

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

PORTA SOPHIA,

Petitioner,

v.

GREGORY ELLIS,

Patent Owner.

U.S. Patent 11,235,110

DECLARATION OF DR. DAVID PEYTON.

TABLE OF CONTENTS

I. INTRODUCTION	1
II. QUALIFICATIONS AND EXPERIENCE	2
III. THE PERSON OF ORDINARY SKILL IN THE ART	3
IV. TECHNICAL BACKGROUND	4
A. Vaping Devices	5
B. Vaping formulations	12
C. DMT, 5-MeO-DMT, and 2C-B	12
D. Vaping DMT	14
V. LEGAL STANDARDS	15
VI. THE CHALLENGED PATENT	18
A. The '110 Patent	18
B. Summary of the Claimed Subject Matter	18
VII. SUMMARY OF SELECTED PRIOR ART REFERENCES	20
A. DMT-NEXUS 2012	24
B. DMT-NEXUS 2015	27
C. DMT-NEXUS 2018	28
D. EROWID 2014	29
E. MUNOZ	31
F. GREENHILL	31
G. POWER	32
H. CALLAWAY	33
I. GIROUD	34
J. THE VISUAL VAPING DICTIONARY (2020)	37
K. HALBERSTADT	39
L. U.S. Pat. Publ. No. 2022/0081396	39
M. U.S. Pat. Publ. No. 2018/0303165	41
N. Int'l Pat. Publ. No. 2019/191712	41
O. Int'l Pat. Publ. No. 2020/053392	42
VIII. OVERVIEW OF GROUNDS OF UNPATENTABILITY	42
IX. THE CLAIMS OF THE '110 Patent ARE ANTICIPATED OR OBVIOUS	43
A. Ground 1	43
B. Ground 2	45
C. Ground 3	46
D. Ground 4	48

E. Ground 5	52
F. Ground 6	52
G. Ground 7	55
H. Ground 8	57
X. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS	59
XI. CONCLUSION	59

I. INTRODUCTION

1. I have been asked by attorneys for Porta Sophia to offer my opinions regarding whether the claims of U.S. Patent No. 11,235,110 (EX1001; “the ’110 Patent”) are anticipated by earlier published, publicly available, printed publications (the “prior art”) or would have been obvious to the person of ordinary skill in the art (“POSA”) as of July 29, 2020, which I understand is the earliest priority date claimed by the ’110 Patent, or July 18, 2021, which I understand is the earliest priority date for claims 17-19, dates before which, respectively, are the “prior art time period.”

2. I understand that my opinions in this Declaration will be submitted as evidence in an inter partes review (“IPR”) proceeding before the Patent Trial & Appeal Board in the U.S. Patent & Trademark Office concerning the ’110 Patent. I understand Porta Sophia is the Petitioner in this proceeding and that MONSTER COLOR CARNIVAL LLC (“MCC”) is the Patent Owner.

3. I am being compensated at my usual rate of \$650 per hour plus expenses for my work in connection with this IPR proceeding. My compensation in no way depends on the outcome of this proceeding or on the opinions I express. The opinions and conclusions I express herein are based on my review of the materials cited herein, and on (1) my general knowledge of vaping formulations, vaping devices, and vaporizable substances, and (2) my years of experience acquired working in this field. I reserve the right to supplement or amend my opinions in response to opinions expressed by other experts, or in light of any additional evidence, testimony, or other information that may be provided to me after that date of this declaration.

II. QUALIFICATIONS AND EXPERIENCE

1. My current Curriculum Vitae is attached as EX 1003. I have summarized my educational and professional background below.

2. I received a PhD in Chemistry at the University of California at Santa Barbara in 1983. I subsequently was a Postdoctoral Researcher from 1983-1985 in Biochemistry at the Cornell University Medical College (now known as Weill Cornell Medicine, in New York City) and in Physical Chemistry from 1985-1987 at the University of California at Davis. I then moved to Portland State University (Chemistry Department) in 1987, proceeding through the ranks of Assistant Professor, Associate Professor, Full Professor, before becoming Emeritus Professor (Retired) in 2022. My research expertise includes structural biology, drug discovery/drug development, and analytical chemistry (especially relevant to vaping).

3. I have authored or co-authored multiple peer-reviewed publications associated with this work. Of my total of 84 peer-reviewed publications, 25 concern traditional cigarettes, electronic cigarettes, or vaped cannabinoids. Twenty-three of my last 29 publications (since 2015) have been in this field.

4. Although retired I retain Emeritus Professor status and continue to advise / collaborate with other faculty members and graduate students in the broad field of vaping, as well as in malaria drug discovery. Thus, I have 9 publications since 2022. I also regularly peer-review manuscripts in the field of vaping.

5. My key contributions to the understanding of vaping have to do with the chemical reactions that happen after vaping liquids are mixed, including what happens to the constituents during storage, heating, and the aerosol (gas / particle phases) as the mixture is delivered to the lungs; this relates to (potential) toxicology of the practice of vaping. Significantly, I found that

more formaldehyde than had been appreciated may be formed during the vaping process, and that this can be ‘trapped’ as a hemiacetal, which is not a stable molecule which can subsequently release formaldehyde into the lungs. Another critical aspect of my work in vaping has to do with the addictiveness of nicotine-containing devices (electronic cigarettes) by the use of very popular ‘nicotine salt’ formulations. I also have been involved in the characterization of the highly toxic ketene formation from various cannabinoid devices.

III. THE PERSON OF ORDINARY SKILL IN THE ART

1. I have been informed that the person of ordinary skill in the art (“POSA”) is a hypothetical person who is presumed to have known all of the relevant art as of the priority dates of the ’110 Patent claims and is the person to whom the subject matter of the challenged patent is directed.

2. I have been asked to opine as to the qualifications of the POSA to which the claims of the ’110 Patent are directed. For the purpose of rendering an opinion, I have further been instructed to assume that the priority date of the ’110 Patent to be July 18, 2021 for claims 17-19 and July 29, 2020 for the remaining claims (the “Priority Dates”). I have been informed that factors that may be considered in determining the level of ordinary skill may include: (1) the educational level of the inventor; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) the sophistication of the technology; and (6) the educational level of active workers in the field. I have further been informed that the POSA may possess the education, skills, and experience of multiple actual people who would work together as a team to solve a problem in the field.

3. In my opinion, a POSA relevant to the ’110 Patent would have either a basic science background at the level of an undergraduate student or early graduate student or working

experience with vaping devices and vaping formulations, which could include a “citizen scientist” (a self-educated vaping enthusiast or hobbyist having hands-on experience with or without a scientific education or degree).

IV. TECHNICAL BACKGROUND

1. The disputed technology in this matter relates to vaporizable formulations of dimethyltryptamine (“DMT”), 5-methoxy-N,N-dimethyltryptamine (“5-MeO-DMT”), or 2,5-dimethoxy-4-bromophenethylamine (“2C-B”) in the chamber of a device.

2. Dependent claims of the ’110 Patent recite additional details of the device design, the inclusion of a monoamine oxidase inhibitor in the vaporizable formulation, isotopomer or isotopologue forms of the drugs, and propylene glycol (PG), vegetable glycerin (VG), or polyethylene glycol (PEG) in the vaporizable formulation.

3. The device designs claimed are all well-known vaping device designs. The specification of the ’110 Patent simply describes known vaping device designs, showing photographs of products commercially available in the prior art time period. There is no indication in the ’110 Patent that the inventor made any contribution to device designs, nor based on my experience, do I see any inventive contributions.

4. PG, VG, and PEG are all well-known solvents or suspension agents routinely used in vaping devices. The ’110 Patent acknowledges as much stating that PG, VG, and PEG are “commonly used substances known in the field of vaporizing.” There is no indication in the ’110 Patent that the inventor made any contribution to formulation chemistries, nor based on my experience, do I see any inventive contributions. The specification describes “optimal formulation ratios” in Table 1. However, Table 1 simply lists every combination of PG, VG, and PEG from

0:100 to 100:0 ratios in 10% increments. There is no testing data in the '110 Patent indicating the performance of any of these ratios relative to each other or any other formulation.

5. DMT, 5-MeO-DMT, and 2C-B are well known psychedelic drugs of the prior art with known biological activities and potential health benefits. These and other psychedelic drugs have been the subject of scientific study by both academic professionals and citizen scientists, and also have a long and public history of underground use. There is no indication in the '110 Patent that the inventor made any contribution to the discovery of these drugs or their uses.

6. It appears that the '110 Patent supposes that its inventive work resides in the application of these “ayahuasca-like substances” to vaping devices. Yet this is not new. For example, there are numerous prior publications describing the vaping of DMT, which I describe in more detail below.

7. I do not see any inventive concepts in either the claims or the specification of the '110 Patent.

A. Vaping Devices

Vaping devices have been around for many decades, with early versions now more than 50 years old. Vaping devices became popularized in the United States in the early to mid-2000s with the commercialization of e-cigarette devices. Popularity increased in 2015 with the youth-appealing marketing of e-cigarette devices launched by JUUL, designed with high-nicotine delivery. In the prior art time period, the diversity of drugs used in vaping devices expanded to include cannabis and DMT (EX 1011, 9996; EX 1012, 18).

Most vaping devices contain four components: 1) a cartridge or reservoir or pod that holds a liquid solution containing varying amounts of a drug, flavorings, and other chemicals; 2) a heating element; 3) a power source; and 4) a mouthpiece that the person uses to inhale.

By 2015, many different vaping devices were in use for administration of nicotine, cannabis, and other drugs, including DMT. EX 1011, 9996. Figure 2 of GIROUD shows several different vaping device configurations used to vape cannabis-containing E-liquid, each having the four common components: a chamber that holds the E-liquid (parts 3 (“Vaporizer chamber”), 9c (“Clearomizer tube”), and 12 (“Glass globe”)); a heating element (parts 5 (“Wax coil head”), 10 (“Clearomizer coil and four-wick head with base assembly”), and 13 (“Ceramic heating chamber and coil”)); a power source (part 7 (“medium capacity batter”)); and a mouthpiece with a channel to allow vapor generated in the chamber to enter the user’s mouth (parts 2 (“spring-loaded mouthpiece”), 8 (“Clearomizer tip”), and 11 (“Drip tip”)). *Id.* At 9992.

The ’110 Patent acknowledges that these types of devices are known in the prior art and equates their features to the language “device” and “chamber” used in the claims of the ’110 Patent.

Devices used to vaporize substances are known in the art, and are commonly referred to in the art as vaporizers, atomizers (e.g., rebuildable atomizers, rebuildable dripping atomizers, rebuildable tank atomizers, clearomizers, or cartomizers), mods (including but not limited to squonk mods, sub ohm mods, box mods, tube modes, temperature control mods, regulated mods, and mechanical mods), E-cigs, vape pens, etc.

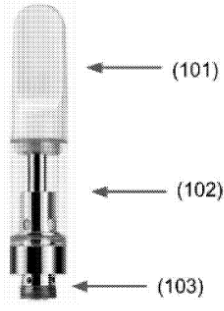
EX 1001, col. 6 l. 13-20.

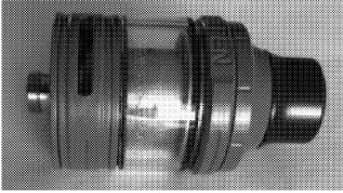
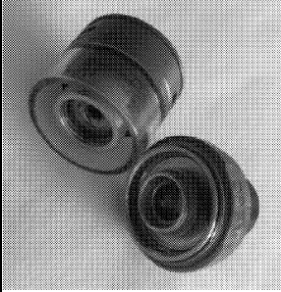
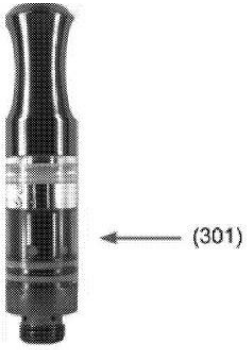
As used herein, a “chamber” refers to a device that holds a vaporizable formulation comprising an ayahuasca-like substance. A chamber is analogous to a “vape cartridge” well known in the art that may include a top portion connected to a mouthpiece, and a bottom portion connected to a battery or power supply that provides power to a heating element that may be present in the chamber that functions to heat the vaporizable formulation to produce vapor.

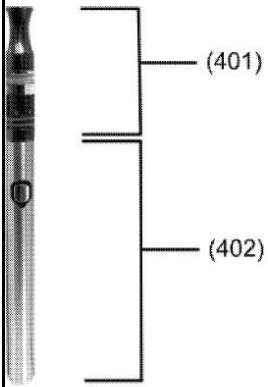
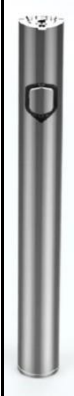
Id. at col. 7 l. 10-17.

The figures of the ’110 Patent, as shown in the below table, appear to be nothing more than photographs of commercially available device components. The photograph shown in Figure 1

looks essentially identical to a #1 H10 Ceramic 510 Oil Dab Cartridge for Vape Pen C4CELL which can be found in the prior art time period. EX 1020, 14. The component shown in Figure 2 appears to be an ELLO atomizer or similar product, which can be found in the prior art time period. EX 1021, 1. The component shown in Figure 3 has a design similar to O2Vape products (O2Vape Round Tip Wickless Ceramic Cartridges, found in the prior art time period and O2VAPE Ceramic Vape Cartridges, found in the prior art time period). EX 1022, 6; EX 1023, 1. Figure 4, based on the shape of the button, appears to be, or is similar to, a power unit sold by a number of vendors (CBD Hemp Vape iKrusher AB105-S1 Slim Pen Rechargeable, found in the prior art time period; 510 threaded variable voltage 380mah, found in the prior art time period; iKrusher, Slim Pen 320mAh Battery, found in the prior art time period; Newest 510 Vape Battery Auto Draw Custom 510 Thread Battery Rechargeable Vape Pen Battery 280mAh, found in the prior art time period). EX 1024, 2; EX 1025, 1; EX 1026, 1; EX 1027, 2.

