

2021-2347

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

STEPHEN THALER,
Plaintiff-Appellant

v.

**ANDREW HIRSHFELD, Performing the Functions and Duties of the
Under Secretary of Commerce for Intellectual Property and Director of the
United States Patent and Trademark Office, UNITED STATES PATENT
AND TRADEMARK OFFICE,**
Defendants-Appellees

APPEAL FROM THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA in Case No. 1:20-CV-00903-LMB-
TCBAVAED,

The Honorable Judge Leonie M. Brinkema

**CORRECTED OPENING BRIEF FOR PLAINTIFF-APPELLANT
STEPHEN THALER**

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**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF INTEREST

Case Number 2021-2347

Short Case Caption THALER v. ANDREW HIRSHFELD, et al.

Filing Party/Entity APPELLANT STEPHEN THALER

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Date: 09/30/2021

Signature: /s/ Ryan Abbott

Name: Ryan Abbott

<p>1. Represented Entities. Fed. Cir. R. 47.4(a)(1).</p>	<p>2. Real Party in Interest. Fed. Cir. R. 47.4(a)(2).</p>	<p>3. Parent Corporations and Stockholders. Fed. Cir. R. 47.4(a)(3).</p>
<p>Provide the full names of all entities represented by undersigned counsel in this case.</p>	<p>Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities.</p> <p><input checked="" type="checkbox"/> None/Not Applicable</p>	<p>Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities.</p> <p><input checked="" type="checkbox"/> None/Not Applicable</p>
<p>Stephen Thaler</p>		

Additional pages attached

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4).

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5. Related Cases. Provide the case titles and numbers of any case known to be pending in this court or any other court or agency that will directly affect or be directly affected by this court’s decision in the pending appeal. Do not include the originating case number(s) for this case. Fed. Cir. R. 47.4(a)(5). See also Fed. Cir. R. 47.5(b).

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6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

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STATEMENT OF RELATED CASES

Pursuant to Federal Circuit Rule 47.5, appellant states that to the best of his knowledge:

No appeal from the same trial court action was previously before this or any other appellate court or agency and there are no cases pending in any court or agency that will directly affect or be directly affected by the Federal Circuit's decision in this appeal.

ORAL ARGUMENT REQUESTED

Pursuant to Federal Rule of Appellate Procedure section 34(a), the Appellant Stephen Thaler requests an oral argument on this matter. Appellant requests the oral argument because of the novel, complex, and important issues relating to patent rights raised in this matter, and Appellant believes given these issues the Court will benefit from the opportunity to have the oral argument.

I. INTRODUCTION

This case raises the novel legal issue of whether a patent can be obtained for an invention created by an artificial intelligence (AI) in the absence of a traditional human inventor (“AI-Generated Invention”). The United States Patent and Trademark Office (“USPTO”) and the District Court for the Eastern District of Virginia have barred such inventions from being patented. This ignores fundamental statutory and constitutional principles and also stymies innovation. While other countries are promoting the progress of science, the USPTO is belatedly adopting luddism.

Plaintiff-Appellant Stephen Thaler, Ph.D (“Dr. Thaler”) develops, owns, and operates technology that can, and does, generate AI-Generated Inventions. One of these AI systems is named DABUS, which stands for Device for the Autonomous Bootstrapping of Unified Science. DABUS created two substantively patentable inventions that are the subject of this appeal: the “Neural Flame” and “Fractal Container” (the subject matter of patent application numbers 16/524,350 and 16/524,532, respectively the “Applications”). (Appx0679, Appx0021-0098).

Because this case involves review under the Administrative Procedure Act (“APA”) and review is limited to the administrative record without fact finding on behalf of the Court, the factual assertions made by Plaintiff during the application process, which have never been disputed by the Defendants, are taken as true for the Court’s review. See *Genetics & IVF Inst.*, 801 F. Supp. 2d 497, 502 (E.D. Va. 2011). It is thus undisputed that DABUS generated the otherwise patentable inventions at issue and that DABUS identified the novelty

and salience of these inventions before they were seen by a natural person. Also, that no natural person qualifies as an inventor for the Applications and, as a result, that Plaintiff was and is unable to identify a natural person who qualifies as an inventor.

