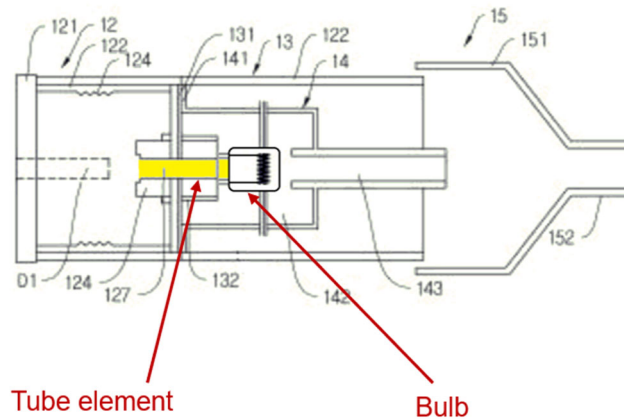
- (g) **Element 1f: “a tube element communicating between the first and second chambers, with a first distal end of the tube element located in the first chamber, and a second distal end of the tube element located in the second chamber and affixed to the bulb, the tube element providing an air passage between the first and second chambers;”**

125. Lee discloses an air inlet path (127). EX1005 at [0029]. Lee explains that the “structure of the inlet groove (G) allows the air present in the connection chamber (113) or the guide chamber (12) to flow along the inlet groove (G) to be introduced into the air inlet passage (127).” *Id.* at [0026]. Lee further explains that the air is then “introduced into the storage housing (13) through the air conduit (127a)” and the air inlet path (127) “is connected to the inside of the storage housing (13)” EX1005 at [0027], [0029]. Finally, Lee discloses that “[t]he air introduced into the storage housing (13) through the air conduit (127a) can be supplied to the heating element (133).” *Id.* at [0029].

limitation.

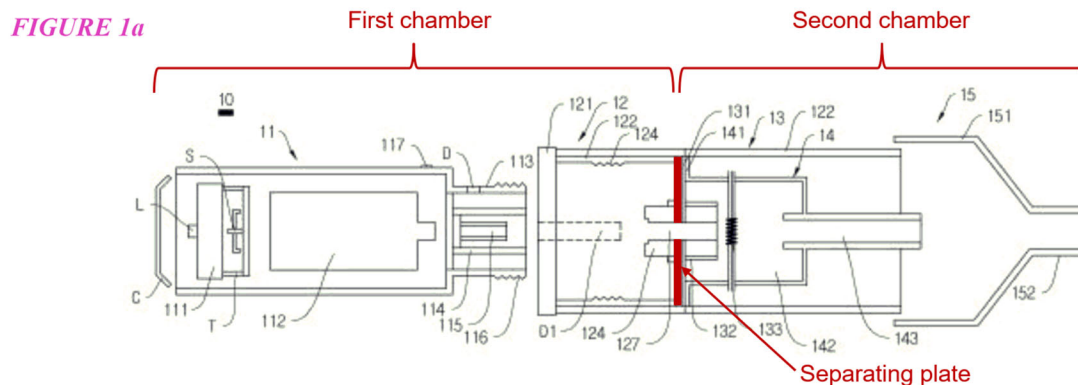


moving around the bulb, in a direction transverse to the image.



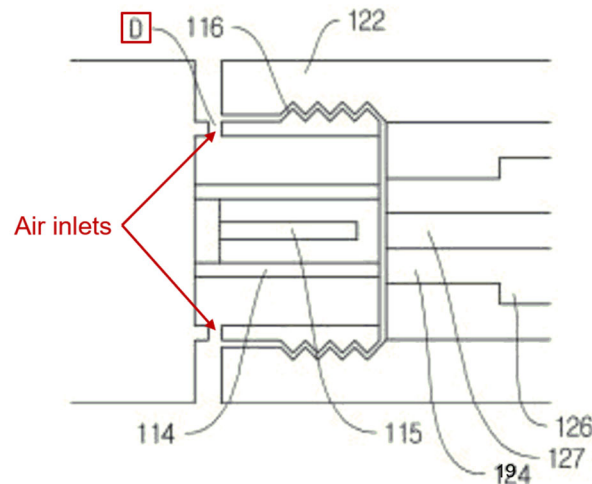
(h) Element 1g: “a sealing element forming a partition between the first and second chambers; and”

128. Lee discloses a separating plate 131 that “physically separates the guide chamber (12) and the storage housing (13).” EX1005 at [0028]. This separating plate is a sealing element that forms a partition between the first and second chambers, as shown in annotated Figure 1a of Lee below.



(i) Element 1h: “an air inlet provided on an external wall of the casing;”

129. Lee discloses that “external air flows in through the inlet hole (D)” and the air then “flows along the guide groove (D1) to the inside of the connection chamber (113) and the guide chamber (12).” EX1005 at [0024]. These air inlets, on an external wall of the casing, are shown below in annotated Figure 2a of Lee.



- (j) **Element 1i: “wherein the heating wire heats the bulb, and wherein the bulb heats fluid introduced to and coming in contact with the bulb through the fluid passageway.”**

130. As I explained above, it would have been obvious to a POSITA to use the bulb/wire configuration described in Gilbert with the Lee device. And as I described above with respect to Gilbert, the Gilbert bulb/wire heating assembly discloses this limitation.

2. Dependent Claim 11

131. Claim 11 depends from claim 1 and adds the limitation “wherein the fluid is selected from a group consisting of: a glycol fluid, a fluid containing nicotine,

a water-based ‘regular’ cigarette flavored fluid, a water-based ‘menthol’ cigarette flavored fluid, and combinations thereof.” Lee discloses a “storage container for supplying nicotine solutions” and refers to this nicotine solution as “nicotine liquid,” which is a “fluid containing nicotine.” *Id.* at [0003], [0017].

D. Claims 7 and 8: Lee In View Of Gilbert, Levin, and Weigensberg

132. Claim 7 and claim 8 depend from claim 1. Claim 7 adds the limitation “further comprising a removable sleeve positioned about a portion of an exterior 30 of the casing” and claim 8 adds the limitation “further comprising a removable sleeve located around an exterior of the casing.” Weigensberg discloses these limitations, as I explained above. A POSITA would have been motivated to combine Lee with the removable sleeves of Weigensberg for the same reasons described above.