'110 Patent Figure	Commercial device	Source
 Figure 1		#1 H10 Ceramic 510 Oil Dab Cartridge for Vape Pen C4CELL, VapingDaily, https://vapingdaily.com/best-cbd/cbd-cartridges/ [https://web.archive.org/web/20200603131123/https://vapingdaily.com/best-cbd/cbd-cartridges/]; EX 1020, 14. The Internet Archive confirms the publication date precedes the priority date of the '110 Patent. EX 1072, 29.

 Figure 2A  Figure 2B		The ELLO atomizer, Eleaf, https://www.eleafworld.com/ello/ [https://web.archive.org/web/20170613175846/https://www.eleafworld.com/ello/]; EX 1021, 1. The Internet Archive confirms the publication date precedes the priority date of the '110 Patent. EX 1072, 18.
 Figure 3		O2Vape Round Tip Wickless Ceramic Cartridges, O2VAPE, https://o2vape.com/product/ceramic-cartridges-round/ [https://web.archive.org/web/20211201204948/https://o2vape.com/product/ceramic-cartridges-round/]; EX 1022, 6. The Internet Archive and metadata confirms the publication date precedes the priority date of the '110 Patent. EX 1064, 16-17; EX 1072, 8.

		<i>O2VAPE Ceramic Vape Cartridges</i>, O2VAPE, https://o2vape.com/product/1ml-wickless-ceramic-cartridges/ [https://web.archive.org/web/20190911065755/https://o2vape.com/product/1ml-wickless-ceramic-cartridges/]; EX 1023, 1. The Internet Archive confirms the publication date precedes the priority date of the '110 Patent. EX 1072, 14.
 Figure 4		<i>CBD Hemp Vape iKrusher AB105-Slim Pen Rechargeable</i>, CBD4PLEASURE, https://cbd4pleasure.com/products/ikrusher-slim-pen-rechargeable-battery-ab1004; EX 1024, 1. Metadata confirms the publication date precedes the priority date of the '110 Patent. EX 1064, 17-18. <i>510 threaded variable voltage 380mah</i>, COOLVAPE,

		https://coolvape.ca/products/510-threaded-variable-voltage-380mah; EX 1025, 1. iKruher, Slim Pen 320mAh Battery, CSVAPE, https://csvape.com/products/ikruher-slim-pen-320mah-battery; EX 1026, 1. <i>Newest 510 Vape Battery Auto Draw Custom 510 Thread Battery Rechargeable Vape Pen Battery 280mAh, Made-in-China, https://interearvape.en.made-in-china.com/product/swctEWVKAuAv/China-Newest-510-Vape-Battery-Auto-Draw-Custom-510-Thread-Battery-Rechargeable-Vape-Pen-Battery-280mAh.html; EX 1027, 2.</i>
--	--	---

No novel or inventive features are shown in these figures.

B. Vaping formulations

E-cigarette liquid formulations are composed of a solvent, various flavoring components, and an active drug or drugs. The solvents are used to produce aerosols that mimic combustible tobacco cigarette smoke. The solvents often contain PG and/or VG. In 2016, Peace et al. (J Anal Toxicol. 2016 Jul 14;40(6):403–407) published a survey of the chemical compositions of 27 electronic cigarette formulations. Each of the formulations contained either PG or VG alone, or combinations of the two ranging from 28%:72% to 81%:19% PG/VG. Because early nicotine-based formulations used PG and/or VG and because vape device configurations have been designed for use with such formulations, PG and VG are the obvious first choice in selecting a solvent mixture for any new vaporizable formulation. The '110 Patent acknowledges that these, and PEG, are common, art-known components for use in vaporizable formulations.

As used herein, the terms “propylene glycol (PG),” “vegetable glycerin (VG),” and “polyethylene glycol (PEG)” refer to components of vaporizable formulations that are substances commonly used as food additives, and have other medical applications, and which are commonly used substances known in the field of vaporizing. The components can be a molecular weight variation, for example but not limited to, PEG 200, PEG 400, and the like.

EX 1001, col. 7 l. 65 - col. 8 l. 5.

C. DMT, 5-MeO-DMT, and 2C-B

DMT, 5-MeO-DMT, and 2C-B are known prior art psychedelic compounds. DMT is found in nature and was first reported as chemically synthesized in 1931. EX 1061, 592. 5-MeO-DMT is also a natural compound, and was first reported as chemically synthesized in 1936. EX 1062, 224. 2C-B was first reported as chemically synthesized in 1974. EX 1063, 95.

The '110 Patent does not purport to have invented any of these compounds, but rather acknowledges their existence in the prior art.

It should be stressed that dimethyltryptamine can be synthesized or extracted using a variety of different well known methodologies, and need not be limited to any specific synthesis and/or extraction method specifically described herein.

Most ayahuasca-like substances are readily available and need not be synthesized or extracted. For example, dimethyltryptamine, which was first synthesized in 1931, is readily available in decriminalized jurisdictions.

EX 1001, col 18 l. 23-31.

Likewise, the '110 Patent acknowledges the motivation to study and potentially use these compounds for a number of different medical indications.

Therapeutic benefits of psychedelic drugs, such as dimethyltryptamine, lysergic acid diethylamide and psilocybin, are being actively researched in humans. Studies in healthy volunteers have shown long-term increases in trait optimism (Carhart-Harris et al., *Psychological Medicine* 2016, 46:1379-1390), well-being (Id. and Griffiths et al., *Psychopharmacology* 2011, 218:649-665), and openness (Carhart-Harris et al., *Psychological Medicine* 2016, 46:1379-1390; MacLean et al., *Journal of Psychopharmacology* 2011, 25:1453-1461), neurodegenerative disorders (Morales-Garcia et al, *Translational Psychiatry*, 10:331 (2020)), and studies in patients have found long-term improvements in obsessive compulsive disorder (Moreno et al., *Journal of Clinical Psychiatry* 2006, 67:1735-1740), nicotine addiction (Garcia-Romeu et al., *Current Drug Abuse Reviews* 2014, 7:157-164), alcoholism (Krebs and Johansen, *Psychopharmacology* 2012, 26.7:994-1002; Bogenschutz et al., *Journal of Psychopharmacology* 2015, 29.3:289-299), narcotic addiction (Savage and McCabe, *Psychiatry* 1973, 28.6:808-814), depression and anxiety related to diagnosis of a life-threatening or terminal illness (Grob et al., *Archives of General Psychiatry* 2011, 68:71-78; Griffiths et al., *Journal of Psychopharmacology* 2016, 30(12):1181-1197; Ross et al., *Journal of Psychopharmacology* 2016, 30(12):1165-1180), and depression (Carhart-Harris et al., *The Lancet Psychiatry* 2016; Sanches et al., *Journal of Clinical Psychopharmacology* 2016, 36:77-81) after treatment with psychedelics. Other psychological disorders can include, but are not limited to general anxiety, major depressive disorder, dysthymic disorder, bipolar disorder, panic attacks, schizophrenia, attention deficit disorder, attention deficit hyperactivity disorder, impulse disorders, delusional disorders, cluster headaches, migraines, personality disorders, gambling disorders, eating disorder, body dysmorphic disorder, and other psychological disorders described in the "Diagnostic and Statistical Manual, Version IV." These long-term positive effects can endure for several months, if not years, even after the compound has been metabolized and has been excreted from the body.

Id. at col. 19 l. 64 - col. 20 l. 36.

D. Vaping DMT

Vaporization is a common delivery method for DMT and 2C-B and is the most popular method of delivering 5-MeO-DMT. EX 1028, 2; EX 1029, 8; Ex 1030, 3, 6. Mainstream news reports document the use of commercially available vaporizer devices to administer DMT before the priority date of the '110 Patent. A 2015 report titled "E-cigarettes rigged by drug users to smoke hallucinogen DMT" documents the ease of administration of DMT through commercial vaporizer devices. EX 1016, 1. This article was cited later that same year by a peer-reviewed manuscript focusing on vaporizer device trends. EX 1011, 9996. Subsequent news reports such as "New on the Black Market: Vape Pens Full of DMT" and "I Sell DMT Vape Pens So People Can 'Break Through' at Their Own Speed" document the sale and use of vaporizer cartridges containing liquid formulations containing DMT that can be used in commercially available vaporizers. EX 1018, 1-2; EX 1047, 1.

The utilization of commercial vaporizer devices with the same device elements as claimed in the '110 Patent for the delivery of these drugs is suggested to be superior to other means of administration because of convenience and discretion, safety considerations, as well as "the ease of control" one has regarding dosing while vaping, as reported in "Why Some Meth and DMT Users Are Using Vapes." EX 1017, 2; EX 1030, 6; EX 1048, 1.

There has also been public discussion regarding methodology to effectively vape DMT. These public communications include description and use of commercially available device components, "vape juice" formulations, and drug combinations – all aspects claimed in the '110 Patent. Public forum posts discuss "shopping lists" of commercially available components to effectively vape DMT – such as batteries and cartridges – as provided in the post "Ecig Method for Vaping DMT summarized" on DMT-Nexus. EX 1008, 4. Other posts provide detailed vaporizer set-ups used to effectively vape DMT. EX 1013, 1; EX 1015, 2-3; EX 1053 1-4. In addition, the

disclosures depict the modularly assembled device components in images or in video. EX 1014, 2; EX 1015, 2; EX 1054, 1; EX 1055; EX 1056; EX 1057.

Based on my knowledge and experience in the field, I have no reason to doubt the accuracy of these reports. They provide sufficient detail to enable a POSA to conduct the claims of the '110 Patent without undue or inventive work. These reports were readily available to a POSA by routine Internet searches and are the types of sources a POSA would consult in assessing the state of the field, considering the underground nature of work in this field during the prior art time period and the more limited materials available in traditional peer reviewed literature.

V. LEGAL STANDARDS

I understand that in an IPR proceeding such as this one, the petitioner challenging a patent bears the burden of proof by a preponderance of the evidence to show that a patent claim is either anticipated or would have been obvious to the person of ordinary skill in the art.

I have been informed that a claim is invalid as anticipated if a single prior art reference discloses every limitation of the claim, either expressly or inherently, as arranged in the claim. I also understand that a reference can anticipate if it discloses a sufficiently small group of possible options for a parameter that the POSA could at once envisage the claimed invention from within that group. I have also been informed that, for a reference to anticipate a claim, the reference must provide disclosure sufficient for the POSA to practice the relevant disclosure without undue experimentation. I understand, however, that a reference does not need to disclose what is already well-known to the POSA. Moreover, I understand that a prior art reference should be considered for all that it teaches, and not just limited to a particular embodiment or the claimed invention of the prior art.

I have been informed that a patent claim is invalid if the claimed invention would have been obvious to the POSA at the time an alleged invention was made. Whether a claimed invention would have been obvious depends on (1) the scope and content of the prior art; (2) differences between the prior art and the claims; (3) the level of ordinary skill in the art; and (4) objective indicia of non-obviousness. Objective indicia of non-obviousness (which I understand are also known as “secondary considerations”) include: copying, long-felt but unsolved need, failure of others, commercial success, unexpected results or properties achieved by the claimed invention, and skepticism of skilled artisans before the invention.

In particular, I have been advised that, for an invention to be regarded as “obvious,” the POSA must have had a reason or been motivated to modify the prior art or to combine one or more prior art references in a manner that would yield the claimed invention. I understand, however, that the prior art does not need to contain an explicit reason or motivation to modify the prior art, but that a motivation or reason may be found explicitly or implicitly in market forces, design incentives, the interrelated teachings of multiple patents and publications, any need or problem known in the field of endeavor at the time of the invention, and the background knowledge, creativity, and common sense of the POSA.

I have been informed that exemplary rationales that may support obviousness include: (a) combining prior art elements according to known methods to yield predictable results; (b) simple substitution of one known element for another to obtain predictable results; (c) use of a known technique to improve similar devices (or methods or products) in the same way; (d) applying a known technique to a known device (or method or product) ready for improvement to yield predictable results; (e) choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success or “obvious to try”; (f) known work

in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations are predictable to one of ordinary skill in the art; and (g) some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

I have also been informed that, for a claim to be obvious, the POSA must have had a reasonable expectation of success with respect to the claimed invention. I understand that a reasonable expectation of success does not, however, require certainty of success, and that obviousness cannot be avoided simply by a showing of some degree of unpredictability in the art so long as there was a reasonable probability of success.

I understand that the use of hindsight in an obviousness analysis is impermissible. In other words, I understand that it is improper to start from the challenged patent as a blueprint to work backwards to the claimed invention. As such, I have not used hindsight in my analysis. I further understand that it is not hindsight to rely on knowledge that was within the level of ordinary skill, nor must there be an express motivation to modify or combine the prior art.