Thus, as a factual matter, DABUS invented the present inventions—there has been no claim by the USPTO to the contrary. (Appx0688.) The USPTO has instead posited as a legal matter DABUS cannot be listed as an inventor. The effect of which is that two otherwise patentable inventions cannot receive patent protection. For this reason, Dr. Thaler seeks this Court’s intervention.

II. STATEMENT OF JURISDICTION

The District Court for the Eastern District of Virginia had subject matter jurisdiction over this action under 5 U.S.C. §§ 701-06, 28 U.S.C. §§ 1331, 1338 (a), 1361, and 2201-2202.

The District Court for the Eastern District of Virginia granted the USPTO’s Motion for Summary Judgment on September 2, 2021. (Appx0001-0020). Stephen Thaler timely filed a Notice of Appeal to this Court on September 10, 2021.

This Court has appellate jurisdiction under 28 U.S. Code § 1291, § 1295(a)(1).

III. STATEMENT OF THE ISSUES PRESENTED FOR REVIEW

The issue presented in this case is whether an AI-Generated Invention is patentable. The USPTO claims that it is not, filing a summary judgment motion to that effect, which was granted by the District Court for the Eastern District of

Virginia. Appellant challenges this Denial and the Summary Judgment on statutory and constitutional grounds.

IV. STATEMENT OF THE CASE

A. Procedural Background

Plaintiff-Appellant appeals from: (1) the Judgment entered on September 2, 2021 (Appx0001) and (2) the Memorandum Opinion dated September 2, 2021 (Appx0002-20) denying Dr. Thaler's motion for summary judgment and granting the USPTO's motion for summary judgment. *Id.*

Dr. Thaler filed two patent applications with the United States Patent and Trademark Office ("USPTO"), assigned U.S. Application Serial Nos. 16/524,350 (the "350 application") and 16/524,532 (the "532 application") (collectively, "the Applications"). (Appx0021-0099). Dr. Thaler filed the Applications with the USPTO on July 29, 2019.

After its initial review of the Applications, the USPTO issued Dr. Thaler a "Notice to File Missing Parts of Non-Provisional Application." (Appx0235-236, Appx0518-519). On August 19, 2019, Dr. Thaler filed a petition with the USPTO Director pursuant to 37 C.F.R. § 1.181 in which the USPTO was asked to vacate its Notice to File Missing Parts of Non-Provisional Application. (Appx0249-254, Appx0532-537.) On December 17, 2019, the USPTO issued a written decision dismissing Dr. Thaler's petition. (Appx0269-271, Appx0548-550.) On January 20, 2020, Dr. Thaler sought reconsideration of the USPTO's decision by filing a "Petition to the Director Under 37 C.F.R. § 1.181 – Request for Reconsideration." (Appx0273-284, Appx0552-563.) On April 22, 2020, the USPTO denied Dr. Thaler's request for reconsideration in a final written

decision, which Dr. Thaler challenged in its motion for summary judgment. (Appx0343-351, Appx0594-602.)

Dr. Thaler filed a civil action seeking review of the USPTO's decision. (Appx0105-129.) He argued that the denial of the Applications by Defendants Andrew Hirshfeld and the USPTO (collectively, "Defendants" or "USPTO") was "arbitrary, capricious, an abuse of discretion and not in accordance with the law; unsupported by substantial evidence, and in excess of the USPTO's statutory authority." (Appx0120.) Dr. Thaler sought an order compelling USPTO to reinstate the Applications and vacate the prior decision on Dr. Thaler's petitions filed under 37 C.F.R. § 1.181. (Appx0120-121.) Dr. Thaler also sought a declaration that a patent application for an AI-generated invention should not be rejected on the basis that no natural person is identified as an inventor; a declaration that a patent application for an AI-generated invention should list an AI where the AI has met inventorship criteria; and an award of the costs and reasonable attorneys' fees Dr. Thaler incurred during the litigation. *Id.*

The District Court for the Eastern District of Virginia granted USPTO's Motion for Summary Judgment and denied Dr. Thaler's Motion for Summary Judgment. (Appx0001-0002.) Dr. Thaler asks this Court for reconsideration.