Finally, I have been informed that, while objective indicia or secondary considerations can support non-obviousness, they are only relevant if there is a nexus between the merits of the claimed invention and the evidence of objective indicia. I understand that, in order to show a nexus, a patentee must show that the evidence of secondary considerations results both from what is claimed and what is novel in the claim. I also understand that nexus requires a showing that any product asserted to be the source of secondary considerations both embodies and is co-extensive with the claims challenged as obvious.

VI. THE CHALLENGED PATENT

A. The '110 Patent

I understand that the '110 Patent is titled "Delivery system for ayahuasca-like substances" and that its only named inventor is Gregory Ellis. I understand that Gregory Ellis is a patent attorney.

I understand that the '110 Patent is part of a family of applications and that the '110 Patent claims priority to an international application PCT/US2021/042123, filed on July 18, 2021, and to two provisional patent applications No. 63/144,923, filed on February 2, 2021 and No. 63/058,444, filed on July 29, 2020.

I understand that concepts associated with isotopomer or isotopologue forms of drugs first appear in the July 18, 2021 priority application and that claims 17-19 that recite these features are only entitled to a July 18, 2021 priority date.

B. Summary of the Claimed Subject Matter

The '110 Patent contains one independent claim and 19 dependent claims. I have been informed and understand that an independent claim in a patent does not refer back to any previous claim, while a dependent claim does so refer and is understood to incorporate all of the limitations recited in its "parent" claim and must specify a further limitation of the subject matter claimed in its parent.

Independent claim 1 recites a device for the delivery of a substance, the device comprising a chamber, the chamber comprising at least one vaporizable formulation, the vaporizable formulation comprising the substance, the substance comprising one or more of DMT, 5-MeO-DMT, or 2C-B. I understand that the intended use of the device, "for the delivery of a substance," is given no patentable weight for device claims. My opinions do not change even if this phrase is

given patentable weight. As worded, the claim only requires that a vaporizable formulation comprising the substance be present in a chamber of a device. I understand that vaporization of the substance is not a requirement of the claim.

Claim 2 further describes that the chamber comprises a top portion adapted for coupling to a mouthpiece wherein the top portion of the chamber comprises at least one aperture adapted to permit flow of air, liquid, solids, or vapor between the top portion of the chamber and the mouthpiece. Claim 3 further adds the mouthpiece coupled to the top portion of the chamber wherein the mouthpiece comprises a top aperture, a central open bore, a bottom portion comprising an aperture, and wherein the bottom portion of the mouthpiece is coupled to the top portion of the chamber. Claim 4 specifies that the device additionally comprises at least one seal situated between the bottom portion of the mouthpiece comprising an aperture and the top portion of the chamber.

Claim 5 specifies that the mouthpiece is releasably coupled to the top portion of the chamber. The '110 Patent defines this as referring to a reusable/refillable device.

Claim 6 specifies that the mouthpiece is lockably coupled to the top portion of the chamber. The '110 Patent defines this as referring to a single-use/disposable device.

Claim 7 further describes that the chamber comprises a bottom portion adapted for coupling to a power unit capable of providing power to vaporize the vaporizable formulation.

Claim 8 specifies that the chamber is coupled to the power unit capable of providing power to vaporize the vaporizable formulation.

Claim 9 specifies that the chamber is releasably coupled to the power unit. The '110 Patent defines this as referring to a reusable/refillable device.

Claim 10 specifies that the chamber is lockably coupled to the power unit. The '110 Patent defines this as referring to a single-use/disposable device.

Claim 11 specifies that the chamber comprises one or more of a 401, 510, 601, 610, 710, 808, 901, 4081, CE-4, CE-5, E9, or eGo connector. Claim 12 more specifically states that the chamber comprises a 510 connector.

Claim 13 specifies that the chamber is transparent to permit visualization of levels of the vaporizable formulation.

Claim 14 specifies that the chamber is refillable.

Claim 15 specifies that the vaporizable formulation further comprises a monoamine oxidase inhibitor.

Claim 16 specifies that the substance is DMT.

Claim 17 specifies that the DMT, 5-MeO-DMT, or 2C-B is an isotopomer or isotopologue. Claim 18 specifies that the isotopomer or isotopologue comprises deuterium. Claim 19 specifies that DMT is the isotopomer or isotopologue.

Claim 20 specifies that the vaporizable formulation comprises one or more of PG, VG, or PEG.

VII. SUMMARY OF SELECTED PRIOR ART REFERENCES

In my opinion, claims 17-19, related to isotopomers or isotopologues, are anticipated by US Pat. Publ. No. 2022/0081396 (“the ’396 application”; EX 1009), which describes vaporizable formulations of deuterated DMT and related compounds and are obvious in view of DMT-NEXUS 2012 (EX 1008), which describes vaping of DMT, and Halberstdat (EX 1010), which describes deuterated DMT and reasons for using deuterated DMT in place of DMT.

In my opinion, claims 1, 7, 8, 9, 11, 12, 14, 15, 16, and 20 are anticipated by DMT-NEXUS 2012, which describes vaporizable formulations of DMT contained in chambers of vaping devices successfully used to vape DMT.

In my opinion, claims 2, 3, 4, 5, 6, 7, 8, 10, and 13 are obvious in view of DMT-NEXUS 2012, GIROUD (EX 1011), THE VISUAL VAPING DICTIONARY (EX 1012), the '165 Application (EX 1050), the '712 Application (EX 1051), and the '392 Application (EX 1052), which describe vaping devices that would be obvious to use as alternatives to the vaping devices used by the authors of DMT-NEXUS 2012 at the time of the priority date of the claims of the '110 Patent.

In my opinion, claims 1, 7, 8, 9, 11, 12, 16, and 20 are anticipated by DMT-NEXUS 2018 (EX 1013), which describes vaporizable formulations of DMT contained in chambers of vaping devices successfully used to vape DMT.

In my opinion, claims 1-16, and 20 are obvious under DMT-NEXUS 2015 (EX 1014), EROWID 2014 (EX 1015), MUNOZ (EX 1016), GREENHILL (EX 1017), and/or US 2022/0081396 in view of GIROUD (EX 1011) and/or THE VISUAL VAPING DICTIONARY (EX 1012).

In my opinion, claim 15 is obvious in view of POWER (EX 1018) and CALLAWAY (EX 1019).

In my opinion, claim 20 is obvious under DMT-NEXUS 2012 in view of GIROUD, DMT-NEXUS 2018, and/or THE VISUAL VAPING DICTIONARY

Many of the claims of the '110 Patent focus on device features. The claimed devices describe well known device features of the prior art. Claim 1 recites a “device” comprising a “chamber.” This is a standard feature of vaping devices and is shown in the example devices in Figure 2 of GIROUD. EX 1011, 9992.

Claim 2 recites that the “chamber comprises a top portion adapted for coupling to a mouthpiece wherein the top portion of the chamber comprises at least one aperture adapted to

permit flow of air, liquid, solids, or vapor between the top portion of the chamber and the mouthpiece.” This is a standard feature of vaping devices and is shown in the example devices in Figure 2 of GIROUD where the e-liquid containing chamber is designed to mate with mouthpieces and transfer vapor between the chamber and the mouthpiece. Claim 3 adds the mouthpiece, another standard vape device component. Figure 2 of GIROUD shows mouthpieces with a bottom portion that connects to the chamber and a top aperture designed to contact the user’s mouth, with a channel (“a central open bore”) running through. *Id.*

Claim 4 recites “at least one seal” situated between the bottom portion of the mouthpiece and the top portion of the chamber. Seals are commonly used in vaping devices to form an airtight seal between the mouthpiece and the component housing the vaping chamber. O-ring style seals are clearly shown in mouthpiece components 8 and 11 of Figure 2 of GIROUD.

Claim 5 specifies that the mouthpiece is releasably coupled to the top portion of the chamber. This is a common feature in refillable vaping devices of the prior art. The devices shown in Figure 2 of GIROUD utilize mouthpieces that are releasably coupled to the chamber, either with threading or pressure contacts.

Claim 6 specifies that the mouthpiece is lockably coupled to the top portion of the chamber. “Lockably coupled” is a defined term in the ’110 Patent and refers to devices intended for single use. This includes single-use disposable devices. The term is in contrast to “releasably coupled,” which is a design with a removable component to allow refilling and reuse.

As used herein, “lockably coupled” refers to components that are not intended to be removed by an end-using consumer. For illustrative purposes, a mouthpiece that is lockably coupled to a chamber is not intended to be removed. Lockably coupled chambers are intended for single-use and are meant to be discarded following vaporization of all the vaporizable formulation present in a chamber. As used herein, “releasably coupled” refers to components that may be removed by an end-using consumer. For illustrative purposes, a mouthpiece that is releasably coupled to a chamber may be removed so that a user may reuse and refill a chamber with additional vaporizable formulation.

EX 1001, col. 7 l. 43-54.

Both single-use disposable and re-usable, re-fillable vaping device are well known in the prior art. EX 1012, 8.

Claim 7 specifies that “the chamber comprises a bottom portion adapted for coupling to a power unit capable of providing power to vaporize the vaporizable formulation.” As I note above, power units are standard components of vaping devices. Component 7 of Figure 2 of GIROUD shows an example of such a power unit. EX 1011, 9992.

Claim 8 specifies that the chamber is coupled to the power unit. This describes standard prior art device design. Power units are directly or indirectly coupled to the component containing the chamber. In some instances, the component housing the chamber also contains the heating element and directly connects to the power component. In some instances, an adapter is positioned between the component housing the chamber and the power unit. The adapter may be attached to and be considered part of the chamber component. The '110 Patent describes such configurations in its Figs. 1-4. GIROUD Figure 1 shows a “clearomizer” directly coupled to the power unit. *Id.* at 9990.

Claim 9 recites that the power unit is “releasably coupled” from the chamber and claim 10 that the power unit is “lockably coupled.” As noted above, both reusable/refillable and single-use, disposable devices are well known in the prior art.

Claim 11 recites that the chamber has a connector from one of 401, 510, 601, 610, 710, 808, 901, 4081, CE-4, CE-5, E9, or eGo connectors. Claim 12, specifies that connector is a 510 connector. These are in reference to known, prior art connectors. 510 connectors are commonly

used in vaping devices, as shown in the commercially available prior art devices shown in the Figures of the '110 Patent (Figs 1-4 each identifying the presence of 510 connectors).

Claim 13 recites that the chamber is transparent to permit visualization of levels of the vaporizable formulation. This is a feature of a number of prior art vaping devices, including the designs shown in Figure 2 of GIROUD.

Claim 14 recites that the chamber is refillable. As noted above, this is a common feature of prior art vaping devices, including the designs shown in Figure 2 of GIROUD.

Below, I briefly summarize the teachings of the prior art references, as they would have been understood by the POSA as of the relevant Priority Date.

A. DMT-NEXUS 2012

Ecig Method for Vaping DMT summarized - best thing since... ("DMT-NEXUS 2012"; EX 1008) is an online published discussion, posted in 2012.

The opening three posts by user "foaf," posted November 19, 2012, describe the formulation and vaporization of DMT using vaporization devices based on a summary of work conducted by others.

The ecig vaporizers have lead to a whole new way for DMT to fit into my life; and believe me, I've been trying to fit it in for a long time.

EX 1008, 1.

So I didn't come up with any of this, but the two threads that I've seen on this forum are most certainly under-appreciated. It may be because when you read them they sound like people trying to work this out, and perhaps not coming to a clear conclusion. But that's not the way it is. This is simple, and great. Really.

Id.

1) DMT is quite soluble in PEG-400, one of the less common e-cig solvents. It is much easier to manipulate a concentrated solution than a powder.

2) The newer "tank" type ecig cartridges hold liquids, and supply them to a vaporizing element. These are the type to look at. They are made to vaporize solutions of stuff.

3) You put a saturated PEG-400 / DMT solution into a "tank" cartridge and you are set. Anyone can breakthrough every time, it does take a few hits.

Benefits --

1) Always works. No learning curve. You can pull this sharpie sized electronic thing out of your pocket, hand it to a newbie, tell them to hit the button and take one draw after another, and it will get them as far as they want to go. They can drop it in their lap and it won't spill or burn them. You can pick it up and hand it to another person. It's that easy. Over 100 draws in even a small tank setup.

2) Much more efficient with the spice than any way I've done it. In fact, I think the whole vaporized dose recommendations are changed somehow. I estimate that a common puff with one of the common vape setups has about 2-5 mg dmt in it. Three hits and you are past breakthrough and 6 good hits and you drop the device for sure. You can hit it pretty quickly. They make setups that create much bigger hits if you wanted.

3) Ecig equipment is standardized, mass produced, relatively inexpensive for what you get, doesn't look sketchy. If a cop pulled it out of your pocket, he would think it was an ecigarette setup 'cause it is.

Id. at 2.

A saturated DMT in PEG-400 solution. You can get about 0.5 grams into 3 mls of PEG-400, maybe a bit more. You can order PEG-400 from online e-cig vendors. It's thought to be safer than the other solvents that they use and is usually recommended for people who are allergic to glycerin. The brown bottle is PEG-400. The black sticks are the battery/handle part of an ecig setup. I've found the eco-t size/type to be a good compromise between size and battery life. You can "lock" them so that they don't go off in your pocket.

In the picture, the little vial is a saturated solution of DMT in PEG-400. The glass bottle has some active charcoal purified DMT, and the casserole dish has some that I just freeze precipitated from a direct to base extraction and will clean up soon.

The bottom right thing is an eco-t battery with the atomizer attached and a filled cartridge in it, two spare cartridges sitting next to it. This is what I think is the best setup. That's the whole rig, it holds over a cc of mixture, ie about 200 mg, and you can have other filled cartridges in your pocket ready to go if needed.

The vivanova tank pictured holds more and gives bigger hits and is rebuildable if it burns out. The green box is c3 smokimizers and are cheaper and disposable. Lots of

these tanks work well. Once you get the batteries, all other brands of tanks fit on them if they use the most standard threads, called 510 threads.

Id. at 3.

To make it simple, here is my recommendation. This would be using the #1 company's products, Joye. There are many others, but most copy Joye. The threads that connect the battery to the atomizer/cartridge are standardized by Joye and called 510. If you get other brands, stick to 510 threads.

Id. at 4.

The discussion proceeds with multiple posters, including the original poster, discussing iterations of the original post and some users following through and placing a vaporizable formulation of DMT into a chamber of a vaporization device.

Being the device-curious person that I am, I ordered one of these (the JOYE eGo Mega) and some propylene glycol last week and got them today.

I tried it out first with plain propylene glycol (PG). It worked OK – produced a slightly sweet, nearly tasteless flavor.

Next, I dissolved about 100mg DMT into maybe 0.5ml PG and tried it out.

Id. at 15.

- Thank you for revision! I shall try once again to check dissolve DMT in PG - only from curiosity.

The value dissolve 0.2g/ml really too small for practical application.

For comparison: i used e-Liquid 1g DMT / 1ml Eton+VG (50/50) with best result deep loooong trip (with using MAOI in gelcaps).

Now i wanted find to change Eton on other (not self-evaporating) solvent with similar high ability of the dissolution DMT...

...

E-cig solved wrote about dissolved 1g DMT in 10 drops heated VG! This way opens the new prospects at condition of the decision of the problem of the preliminary heating cartridge e-cig before use.

...

For me, E-cig very suitable else and since during DEEP trip for continuations, it's necessary only to press on button and do 1-2 puffs!

...

Only to make sure in efficiency e-Cig (on example Ego-T) it is enough to dissolve 0.2g DMT in 0.1ml Eton (95%) , place this e-Liquid near/on spirals of atomizer and make one good puff! This so simply.
Your trip will be long more than 5 minutes.

Id. at 18.

so I mixed another batch, this time more as Lost traveller recommends, and it is better.

just dmt in 95% ethanol, leaving out all the ecig solvents and putting it in a tank as above. I mixed it 1 gram in 2cc ethanol, dissolved easily. works great and tastes better than the PEG. Can get a pretty big dose with this and a dual coil tank as above. I don't know why I didn't do this at fist, it was already posted up, just not in a tank.

Id. at 28.

B. DMT-NEXUS 2015

“A guide to vaporizing DMT electronically” (“DMT-NEXUS 2015”; EX 1014) is an online published discussion, posted in 2015, and publicly available at <https://www.dmt-nexus.me/forum/default.aspx?g=posts&t=63439>.

The opening post by user “jagarock” posted March 15, 2015, describes the vaporization of DMT using a vaporization device that can be set to a specific temperature.

The correct vaping temperature for DMT is 150C. Much higher, it will get harsh, and it will be burnt. At 150C, you can pull it without feeling much resistance at all.

The vaporizer i use is crafty. You can use an iphone or android app to set the temperature to 150C.

What you need is something in the bottom of the vaporizer, so that the DMT doesnt just vanish, because DMT melts into liquid before it transforms into vapor/smoke

With crafty, you get a steel filter you can just put in the bottom, like in the image above. (For future reference, if the image above is gone, you can probably use a layer of oregano or just some aluminium foil to catch the DMT when it melts). Then just sprinkle some DMT on top. (i used 30mg to get where i wanted).”

EX 1014, 2.

The discussion proceeds with multiple users discussing the device described in the original post, variations of the device, temperatures used, using harmalas in a similar vaporization device and solvents used for dissolving DMT into a vaporizable formulation.

i own a Crafty as well as the Mighty, which is the larger, dual battery version of the Crafty that does not use an app for temp control. (#4 Posted; posted 12/30/2015; user ducdevil)

Id. at 4.

Thank you for this. Ive spent hundreds of dollars over the past few years trying to find the perfect electronic vaporizer for spice. I gave up my search almost a year ago as all the ones ive tried have ended up burning my elf dust. Ill have to give this one a shot! (#5 Posted; posted 12/30/2015; user hortwizard)

Id.

Just looked it up. Definitely sold on this! Storz & Bickel FTW. I think i might get 2 one for spice and the other for harmalas. I was already looking at their Plenty vaporizer but wasnt sure how I felt about the power cord. (#7 Posted; posted 12/30/2015; user hortwizard)

Id. at 5.

I'm investigating the e-vape route on the steps of ducdevil for the moment. I got all the gear (75W box mod and sub-ohm clearo, 30/70 juice, FB DMT & Harmalas)... (#26 Posted; posted 9/12/2016; user Silly(c)One)

Id. at 17.

Has anybody tried mixing PG and DMT together (like the ccell recipe) 1g DMT: 1ml PG? Seems this would be the one of the best ways to use Storz and Bickel vapes. (#43 Posted; posted 11/8/2019; user Firedragon)

Id. at 27.

C. DMT-NEXUS 2018

“I want to master Vaping DMT” (“DMT-NEXUS 2018”; EX 1013) is an online published discussion, posted in 2018, and publicly available at <https://www.dmt-nexus.me/forum/default.aspx?g=posts&t=82998>.

The opening post by user “ManCrossWater” posted December 2, 2018, describes the user coming into possession of a DMT vape cartridge, attaching the cartridge to a battery, vaporizing DMT from the device, and subsequently using various power sources and solvents/solvent mixtures to dissolve DMT for vaping.

I came into the substance years ago, but failed before I flew. I can remember my first piece... it was made of a large plastic water container with the bottom cut off and aluminum foil wrapped around the ring with rubber bands. This didn't work out that well.

Then I tried out of a Glass Oil Pipe, and I got closer, but I still never broke through. DMT was a rough experience, with flame.

Finally, on a whim I came into the possession of a DMT Vape Cartridge... this interested me. On the tail end of an acid trip, I plugged it into my variable voltage 510 battery at 3.8v and laid in my bed. I hit it... and kept on hitting it (at this point I didn't know that holding DMT in for a 15+ seconds was key to breaking through.) I hit it maybe 6 times, with deep inhales. Suddenly... or slowly... I was somewhere else, somewhere more colorful and decadent than my room. I describe it as an astral mall, where there were figures dancing in front of me. I was listening to some pretty calm music (REMEMBER, a vaporwave artist), but even then it was a lot like a dancy music video.

When I opened my eyes, my room was transformed into a purple and black striped box, it was fantastic.

After that experience I knew that vaping DMT was the way to go. I moved on from a cartridge vaporizer to a bigger sub-ohm Vape, the Smoke X-Priv Baby. When I first made juice for this, I used an 80/20 VG to PG Juice from BLVK Unicorn. I then tried to make juice with Wax Liquidizer, a product that is used to turn Cannabis Wax Concentrate into vapable E-Liquid. Wax Liquidizer is made out of PG, PEG200, and PEG400, and does a great job at dissolving DMT and (I think) keeping it dissolved.

Anyways, thanks for reading. I hope to expand my knowledge on my favorite ROA, Vaping, and I look forward to interacting with you all.

EX 1013, 1-2.

D. EROWID 2014

“How to Build a Better Spaceship” (“EROWID 2014”; EX 2015) is a blog post by author teafaerie, posted in 2014, and publicly available at <https://www.erowid.org/columns/teafaerie/2014/05/29/how-to-build-a-better-spaceship/>.

This post describes the author's first experience using a vaporization device to inhale DMT, and its benefits over other methods of smoking DMT. The post further provides instructions on how DMT is dissolved, the solvents used, how to fill a chamber with DMT, and different doses.

To my surprise he produced what appeared to be an innocuous e-cigarette. It was the refillable kind that has liquid in it.

I could tell that we were puffing on the Next Big Thing. I've tried a lot of different methods for smoking DMT, and each of them has its pros and cons... This funny little electronic vaporizer was definitely the best thing yet!... the e-cig was an unsettlingly delightful, instantaneously convenient, and marvelously inconspicuous launch vehicle.

The DMT is first dissolved in warm ethanol, using the minimum alcohol to get all of the DMT into solution at around 150 Fahrenheit. It is best to use a double boiler on an electric burner to avoid risk of fire and overheating. Everclear or equivalent food-grade ethanol works well. The alcohol will be boiled off/evaporated in a following step.

To the ethanol and DMT solution, a mixture of 40% glycerin and 60% propylene is added. Apparently glycerin by itself is too thick to pull into most syringes and it doesn't quite flow right in e-cig tanks.

Gently heat and stir the resulting mixture until no alcohol smell remains. Once it has cooled to below 100F, a graduated syringe is used to insert the thick liquid into the refillable e-cig reservoir, just as one would do with nicotine liquid.

For the lighter, social dose, 0.25 gram of DMT are used per 4 ml glycerin/glycol. For the hyperdrive potency, the ratio is 1g per 2.5ml.

EX 1015, 1-2.

A comment on the original blog post discusses a variation to the author's described method of producing a vaporizable DMT formulation, including the use of propylene glycol solvent to dissolve DMT into solution without using ethanol.

I have in my possession a 1:1 ratio mixture of 100% pg (1ml) and DMT (1g) that has not shown any signs of recrystallizing in 11 months. Yet the article states it should start doing so after approx 12 hours. I wonder why. I simply dumped the freebase into the PG and it slowly dissolved. There was no need for heating anything or using ethanol. (Comment by anarchy; October 24, 2014)

Id. at 4.

E. MUNOZ

“E-cigarettes rigged by drug users to smoke hallucinogen DMT” (“MUNOZ”; EX 1016) is an article published January 7, 2015 and publicly available at <https://www.rt.com/uk/220551-vape-dmt-electronic-cigarette/>.

This article describes the widespread use of electronic cigarettes to vaporize DMT among various communities. It also describes online discussion about modifying e-cigarettes to vaporize DMT on internet forums such as Reddit.

Drug users have discovered a method of adapting electronic cigarettes to vaporize a potent class A hallucinogen known as dimethyltryptamine or DMT.

The straightforward “hack” is being discussed openly on multiple web forums, with DMT enthusiasts describing how simple it is to consume the drug using an electronic cigarette and a little dexterity.

Certain e-cigarettes reportedly generate precisely the correct temperature needed to vaporize the drug.

One user described his experience of vaping the drug on the social media platform Reddit.

Harry Shapiro of the British charity Drugscope said e-cigarettes are an ideal tool for consuming a wide spectrum of drugs.

EX 1016 2-4.

F. GREENHILL

“Why Some Meth and DMT Users are Using Vapes” (“GREENHILL”; EX 1017) is an article published August 30, 2018 and publicly available at <https://www.vice.com/en/article/why-some-meth-and-dmt-users-are-using-vapes/>.

This article includes interviews with individuals who have used a DMT vaporization device. The interviewees describe their experiences with DMT vaporization devices and the advantages of DMT vaporization methods over DMT smoking methods.

Their reasons for vaping appear to be mixture of portability, ease of use, and dosage control. “The main advantages of vaping DMT are the ease and the control you have whilst vaping,” Sean*, a 35-year-old seasoned DMT and psychedelics user from the UK tells me. “It’s up to you how far down the rabbit hole you want to go, instead of messing around with lighters, bonges, machines, and other glassware.” Nils*, a 22-year-old German guy, explains to us that with the aforementioned traditional routes of smoking DMT, you run the risk of burning yourself, dropping the item, or not maintaining enough heat on the drug. “You can’t burn your fingers and don’t have to concentrate on how to operate things,” he says, “which gets pretty hard after a good first hit. With vaping, you just press the button and inhale till you have enough.”

Dale*, a 17-year-old American, emphasizes the sheer practicality of vaping DMT. “It’s far more concealable, easy to prepare, and easy to ingest.” Both Sean and Nils share Dale’s perspective. Nils tells me that he had his most intensely positive DMT experience sitting in a local park with nothing more than his headphones on and a yellowy brown liquid in his e-cigarette, while Sean recommends using a DMT-filled vape “on a nice walk in nature, at a festival, or around your mate’s house.”

As a relatively novel route of administration, there is little research on the safety of vaping drugs beyond nicotine and cannabis. Nonetheless, for those with a vape pen, access to an online drugs forum, and an aptitude for (risky) experimentation, the possibilities to vape pretty much anything are wide open.

Jones says that “vaping works by heating molecules to give them enough energy to detach from the surface of a liquid and float into the air. The key difference between smoking and vaping is that the temperatures are kept low enough that there is almost no reaction with oxygen in the air.” The drugs that are easiest to vape effectively are those with lower boiling points—in other words, those with smaller molecules.

EX 1017, 2-3.

G. POWER

“I Sell DMT Vape Pens So People Can ‘Break Through’ at Their Own Speed” (“POWER”; EX 1018) is an interview article published June 5, 2020 and publicly available at <https://www.vice.com/en/article/i-sell-dmt-vape-pens-so-people-can-break-through-at-their-own-speed/>.

The interviewee of this interview article is an individual who makes and sells DMT vaporization devices. Throughout the interview, this individual describes their devices as containing a battery and a cartridge, and the process of testing many different components to

develop the device. The interviewee also describes using ingredients that are shared with ayahuasca for the purpose of producing a DMT vaporization device that provides an ayahuasca-like experience.