B. Statement of the Facts

Appellant-Plaintiff Dr. Stephen Thaler develops, owns, and applies AI systems capable of generating patentable output under circumstances in which no natural person qualifies as an inventor ("AI-Generated Inventions"). (Appx0680, Appx0107.) Dr. Thaler's AI, DABUS, produced the two inventions at issue here: the Neural Flame, a light beacon capable of flashing in a new and

inventive manner to attract attention, and the Fractal Container, a beverage container designed based on fractal geometry. (Appx0680-681, Appx0199, Appx0484) Dr. Thaler applied for patents for the Neural Flame and Fractal Container on July 29, 2019. The patent application numbers for each application respectively are 16/524.350 and 16/524.350 (“The Applications”). (Appx0198, Appx0483).

Dr. Thaler listed “DABUS” and “Invention generated by artificial intelligence” in the fields for the inventor names. (Appx0028, Appx0069.) As DABUS lacked the legal ability to swear to the inventor’s oath or make a declaration as required by 35 U.S.C. § 115(d), so instead Dr. Thaler filed a substitute statement under 37 CFR 1.64. (Appx0164-165, Appx0449-450.)

The statement explained that the “inventor,” DABUS, was “under legal incapacity in view of the fact that the sole inventor is a Creativity Machine (*i.e.*, artificial intelligence), with no legal personality or capability to execute this substitute statement.” (Appx0711, Appx164-165, Appx0449-450.) In an abundance of caution, Dr. Thaler also submitted a statement under 37 CFR 3.73(c) identifying himself as the assignee of the entire right, title, and interest in the Applications. Dr. Thaler included an assignment document executed by himself on behalf of DABUS assigning all rights to himself. (Appx0209-210, Appx0498-499.)

Applying the same caution given his foray into uncharted legal territory, Dr. Thaler filed an additional “Statement of Inventorship” elucidating that the Applications were based on AI-Generated Inventions. The statement explained

that DABUS conceived of the inventions, so it should be listed as the inventor. (Appx0198-203, Appx0483-488.)

Dr. Thaler explained in the Statement of Inventorship filed with the Applications: “In some instance of machine invention, a natural person might qualify as an inventor by virtue of having exhibited inventive skill in developing a program to solve a particular problem, by skillfully selecting data to provide to a machine, or by identifying the output of a machine as inventive. However, in the present case, the DABUS was not created to solve any particular problem, nor was trained on any special data relevant to the instant invention. The machine rather than a person identified the novelty and salience of the instant invention. A detailed description of how DABUS and a Creativity Machine functions is available in, among others, the following US patent publications: 5,659,666; 7,454,388 B2; and 2015/0379394 A1.” (Appx0099, Appx0484.)

Dr. Thaler further explained why he could not list himself as the inventor: “Stephen Thaler, the creator of DABUS, is prohibited from listing himself as an inventor for the instant application because he has not contributed to the conception of the instant invention. DABUS performed what is traditionally considered the mental part of the inventive act. Based on DABUS’s results, a skilled person could have reduced the invention to practice. Inaccurately listing himself as an inventor could subject Dr. Thaler to criminal sanctions. 18 U.S.C. 1001. The Office presumes that the named inventor in an application is the actual inventor. *See* MPEP §2137.01.” (Appx0202, Appx0487.) Dr. Thaler additionally stated, “It has been argued that a natural person may claim inventorship of an autonomous machine invention even in situations in which

that person was not involved in the development or operation of a machine by virtue of recognizing the relevance of a machine's output. This approach is questionable in cases in which the natural person has not made an inventive contribution to the disclosed invention in the accepted meaning of the term. In some cases, recognition of the inventive nature of a computer's output may require significant skill, but in others, the nature of inventive output may be obvious. In the present case, DABUS identified the novelty of its own idea before a natural person did." *Id.* Dr. Thaler's assertions regarding the nature of the invention were accepted and never contested by USPTO. (Appx0683; Manual of Patent Examining Procedure § 2109.)

Dr. Thaler filed a request for accelerated examination for both Applications which required the Applicant to submit a pre-examination search and an accelerated examination support document. In the request he disclosed to the USPTO that foreign analogs of the Applications had been filed in the United Kingdom Intellectual Property Office (UKIPO) and European Patent Office (EPO), and that both offices had examined the Applications on their merits and found them to be patentable to the extent possible in a preliminary examination. (Appx0194-197, Appx0489-492.)