How long have you been selling vapes with DMT in them?

I've been exploring the DMT molecule for eight years, and I made my first DMT vape four years ago.

So what are people actually buying?

You buy the battery and the cartridge and a little case, all in. It costs £100. You get about 30 to 50 trips off it, or 100 smaller, lovely experiences.

Where do you get the DMT from?

I started making my own DMT because it was so hard to find, and it was the only way to guarantee a clean and consistent supply for my own explorations. It's extracted from natural sources. In 2016, I tried putting some DMT solutions in a vape cartridge and it worked amazingly well.

How do you change the DMT powder into a liquid?

My formula is top secret.

Okay, well how did you work out how to make the vapes?

Trial and error. It took a while to tweak and perfect the mix. Then I had to find and test tons of hardware to find out what worked best. I've tried and tested well over 20 different cartridges with mixed results. I don't want leaks, faults or any other issues.

Could you make a vape that gives an ayahuasca-type experience, that lasts a longer time?

Yes. I'm experimenting with this right now. I have some Banisteriopsis Caapi [an Amazonian jungle vine] extract, which I'm adding to the mix. I like the idea of a vape with the exact two plants from which ayahuasca is made. But the drugs involved can cause negative reactions for people on certain medications. So I'm cautious – and it would only extend the trip by five minutes. You can keep taking hits with the vape to have a longer trip.

EX 1018 2, 4.

H. CALLAWAY

Callaway et al., J Psychoactive Drugs. 2005;37(2):145-150, entitled "Phytochemical analyses of Banisteriopsis caapi and Psychotria viridis," ("CALLAWAY"; EX 1019) reports the

chemical analysis of the alkaloid content of *Psychotria viridis* (*P. viridis*) and *Banisteriopsis caapi* (*B. caapi*), two plants that comprise psychedelic ayahuasca preparations. This research article demonstrates that *B. caapi* contains high levels of various MAOIs and that *P. viridis* contains a high level of DMT, the synergy of which underlies the subjective effects of ayahuasca.

Decoctions of a traditional South American sacrament are made from the pounded woody portions of the liana *Banisteriopsis caapi*, and typically brewed with the carefully washed leaves of the shrub *Psychotria viridis*. Use of these plants and the resulting decoctions form the core spiritual doctrines of many religious groups in this region of the world. Although it has been known by many other names, and many variations of this "tea" have been described (Ott 1994), the most common identifying feature is the presence of harmala alkaloids from *B. caapi* (Schultes 1982). Although these harmala alkaloids are not particularly psychoactive on their own, they can facilitate the activity of N,N-dimethyltryptamine (DMT) from *P. viridis* by the inhibition of the enzyme monoamine oxidase (MAO) in the liver and central nervous system.

EX 1019, 145.

In the *B. caapi* sample set (N = 33), a broad range of alkaloid profiles and concentrations were observed for the three most prominent components: harmine, harmaline and THH.

Id. at 146.

In the *P. viridis* (known locally as chacrona) sample set (N= 37), a broad range of alkaloid concentrations was observed for DMT.

Id.

I. GIROUD

Giroud et al., Int J Environ Res Public Health. 2015;12(8):9988-10008, entitled "E-Cigarettes: A Review of New Trends in Cannabis Use," ("GIROUD"; EX 1011) reviews the state of the art in 2015 related to E-Cigarette systems. GIROUD focuses on cannabinoids, but describes that the devices are also used for a wide variety of compounds, including DMT.

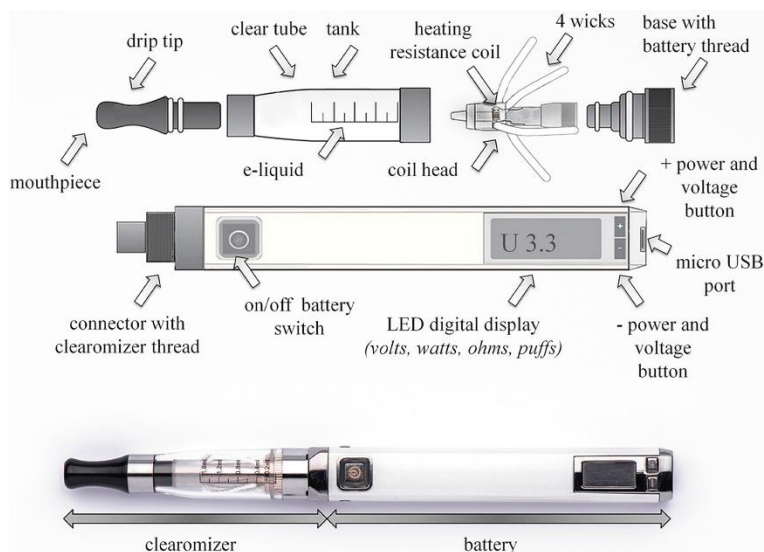
3.6. Vaping Recreational Drugs with E-Cigarettes

In addition to cannabis, e-cigs can also be used to vape any type of psychoactive drugs, such as methamphetamine, cocaine, heroin, or bath salts (cathinones). Until now, information on the use of e-cigs for the vaporization of THC-enriched aerosols has come

mainly from the Internet, the popular press, street healthcare workers, and user's testimonials, but not from reliable scientific literature. For instance, dedicated magazines publish buyer's guides to vape pens, reviewing dozens of e-devices able to vaporize wax or other hash-style concentrates, but also flower buds or even oil concentrates. Very recently, drug users have discovered a method of adapting e-cigs to vaporize a potent hallucinogen known as dimethyltryptamine or DMT [25]. Many personal experiences about vaping crystal methamphetamine are also reported on the Internet [26]. Similarly, the use of e-cigs as a means of administering numerous controlled substances is abundantly discussed on websites and forums.

EX 1011, 9996.

GIROUD provides detailed descriptions of vaping device designs, sub-components, and functions.



Id. at 9990.

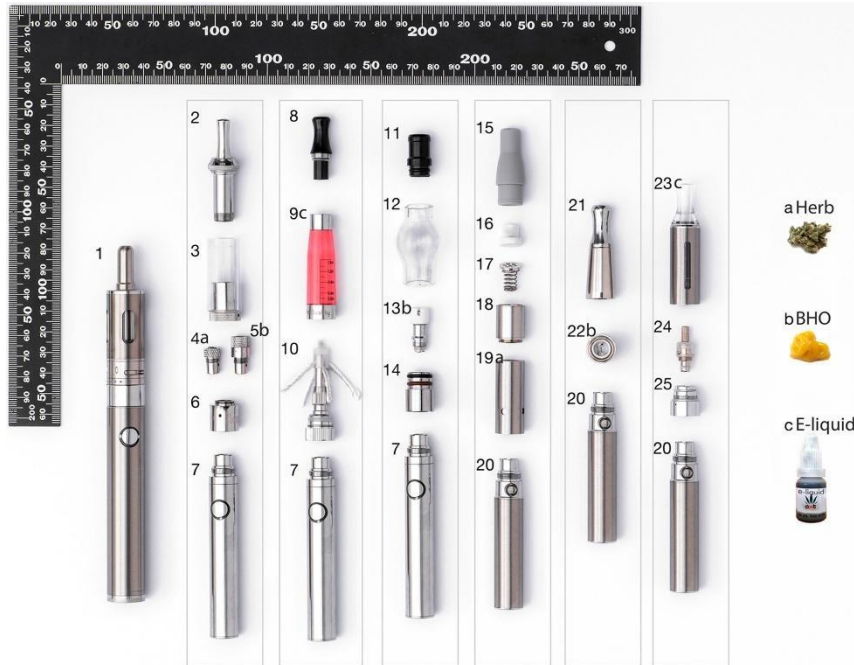
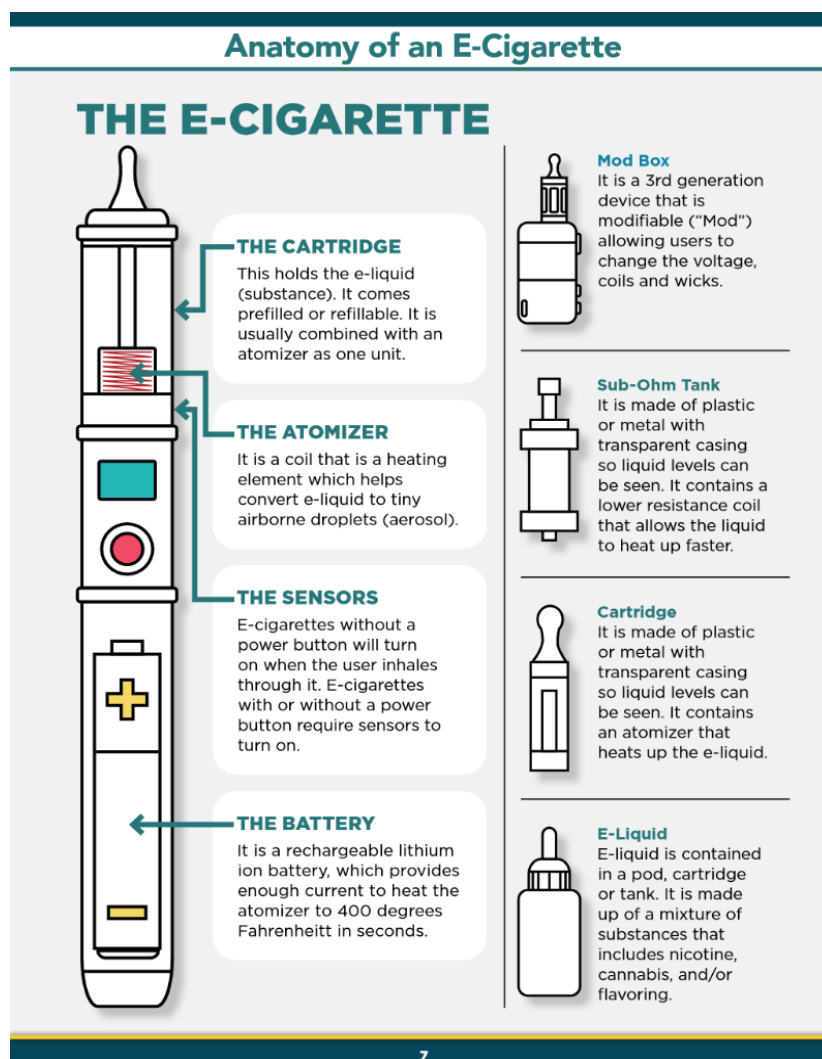


Figure 2. Some models of e-cigs for vaping (a) ground marijuana head tops; (b) cannabis wax (butane honey oil concentrate (BHO)), or (c) cannabis e-liquid. The letters a, b, or c after the numbers indicate the parts of e-cigs used for herb, BHO, or e-liquid vaping, respectively. 1. Mega electronic cigarette (e-cig) with dual-coil clearomizer, adjustable airflow control ring, changeable resistance coils and high capacity, variable voltage battery. 2–7. Dry herb and wax vaporizer: 2. Spring-loaded mouthpiece; 3. Vaporizer chamber; 4. Dry herb coil head; 5. Wax coil head; 6. Detachable base with air holes; 7. Medium capacity battery. 8–10. See-through clearomizer for e-liquids: 8. Clearomizer tip; 9. Clearomizer tube; 10. Clearomizer coil and four-wick head with base assembly. 11–14. Glass-globe atomizer wax tank: 11. Drip tip; 12. Glass globe; 13. Ceramic heating chamber and coil; 14. Metal core. 15–19. Dry herb atomizer: 15. Soft drip tip (mouthpiece); 16. Ceramic screen; 17. Metal screen and spring; 18. Screens connector; 19. Ceramic chamber and battery connector. 20. Medium size battery. 21–22. Wax coil head atomizer: 21. Metal mouthpiece and wax coil chamber connector; 22. Wax coil ceramic chamber and battery connector. 23–25. Clearomizer for e-liquids: 23. Shell (mouthpiece attached to metal tank with viewing window); 24. Bottom head changeable coil assembly; 25. Battery base connector. a. Marijuana head tops, b. Cannabis Butane Honey Oil concentrate (BHO), c. Cannabis e-liquid (mixture of cannabinoid concentrates (cannabis wax), propylene glycol and glycerol).

Id. at 9992.

J. THE VISUAL VAPING DICTIONARY (2020)

The Center for Disease Control published the review “E-cigarette, or Vaping, Products Visual Dictionary” in 2020 (https://www.cdc.gov/tobacco/basic_information/e-cigarettes/pdfs/ecigarette-or-vaping-products-visual-dictionary-508.pdf) (“THE VISUAL VAPING DICTIONARY”; EX 1012). THE VISUAL VAPING DICTIONARY provides a contemporary review and history of E-cigarette, or vaping, products that can be used to vaporizable forms of chemicals and substances.



EX 1012, 7.



Id. at 15.

THE VISUAL VAPING DICTIONARY discloses in the Figure on page 7 that “THE CARTRIDGE” “holds the e-liquid (substance). It comes prefilled or refillable. It is usually combined with an atomizer as one unit.” Thus, THE VISUAL VAPING DICTIONARY describes both single-use and reusable device configurations - the lockably coupled devices of dependent claims 6 and 10.

K. HALBERSTADT

Halberstadt et al., *Psychopharmacology* (Berl). 2012;221(4):709-18, entitled “Behavioral effects of $\alpha,\alpha,\beta,\beta$ -tetradeutero-5-MeO-DMT in rats: comparison with 5-MeO-DMT administered in combination with a monoamine oxidase inhibitor,” (“HALBERSTADT”; EX 1010) describes animal testing of deuterated 5-MeO-DMT alone or in combination with monoamine oxidase inhibitors (MAOIs). The paper concludes that deuterated tryptamines “may be useful in behavioral and pharmacological studies to mimic the effects of tryptamine/MAOI combinations.”

In summary, we have shown that the behavioral interaction between 5-MeO-DMT and MAO inhibitors is likely a consequence of altered 5-MeO-DMT pharmacokinetics. Indeed, a similar behavioral profile is produced by a deuterated derivative of 5-MeO-DMT that is resistant to metabolism by MAO. The results obtained with $\alpha,\alpha,\beta,\beta$ -tetradeutero-5-MeO-DMT indicate that deuterated tryptamine derivatives may be useful as single-drug approximations of Ayahuasca. Furthermore, because deuteration has little apparent effect on receptor binding, these compounds may have utility in studies where it is desirable to use tryptamine derivatives that are not metabolically labile and thus have long-lasting pharmacological and behavioral effects. Given the complex pharmacokinetic and behavioral interactions that occur between tryptamine derivatives and MAO inhibitors, the present results indicate that interactions between Ayahuasca constituents need to be studied systematically in order to understand fully the mechanism of action of the botanical preparation. It is also important to note that 5-MeO-DMT has recently become popular as a “designer drug”, often obtained from online vendors, and is now controlled in the United States as a Schedule I hallucinogen by the Drug Enforcement Administration (Anonymous 2010). There have been anecdotal reports that 5-MeO-DMT is sometimes ingested in combination with MAO inhibitors (Shulgin and Shulgin 1997; Ott 2001; Brush et al. 2004). Our findings indicate that these drug combinations may have distinct behavioral and toxicological effects compared with 5-MeO-DMT taken alone. Indeed, it has been reported that ingestion of a high dose of 5-MeO-DMT in combination with an MAO inhibitor resulted in a fatality (Sklerov et al. 2005). Studies are currently in progress to examine whether behavioral and pharmacokinetic interactions occur between MAO inhibitors and a variety of tryptamine derivatives.

EX 1010, 715-716.

L. U.S. Pat. Publ. No. 2022/0081396

U.S. Patent Publ. No. 2022/0081396 (“The ’396 Application,” EX 1009) is entitled “Deuterated compounds” and describes the synthesis, formulation, and use of a number of

deuterated psychedelic compounds, including DMT and 5-MeO-DMT. I understand that the '396 Application is available as prior art against claims 17-19 of the '110 Patent because it has a filing date that predates the priority date of claims 17-19.

Among other administration routes, the '396 Application emphasized inhalation using vaporizable formulations of its deuterated compounds.

According to still further embodiments, the pharmaceutical compositions of the invention are presented in a form suitable for inhalation. Inhalable formulations preferably comprise the compound or compounds of formula (I) in freebase form.

For the avoidance of doubt, an inhalable formulation is capable of becoming airborne and entering the lungs of a patient through the action of the patient breathing in. In other words, inhalable formulations are suitable for pulmonary administration. The inhalable formulation may be inhaled in the form of a vapour, aerosol or gas. Often, the inhalable formulation is inhaled in the form of a vapour or aerosol.

By "freebase" is meant that the amine within the compound of formula (I) or undeuterated analogues thereof (for example which may be present in compositions of the invention in addition to compounds of formula (I), as discussed above) are in their unprotonated form, as opposed to the conjugate acid (protonated) form of the amine. Accordingly, salts of the compounds of formula (I) or undeuterated analogues thereof are excluded from the scope of the freebase. For the avoidance of doubt, zwitterions comprising a protonated form of the amine and a negatively charged substituent bound to the DMT (such as in the zwitterionic form of psilocybin) are excluded from the scope of the freebase.

Pharmaceutical compositions suitable for inhalation comprise a solvent in which the freebase is at least partially soluble. The solvent is typically a liquid at ambient temperature and pressure (in particular at about 20° C. and about 1 bar). In more particular embodiments, the solvent is capable of forming a vapour or aerosol comprising the freebase on the application of heat, for example the solvent may be suitable for use in an electronic vaping device (EVD). EVDs typically include a power supply section and a cartridge. The power supply section often comprises a power source such as a battery, and the cartridge often comprises a heater and a reservoir capable of holding an inhalable formulation. The heater is typically contacted with the inhalable formulation (e.g. by a wick), and is typically configured to heat the inhalable formulation to generate a vapour or aerosol.

In some embodiments, the solvent is volatile (has a boiling point of $\leq 100^{\circ}$ C., such as 50 to 100° C.). Such solvents may be capable of evaporation under the airflow of a vaporiser (such as a Volcano Medic Vaporizer) at temperatures of 30 to 70° C., e.g. 55° C. Evaporation of the solvent leaves a residue of freebase, which may then be vapourised into a vapour or aerosol under the airflow of a vapouriser at higher temperatures (e.g. at temperatures of about 150 to 250° C., such as 210° C.), and inhaled.

In some embodiments, the solvent is any one or a combination of two or more selected from the group consisting of propylene glycol (propane-1,2-diol), glycerine, polyethylene glycol, water, propanediol (propane-1,3-diol), butylene glycol (butane-1,3-diol), butane-2,3,-diol, butane-1,2-diol, ethanol and triacetin.

In some embodiments, the solvent is selected from propylene glycol, glycerine and polyethylene glycol, or a mixture thereof. Typically, the solvent is a mixture of propylene glycol and glycerine in a ratio of from about 50:50 (propylene glycol:glycerine) to about 10:90 by weight, such as about 50:50 to about 20:80 or about 50:50 to about 30:70 by weight. In some embodiments, the solvent is a mixture of propylene glycol and glycerine in a ratio of from about 50:50 to about 30:70 by weight.

Often, the glycerine is vegetable glycerine, i.e. glycerine derived from plant oils.

EX 1009, ¶¶ 335-342.

M. U.S. Pat. Publ. No. 2018/0303165

U.S. Pat. Publ. No. 2018/0303165 (“the ’165 Application,” EX 1050) entitled “Vaporizer tank with atomizer” discloses multiple chamber and mouthpiece configurations, including configurations where the chamber and mouthpiece are formed “integrally,” as a single unit. EX 1050, ¶¶ 5, 19. By having such a conformation, these device components are not intended to be removed by a consumer and are therefore lockably coupled.

N. Int’l Pat. Publ. No. 2019/191712

Int’l Pat. Publ. No. 2019/191712 (“the ’712 Application,” EX 1051) entitled “Portable vaporizer” discloses a handheld drug vaporizer with a mouthpiece that attaches in a “permanently locked fashion” to the top portion of the chamber and, below the chamber, a battery that is both wired into the device and “adhere[d] to” the device’s interior chassis. EX 1051, FIG. 10, ¶¶ 16, 32-33, 59, 70.

O. Int'l Pat. Publ. No. 2020/053392

Int'l Pat. Publ. No. 2020/053392 (“the ’392 Application,” EX 1052) entitled “Consumable” describes multiple portable handheld drug vaporizer embodiments, including versions that are reusable or completely disposable. The vaporization device disclosed in the ’392 Application features a mouthpiece that is “integrally formed” to the chamber, and as such these components are not intended to be removed by a consumer and are therefore lockably coupled. EX 1052, 4, l. 26, 13, ll. 24-29.

VIII. OVERVIEW OF GROUNDS OF UNPATENTABILITY

The following table provides an overview of how the above selected references render the claims of the ’110 Patent anticipated or obvious:

Ground	Claims	Basis
1	17-19	U.S. Pat. Pub. No. 2022/0081396 under 35 U.S.C. § 102(a)(2)
2	17-19	DMT-NEXUS 2012 in view of HALBERSTDAT, under 35 U.S.C. § 103
3	1, 7, 8, 9, 11, 12, 14, 15, 16, and 20	DMT-NEXUS 2012, under 35 U.S.C. § 102(a)(1)
4	2, 3, 4, 5, 6, 7, 8, 10 and 13	DMT-NEXUS 2012 in view of GIROUD, THE VISUAL VAPING DICTIONARY, Int'l Pat. Publ. No. 2019/191712, U.S. Pat. Publ. No. 2018/0303165, and/or Int'l Pat. Publ. No. 2020/053392 under 35 U.S.C. § 103
5	1, 7, 8, 9, 11, 12, 16, and 20	DMT-NEXUS 2018, under 35 U.S.C. § 102(a)(1)
6	1-16 and 20	DMT-NEXUS 2015, DMT-NEXUS 2018, EROWID 2014, MUNOZ, and/or GREENHILL in view of GIROUD and/or THE VISUAL VAPING DICTIONARY under 35 U.S.C. § 103
7	15	POWER and CALLAWAY, under 35 U.S.C. § 103

8	20	DMT-NEXUS 2012, GIROUD, DMT-NEXUS 2018, and/or THE VISUAL VAPING DICTIONARY under 35 U.S.C. § 103
---	----	---

IX. THE CLAIMS OF THE '110 Patent ARE ANTICIPATED OR OBVIOUS

A. Ground 1

In my opinion, claims 17-19 are anticipated by “the ’396 Application.” The ’396 Application, entitled “Deuterated compounds,” discloses deuterated DMT compounds and benefits and uses thereof. For example, the ’396 Application discloses that:

we found that α -deuteration gives rise to an increase in metabolic stability (in comparison with the parent compound: undeuterated DMT) in human hepatocytes whereas methyl group deuteration has a minimal effect on metabolic stability in such a system. On the other hand, significantly greater increases in metabolic stability in mitochondrial fractions were found with a representative deuterated DMT having complete methyl group deuteration in comparison with a corresponding compound with no methyl group deuteration.

Id. at col. 4, l. 8-17.

The ’396 Application discloses vaporization of such deuterated DMT compounds, formulated in a vaporizable formulation, using vaporization devices comprising chambers. For example, the ’396 Application discloses:

According to still further embodiments, the pharmaceutical compositions of the invention are presented in a form suitable for inhalation. Inhalable formulations preferably comprise the compound or compounds of formula (I) in freebase form.

For the avoidance of doubt, an inhalable formulation is capable of becoming airborne and entering the lungs of a patient through the action of the patient breathing in. In other words, inhalable formulations are suitable for pulmonary administration. The inhalable formulation may be inhaled in the form of a vapour, aerosol or gas. Often, the inhalable formulation is inhaled in the form of a vapour or aerosol.

....

Pharmaceutical compositions suitable for inhalation comprise a solvent in which the freebase is at least partially soluble. The solvent is typically a liquid at ambient temperature and pressure (in particular at about 20° C. and about 1 bar). In more particular embodiments, the solvent is capable of forming a vapour or aerosol comprising the freebase

on the application of heat, for example the solvent may be suitable for use in an electronic vaping device (EVD). EVDs typically include a power supply section and a cartridge. The power supply section often comprises a power source such as a battery, and the cartridge often comprises a heater and a reservoir capable of holding an inhalable formulation. The heater is typically contacted with the inhalable formulation (e.g. by a wick), and is typically configured to heat the inhalable formulation to generate a vapour or aerosol.

In some embodiments, the solvent is volatile (has a boiling point of $\leq 100^{\circ}\text{C}$., such as 50 to 100°C .). Such solvents may be capable of evaporation under the airflow of a vaporiser (such as a Volcano Medic Vaporizer) at temperatures of 30 to 70°C ., e.g. 55°C . Evaporation of the solvent leaves a residue of freebase, which may then be vapourised into a vapour or aerosol under the airflow of a vapouriser at higher temperatures (e.g. at temperatures of about 150 to 250°C ., such as 210°C .), and inhaled.

In some embodiments, the solvent is any one or a combination of two or more selected from the group consisting of propylene glycol (propane-1,2-diol), glycerine, polyethylene glycol, water, propanediol (propane-1,3-diol), butylene glycol (butane-1,3-diol), butane-2,3,-diol, butane-1,2-diol, ethanol and triacetin.

In some embodiments, the solvent is selected from propylene glycol, glycerine and polyethylene glycol, or a mixture thereof. Typically, the solvent is a mixture of propylene glycol and glycerine in a ratio of from about 50:50 (propylene glycol:glycerine) to about 10:90 by weight, such as about 50:50 to about 20:80 or about 50:50 to about 30:70 by weight. In some embodiments, the solvent is a mixture of propylene glycol and glycerine in a ratio of from about 50:50 to about 30:70 by weight.

Often, the glycerine is vegetable glycerine, i.e. glycerine derived from plant oils.

Id. at col. 37 l. 3 - col. 38 l. 2.

The vaporizable formulation containing the deuterated DMT (DMT isotopologue) is placed into a chamber (e.g., reservoir of a cartridge) of a vaporization device (e.g., electronic vaping device). The '396 Application further refers to the use of a commercially available vape device, Volcano Medic Vaporizer, that comprises a chamber. The structure and function of Volcano Medic Vaporizer, containing a filling chamber, in the contemporaneous time period, may be found in any number of public locations (see e.g., Lanz et al., PLoS One, 11(1): e0147286 (2016) "sample chamber" of "Volcano Medic®" (EX 1058); Volcano Medic, Instructions for Use brochure, 2017 copyright,

https://www.vapormed.com/media/pdf/Volcano_Medic_Vaporizer_Manual_Instructions.pdf,

"filling chamber" page 21 and elsewhere (EX 1059);

<https://www.youtube.com/watch?v=s3v7FLYLnZg>, July 5, 2019, "filling chamber" shown starting at minute 1:24 (EX 1060). The structure and function of the Volcano Medic device,

including the presence of a chamber that contains the vaporizable formulation is well known to a POSA and is reference in THE VISUAL VAPING DICTIONARY.

Unlike the '110 Patent, which contains no working examples or data employing deuterated compounds, or any other isotopomers or isotopologues of the claimed compounds, the '396 Application synthesized, characterized, and tested deuterated DMT compounds.

B. Ground 2

The '110 Patent claims 17-19 recite a device having a chamber comprising a vaporizable formulation of DMT, 5-MeO-DMT, or 2C-B. The claims are not limited to any purpose for which the vaporizable formulation is in the chamber of the device. As such, the claims encompass any of a wide variety of reasons why a vaporizable formulation may reside in a chamber of the device, including therapeutic or recreational administration of the drug and research uses to study vaporizable formulations or the metabolism or activity of the drug.

The scope and content of the prior art includes the vaporization of DMT and DMT-related compounds, deuterated forms of DMT and DMT-related compounds, and the study of the metabolism of deuterated DMT and DMT-related compounds.

DMT-NEXUS 2012 describes several different vaporizable formulations of DMT, including those containing PEG and glycerin, being placed into a chamber of a vaporization device. DMT-NEXUS 2012 describes the use of vaporizable DMT in combination with MAOIs. DMT-NEXUS 2012 does not describe that the DMT was deuterated.

HALBERSTADT describes the use of deuterated tryptamines, such as 5-MeO-DMT, either alone or in combination with MAOIs. HALBERSTADT teaches that deuterated tryptamines can be administered without MAOIs with potential benefits of altered metabolism and toxicity. HALBERSTADT teaches that it is desirable to further study deuterated tryptamines.

Based on the teachings of DMT-NEXUS 2012 and HALBERSTADT, it would have been obvious to make vaporizable formulations of deuterated tryptamines, such as DMT or 5-MeO-

DMT, with or without, MAOIs, and to place such formulations in vaporization devices for the purpose of experimenting with the metabolic effects of deuterated tryptamines compared to non-deuterated tryptamine with or without MAOIs.

C. Ground 3

In my opinion, claims 1, 7, 8, 9, 11, 12, 14, 15, 16, and 20 are anticipated by DMT-NEXUS 2012. DMT-NEXUS 2012 describes formulating DMT for vaporization using vaporization devices, and specifically describes devices with chambers used for containing vaporizable DMT formulations. For example, DMT-NEXUS 2012 discloses that:

DMT-NEXUS 2012 describes the features of claim 1. It describes devices that comprise a chamber, wherein the chamber comprises a vaporizable formulation of DMT. For example, the poster foaf states: “You put a saturated PEG-400 / DMT solution into a ‘tank’ cartridge and you are set. Anyone can breakthrough every time, it does take a few hits.” EX 1008, 2. Further, a poster describes a process for preparing a VG vaporizable formulation and placing it into a device chamber:

Add 1g dmt fb to empty e-liquid bottle
Add 10 drops VG e-liquid to 1g dmt freebase e-liquid bottle
Start your car. Turn the defrost full blast. Place mixture on top of defrost vent.
The dmt will dissolve into the VG e-liquid as it warms up.
Squeeze mixture from bottle into empty tank cartridge. You may have to re-warm several times throughout filling.

Id. at 14.

Claim 7 is dependent from claim 1 and further specifies that the chamber of the claimed device comprises a bottom portion adapted for coupling to a power unit capable of providing power to vaporize the vaporizable formulation. Claim 8 is dependent from claim 7 and recites that the chamber of the claimed device is coupled to the power unit to vaporize the vaporizable formulation. Claim 9 is dependent from claim 8 and recites that the chamber of the claimed device

is releasably coupled to the power unit. Chambers comprising a bottom portion adapted for releasably coupling to a power source (i.e., a charged battery) to vaporize a vaporizable DMT formulation are described by DMT-NEXUS 2012. For example, posts give instructions to “Push cartridge into atomizer. Screw on charged battery.” and describe that:

The bottom right thing is an eco-t battery with the atomizer attached and a filled cartridge in it, two spare cartridges sitting next to it. This is what I think is the best setup. That's the whole rig, it holds over a cc of mixture, ie about 200 mg, and you can have other filled cartridges in your pocket ready to go if needed.

Id. at 3.

Claim 11 is dependent from claim 1 and further specifies that the chamber comprises one or more specific connectors, including a 510 connector. Claim 12 is dependent from claim 11 and further specifies that the connector is a 510 connector. DMT-NEXUS 2012 discloses chambers (“tanks,” “tank cartridges”) having a 510 connector (“510 threads”) or an eGO connector (“ego tank cartridges”):

The vivanova tank pictured holds more and gives bigger hits and is rebuildable if it burns out. The green box is c3 smokimizers and are cheaper and disposable. Lots of these tanks work well. Once you get the batteries, all other brands of tanks fit on them if they use the most standard threads, called 510 threads.

Id.

To make it simple, here is my recommendation [...] The threads that connect the battery to the atomizer/cartridge are standardized by Joye and called 510. If you get other brands, stick to 510 threads.

Id. at 4.

Claim 14 depends from claim 1 and recites that the chamber of the claimed device is refillable. The chambers described in DMT-NEXUS 2012 are specifically noted as being refillable:

So a simplified shopping list includes
added - I now like ethanol better, 2 cc per gram dmt or more concentrated.
1) PEG-400 (ecig solvent faq) Source
2) eco-t battery and charger

- 3) Regular atomizer head and/or High output atomizer head called "low resistance"
- 4) Empty tanks can be refilled as many times as you want.

Id.

Claim 16 is dependent from claim 1 and recites that the substance is DMT. As noted above, the vaporizable formulations disclosed in DMT-NEXUS 2012 comprise DMT.

Claim 20 is dependent from claim 1 and further specifies that the vaporizable formulation of the claimed device comprises one or more of PG, VG, or PEG. As noted above, DMT-NEXUS 2012 discloses vaporizable formulations comprising DMT dissolved in VG ("VG e-liquid") or PEG ("a saturated PEG-400 / DMT solution").

D. Ground 4

In my opinion, claims 2, 3, 4, 5, 6, 7, 8, 10 and 13 are obvious under DMT-NEXUS 2012 in view of GIROUD, THE VISUAL VAPING DICTIONARY, the '165 Application, the '712 Application, and the '392 Application. As described in Ground 3, DMT-NEXUS 2012 teaches all of the elements of claims 1 and 8. Claims 2, 3, 4, 5, 6, 7 and 13 depend from claim 1, claim 8 depends from claim 7, and claim 10 depends from claim 8, each of the dependent claims specifying elements associated with known prior art vaping devices. GIROUD teaches that the components of claims 2, 3, 4, 5, 7, 8 and 13 and the Visual Vaping Dictionary teaches that the components of claims 6 and 10 and that such features are commonly found in prior art describing commercial vaporizers.

These prior art vaping devices are designed to generate sufficient heat to vaporize standard vaporization formulations, such as those using PG, VG, or PEG solvents. The devices vary in terms of their user experience and certain devices may be more optimal for use with specific vaporizable formulations and drugs. However, it would be obvious to a POSA to place a vaporization formulation containing any drug into any of these devices. One motivation for doing so is to test the performance of the device with a particular vaporizable formulation. Another motivation is to

vaporize a vaporizable formulation, where the user selects whichever device they already possess or can readily acquire. It would be obvious to place a vaporizable formulation containing DMT into any of the vaping devices of GIROUD because GIROUD describe the use DMT and other drugs using e-cigs.

In addition to cannabis, e-cigs can also be used to vape any type of psychoactive drugs, such as methamphetamine, cocaine, heroin, or bath salts (cathinones). Until now, information on the use of e-cigs for the vaporization of THC-enriched aerosols has come mainly from the Internet, the popular press, street healthcare workers, and user's testimonials, but not from reliable scientific literature. For instance, dedicated magazines publish buyer's guides to vape pens, reviewing dozens of e-devices able to vaporize wax or other hash-style concentrates, but also flower buds or even oil concentrates. Very recently, drug users have discovered a method of adapting e-cigs to vaporize a potent hallucinogen known as dimethyltryptamine or DMT [25]. Many personal experiences about vaping crystal methamphetamine are also reported on the Internet [26]. Similarly, the use of e-cigs as a means of administering numerous controlled substances is abundantly discussed on websites and forums.

EX 1011, 9996.

It would have been obvious to use any of the devices described in GIROUD or THE VISUAL VAPING DICTIONARY in place of the devices described in DMT-NEXUS 2012. The '110 Patent acknowledges that the invention is premised on the use of vaporization devices known in the art.

Devices used to vaporize substances are known in the art, and are commonly referred to in the art as vaporizers, atomizers (e.g., rebuildable atomizers, rebuildable dripping atomizers, rebuildable tank atomizers, clearomizers, or cartomizers), mods (including but not limited to squonk mods, sub ohm mods, box mods, tube modes, temperature control mods, regulated mods, and mechanical mods), E-cigs, vape pens, etc.

During use, power may be generated by a power unit through the application of voltage generated by the power unit, which is then passed through to threads of a chamber, thus permitting a heating element that may be positioned within the chamber to generate heat. The heat may then vaporize a vaporizable formulation in the chamber adjacent to the heating element present in the chamber. The vaporizable formulation comprising the ayahuasca-like substance may then be inhaled by the user of the chamber. These and other features of the present teachings will become more apparent from the description herein.

EX 1001 col. 6, l. 13-36.

Further, as noted above, the figures of '110 Patent show prior art devices, which are characterized in the figure descriptions as providing a “chamber of the present invention.” For example, the description of Figure 2 states:

FIG. 2A illustrates an exemplary chamber of the present invention using an adaptable “eGo” threaded connector with a “closed” chamber and a 510 connector. FIG. 2B illustrates an adaptable “eGo” threaded connector with an “open” chamber exposing “eGo” threads.

Id. at col. 5, l. 55-60.

These features are described in the specification elsewhere as being part of the prior art devices:

By way of example, a “510 connector” is a connector having a 510 thread as is commonly referred to in the art. In preferred embodiments a “510 connector” means the chamber is adapted with a 510 threaded tenon and the power unit has a 510 mortise able to accept a 510 threaded tenon, as is commonly referred to in the art. An eGo thread can have any diameter, but in most cases as used herein refers to an approximately 14 mm diameter. An eGo thread is usually larger than other threads used in the art, such that a smaller thread, e.g., a 510 thread, can be adapted to function with an eGo connector.

Id. at col. 7 l. 27-37.

The specification of the '110 Patent expressly acknowledges that any of numerous known prior art devices may be used:

Numerous delivery device chambers known in the art can be used to practice the present invention, including but not limited to portable or desktop vaporizable cartridges or tanks.

Id. at col. 9 l. 16-19.

GIROUD and THE VISUAL VAPING DICTIONARY, review articles, teach such portable or desktop vaporizable cartridges or tanks that are obvious to use in the field of vaporization generally and, as taught by GIROUD, specifically for compounds such as DMT. The '165 Application, the '712 Application, and the '392 Application all teach portable handheld vaporizers

with lockable components. DMT-NEXUS 2012 describes vaporizable formulations of DMT placed in a chamber of a delivery device. Several different delivery devices and components are explored and described including Ecig equipment, “tank” type ecig cartridges, Dual Coil Tanks, eco-t size/type (containing an atomizer, filled cartridge, and two spare cartridges; with “a good compromise between size and battery life” and an ability to “‘lock’ them so that they don’t go off in your pocket), vivanova tank, c3 smikimizers, 510 threads, 510 cartridges, battery, charger, regular atomizer head, high output atomizer head, CE3 disposable tank, Ego battery, Joye system, JOYE eGo Mega, cartomizer with wicks (with atomizer head and metal coil wrapped around the wicks), Evolve, Evolve Plus, and Evolve Plus XL. Not all of the subcomponent parts of the recited devices are expressly mentioned, albeit inherent in the products. DMT-NEXUS 2012 describes experimentation with many different devices and configurations and provides teaching and motivation for experimenting with and using any of the known vaping devices on the market.

It would have been obvious to use any of the devices of GIROUD, THE VISUAL VAPING DICTIONARY, the ’165 Application, the ’712 Application, and the ’392 Application or subcomponents or features thereof, with the vaporizable formulations of DMT-NEXUS 2012. DMT-NEXUS 2012 discloses the motivation to utilize and test a variety of different devices to optimize vaporization experience with DMT and related compounds. A POSA would have been motivated to use the vaporization formulations of DMT-NEXUS 2012 with any one of the devices of GIROUD, THE VISUAL VAPING DICTIONARY, the ’165 Application, the ’712 Application, or the ’392 Application with a reasonable expectation of success. Regarding success, the claims simply require placing the vaporizable formulation in the chamber. There is no unpredictability about the ability to place the vaporizable formulations of DMT-NEXUS 2012 in the chamber of any of the devices of GIROUD, THE VISUAL VAPING DICTIONARY, the ’165 Application, the

'712 Application, and the '392 Application or any devices comprising a sub-component of GIROUD, THE VISUAL VAPING DICTIONARY, the '165 Application, the '712 Application, or the '392 Application.

E. Ground 5

In my opinion, claims 1, 7, 8, 9, 11, 12, 16, and 20 are anticipated by DMT-NEXUS 2018. DMT-NEXUS 2018 describes utilizing DMT vaporizable formulations in tank cartridges (“chambers”), vape cartridges coupled to 501 connector batteries (“power units”), and vegetable glycerin and polyethylene glycol e-liquid to dissolve DMT.

DMT-NEXUS 2018 describes the features of claim 1, 7, 8, 9, 11, 12, 16, and 20. It describes devices that comprise a chamber, wherein the chamber comprises a vaporizable formulation of DMT. The poster also reports plugging the device into a variable voltage 510 battery. For example, the poster ManCrossWater states:

Finally, on a whim I came into the possession of a DMT Vape Cartridge... this interested me. On the tail end of an acid trip, I plugged it into my variable voltage 510 battery at 3.8v and laid in my bed. I hit it...After that experience I knew that vaping DMT was the way to go. I moved on from a cartridge vaporizer to a bigger sub-ohm Vape, the Smoke X-Priv Baby. When I first made juice for this, I used an 80/20 VG to PG Juice... I then tried to make juice with Wax Liquidizer... Wax Liquidizer is made out of PG, PEG200, and PEG400, and does a great job at dissolving DMT and (I think) keeping it dissolved.

EX 1013, 1.

F. Ground 6

In my opinion, claims 1-16 and 20 are obvious under DMT-Nexus 2015, DMT-NEXUS 2018, Erowid 2014, Munoz, and/or Greenhill in view of GIROUD and/or THE VISUAL VAPING DICTIONARY.

In addition to DMT-NEXUS 2012, many other prior art sources demonstrate that vaporizing DMT, by modifying commercially available vape devices, was commonplace well

before the earliest priority date of any of the claims of the '110 Patent. For example, MUNOZ describes the widespread use of electronic cigarettes to vaporize DMT among various communities, and the modification of commercial vape devices for this purpose. GREENHILL discloses interviews with DMT vape users describing their experiences with DMT vapes. DMT-NEXUS 2015, DMT-NEXUS 2018, and EROWID 2014 both describe vaporizing DMT using commercially available devices.

The prior art also demonstrates that vaporizable DMT formulations, and methods of producing such formulations, were well known before the earliest priority date of any of the claims of the '110 Patent. For example, EROWID 2014 describes a method of preparing a solution of DMT in glycerin and PG, for use as a vaporizable DMT formulation in commercial vape devices.

MUNOZ, GREENHILL, DMT-NEXUS 2015, DMT-NEXUS 2018 and EROWID 2014 do not expressly disclose all of the subcomponent parts of the devices claimed in the '110 Patent, albeit inherent in these devices. However, as described above, GIROUD and THE VISUAL VAPING DICTIONARY provide a review of known vaping devices, including a description of sub-component parts and functions and their use with vaporizable formulations containing a variety of compounds, including DMT.

It would have been obvious to use any of the devices described in GIROUD and THE VISUAL VAPING DICTIONARY with a vaporizable formulation of DMT described in MUNOZ, GREENHILL, DMT-NEXUS 2015, DMT-NEXUS 2018, and EROWID 2014 for the reasons describe in Ground 4. DMT-NEXUS 2015, DMT-NEXUS 2018, EROWID 2014, and MUNOZ all have detailed forum discussions on the use of e-cigarettes to vaporize DMT, providing guidance for adding vaporizable DMT into an e-cigarette. GREENHILL offers insights into the advantages of vaporizing DMT.

Related to claim 1, the references describe:

Finally, on a whim I came into the possession of a DMT Vape Cartridge...this interested me...I plugged it into my variable voltage 510 battery at 3.8v and laid in my bed. I hit it... After that experience I knew that vaping DMT was the way to go.

EX 1013, 1.

The correct vaping temperature for DMT is 150C The vaporizer i use is crafty. You can use an iphone or android app to set the temperature to 150C... DMT melts into liquid before it transforms into vapor/smoke...With crafty, you get a steel filter you can just put in the bottom... Then just sprinkle some DMT on top. (i used 30mg to get where i wanted).

EX 1014, 1.

To my surprise he produced what appeared to be an innocuous e-cigarette. It was the refillable kind that has liquid in it... I've tried a lot of different methods for smoking DMT, and each of them has its pros and cons... This funny little electronic vaporizer was definitely the best thing yet!

EX 1015, 1.

Drug users have discovered a method of adapting electronic cigarettes to vaporize a potent class A hallucinogen known as dimethyltryptamine or DMT. The straightforward "hack" is being discussed openly on multiple web forums, with DMT enthusiasts describing how simple it is to consume the drug using an electronic cigarette and a little dexterity.

EX 1016, 2.

Their reasons for vaping appear to be a mixture of portability, ease of use, and dosage control. "The main advantages of vaping DMT are the ease and the control you have whilst vaping," Sean*... tells me... Nils*... explains to us, "You can't burn your fingers and don't have to concentrate on how to operate things," he says, "which gets pretty hard after a good first hit. With vaping, you just press the button and inhale till you have enough."

Dale*... emphasizes the sheer practicality of vaping DMT. "It's far more concealable, easy to prepare, and easy to ingest..." Nils tells me that he had his most intensely positive DMT experience sitting in a local park with nothing more than his headphones on and a yellowy brown liquid in his e-cigarette, while Sean recommends using a DMT-filled vape "on a nice walk in nature, at a festival, or around your mate's house."

EX 1017, 2.

Very recently, drug users have discovered a method of adapting e-cigs to vaporize a potent hallucinogen known as dimethyltryptamine or DMT.

EX 1011, 9996.

As noted above, the devices of GIROUD and THE VISUAL VAPING DICTIONARY, when used with DMT, provide all of the elements of claims 1-16 and 20. With regard to claim 20, THE VISUAL VAPING DICTIONARY establishes that PG and VG are commonly utilized in e-liquid for the vaporized delivery of drugs and GIROUD describes the use of PG and glycerol for cannabis e-liquid and application of DMT to e-cigarettes by drug users. It would have been obvious for users to formulate DMT with these solvents and place them into the chamber of the e-cigarette devices of GIROUD or THE VISUAL VAPING DICTIONARY for at least the purposes of testing them. There is a reasonable expectation of success in accomplishing this task as there is no technical challenge or unpredictability a POSA would face in placing DMT into such solvents and placing this vaporizable formulation into a device of GIROUD or THE VISUAL VAPING DICTIONARY.

G. Ground 7

In my opinion, claim 15 is obvious in view of POWER and CALLAWAY. Claim 15 is dependent from claim 1, and recites that the vaporizable formulation further comprises a MAOI. The '110 Patent states that “[t]raditional ayahuasca preparations include monoamine oxidase inhibitors (MAOIs). Thus the vaporizable formulation of the present invention can further include one or more MAOIs, which are well known in the art...” and “[a]yahuasca-like substances are often combined with MAOIs...” EX 1001, col 16 l. 13-16, col. 17 l. 55-56.

The '110 Patent acknowledges that MAOIs are commonly combined with ayahuasca-like substances, including DMT. *Id.* at col 7 l 5-7. Public knowledge of the combination of an

“ayahuasca-like substance” such as DMT and an MAOI in a vaporizable formulation is further demonstrated by POWER and CALLAWAY. POWER describes vapes containing a vaporizable formulation of DMT and a *B. caapi* extract. CALLAWAY describes that plant ingredients in traditional ayahuasca preparations include *B. caapi*, and that *B. caapi* contains various alkaloids (e.g., harmine, harmaline, tetrahydroharmine) that facilitate the activity of DMT by inhibiting monoamine oxidase.

The teachings of POWER and CALLAWAY demonstrate that the combination of DMT and MAOIs, including in vaporizable formulations, was already well known. POWER describes vaporizable formulations comprising a combination of DMT and a MAOI-containing *B. caapi* extract, providing guidance and a motivation for adding a MAOI to vaporizable formulations of the claimed devices, particularly because CALLAWAY teaches that *B. caapi* contains alkaloids that inhibit monoamine oxidase facilitate the activity of DMT.

“Could you make a vape that gives an ayahuasca-type experience, that lasts a longer time?”

Yes. I’m experimenting with this right now. I have some Banisteriopsis Caapi [an Amazonian jungle vine] extract, which I’m adding to the mix. I like the idea of a vape with the exact two plants from which ayahuasca is made. But the drugs involved can cause negative reactions for people on certain medications. So I’m cautious – and it would only extend the trip by five minutes. You can keep taking hits with the vape to have a longer trip.”

EX 1018.

“Although [ayahuasca] has been known by many other names... the most common identifying feature is the presence of harmala alkaloids from *B. caapi*... [which] can facilitate the activity of N,N-dimethyltryptamine (DMT) from *P. viridis* by the inhibition of the enzyme monoamine oxidase (MAO) in the liver and central nervous system.”

EX 1019, 145.

“In the *B. caapi* sample set, a broad range of alkaloid profiles and concentrations were observed for... harmine, harmaline and tetrahydroharmine (THH).”

Id. at 146.

“In the *P. viridis* sample set, a broad range of alkaloid concentrations was observed for DMT.”

Id.

The '110 Patent does not provide any data or instructions for combining an MAOI with a vaporizable formulation, but rather relies on knowledge in the art for making the combination. I agree that there is a motivation known in the art to combine an MAOI with a vaporizable formulation containing ayahuasca-related compounds, such as DMT, and that there is a reasonable expectation of success in making the combination. There is nothing about the chemistry of MAOIs such as those found in the *Banisteriopsis Caapi* extract of POWERS that would present a challenge to a POSA in combining with DMT vaporizable formulations or placing such formulations in the chamber of a vape pen device.

H. Ground 8

In my opinion, claim 20 of the '110 Patent is obvious under DMT-NEXUS 2012 in view of GIROUD, DMT-NEXUS 2018, and/or THE VISUAL VAPING DICTIONARY. The '110 Patent acknowledges that PG, VG, and PEG are all common substances used in vaporizable drug delivery formulations, or “e-liquids.” EX 1001, col. 7 l. 65 - col. 8 l. 5. The solvents recited in claim 20 are well known and broadly utilized for creating vaporizable formulations containing any number of compounds, including the compounds recited in the '110 Patent. This is supported in both THE VISUAL VAPING DICTIONARY, and a peer-reviewed publication, GIROUD.

THE VISUAL VAPING DICTIONARY describes that e-liquids are used to deliver not only nicotine and cannabis (THC, CBD), but “other substances” as well. PG and VG formulation components recited in '110 are specifically identified in THE VISUAL VAPING DICTIONARY

for vaporized aerosol drug delivery. THE VISUAL VAPING DICTIONARY does not describe vaporized delivery of the drugs listed in '110 claim 1.

GIROUD recites that vape users utilize VG, PG, and/or PEG for e-liquids formulations in their vape devices. EX 1011, 9991. GIROUD also describes drug users successfully adapting vaporization devices those formulations are used in to vaporize DMT. *Id.* at 9996. GIROUD does not directly specify the formulation components used to vaporize DMT.

The utilization of one or more of PG, VG, and PEG for the delivery of DMT specifically as claimed in the '110 Patent is established in detail by public discussion as documented through the internet forum posts DMT-NEXUS 2012 and DMT-NEXUS 2018.

DMT-NEXUS 2012 describes a method of vaping DMT using a vape device made of commercially available components – similar to the '110 Patent. In the original post and in the responses to that post, forum members discuss using individual vaporizable formulation components of '110 Patent claim 20 to vape DMT, including PEG and VG. EX 1008.

Combinations of vaporizable formulation components for vaporized drug delivery is known in the prior art and has been disclosed for effectively vaping DMT, as recited in DMT-NEXUS 2018. DMT-NEXUS 2018 describes several different vaporizable formulations of DMT, including those that contain PEG and PG or PG and VG. EX 1013, 1. Specific ratios of vaporizable formulation components as described in the '110 Patent at col. 15 l. 29-42 are likewise disclosed in DMT-NEXUS 2018. *Id.*

THE VISUAL VAPING DICTIONARY and GIROUD establish that the vaporization formulation component substances PG, VG, and PEG are known in the prior art for the vaporized delivery of drugs. EX 1011, 9991; EX 1012, 17. Those same vaporization formulation component substances in singular or combinatorial solutions have likewise been directly used in the vaporized

delivery of DMT, as demonstrated in DMT-NEXUS 2012 and DMT-NEXUS 2018. EX 1008, 2, 14, 15; EX 1013, 1. Based on these teachings, the prior art establishes that it would be obvious to someone skilled in the art to utilize one or more of the claimed vaporizable formulation components PG, VG, and PEG in a vaporization device to effectively deliver the drug substances as claimed in the '110 Patent.

X. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

I understand that Patent Owner bears the burden of coming forward with evidence of any secondary considerations supporting the non-obviousness of the '110 Patent. I understand that Patent Owner has not yet provided such evidence in this proceeding, and I reserve the right to respond to Patent Owner's evidence of secondary considerations if and when such evidence is provided to me.

XI. CONCLUSION

1. For the reasons set forth above, it is my opinion that all of claims of the '110 Patent are unpatentable.

2. I reserve the right to offer further opinions relevant to the unpatentability of the claims of the '110 Patent and/or offer testimony in support of this declaration.

3. In signing this declaration, I recognize that the declaration will be filed as evidence in Porta Sophia's IPR. I also recognize that I may be subject to cross-examination in this proceeding. If required, I will appear for cross-examination at the appropriate time.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that the statements were made with the knowledge that willful false statements and the like are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001.

 12 Aug 2025

David Peyton

Date