Both Applications followed similar procedural pathways at the USPTO. (Appx0684). On August 8, 2019, the USPTO issued a "Notice to File Missing Parts of Nonprovisional Application" for each application. The notices indicated that the application data sheets filed with the Applications did not identify each inventor by a legal name. (Appx0235-236, Appx0518-519.) A few weeks later, under 37 CFR 1.181, Dr. Thaler petitioned for supervisory review and to vacate

the notices for being unwarranted and/or void. (Appx0249-254, Appx0532-537). In December, a second “Notice to File Missing Parts of Nonprovisional Application” was issued for each application. Dr. Thaler’s petitions in response to the initial notices were dismissed in a decision issued on December 17, 2019. (Appx0259-260, Appx0538-540.) Dr. Thaler petitioned the USPTO under 37 CFR 1.181 on January 20, 2020. Dr. Thaler requested reconsideration of the December 17 decisions refusing to vacate the August 8, 2019 notices. (Appx0273-284, Appx0552-564.) Approximately four months later, the USPTO denied the petitions for both Applications. (Appx0343-352, Appx0594-603.)

The USPTO took the position that all patent applications require an inventor who must be a natural person. *Id.* The USPTO cited to 35 U.S.C. § 101 which states: “Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter... may obtain a patent therefore, subject to the conditions and requirements of this title.” (Appx0347, Appx0598.) The USPTO also cited to various cases holding that corporations and sovereigns cannot be inventors. Those decisions constituted final agency action. Dr. Thaler exhausted all available remedies at the USPTO. (Appx0370, Appx0621.)

Dr. Thaler filed a civil action seeking review of the USPTO’s decision in the District Court for the Eastern District of Virginia. (Appx0125-129.) The district court granted USPTO’s Motion for Summary Judgment and denied Dr. Thaler’s Motion for Summary Judgment, finding that an artificial intelligence machine cannot be an “inventor” under the Patent Act. (Appx0001-0020.) Dr. Thaler asks this Court for reconsideration.

V. SUMMARY OF ARGUMENT

The Patent Act (the “Act”) allows for patents on AI-Generated Inventions. If a patent requires an inventor, in the absence of a human inventor, AI inventorship is consistent with the plain language of the Act. Terms like “individual,” “person,” and pronouns referring to such entities have consistently been understood to include more than just natural persons. In fact, the use of the term “person,” and not “natural person,” itself, shows a deliberate choice to not exclude a broader category. Likewise, conception can be at least functionally accomplished by AI, and any stricter reading would read the long discarded “flash of genius” requirement into the Act.

The intent behind the Act, as well as the Constitution, further supports patentability of AI-Generated Inventions. The Constitution’s “Patent Clause” provides an explicit rationale and limitation to the patent system that would be frustrated under the USPTO’s proposed interpretation. U.S. Const. Art. I, § 8, cl. 8. The Supreme Court, and this Circuit, has held in the past that the Patent Clause not only empowers Congress to pass laws related to Patents, it also restricts Congress from taking an action that would interfere with “promot[ing] the Progress of Science and useful Arts. . . .” Courts have overturned laws that would impede such Progress.

The canon of constitutional avoidance guides courts to not implicate constitutional issues by a reading of an ambiguous statute. To the extent inventorship requirements are ambiguous in the Patent Act, then the Court

should make the interpretation that supports progress to avoid the question of whether Congress overstepped their bounds.

The USPTO does not accept that an AI can be an “inventor.” (Appx000651) This holding is simply inconsistent with the Patent Act’s plain language, Congressional intent, and the Constitution. (Appx0755.) The District Court improperly endorsed an interpretation of the Patent Act that, for the first time, excludes an entire category of innovation from patent law protection. (Appx0755.) The result of which will be to discourage innovation, limit disclosure of trade secrets, and restrict commercialization of new products.

Thus, this Court should reverse the District Court’s errant interpretations and should accordingly vacate the summary judgment award and instead grant summary judgment in favor of Dr. Thaler and allow him to receive his patents.

VI. ARGUMENT - THE PATENT ACT DOES NOT REQUIRE THAT AN “INVENTOR” BE A HUMAN BEING

USPTO has taken an overly restrictive view of inventorship that defies the plain language and intent of the Patent Act and the Constitution. The Act does not specifically address AI-Generated Innovations, so the USPTO’s claim that the language of the statute is geared toward human inventors is simply inertia based on reading situations that never involved AI. Taking a holistic view of the Patent Act and analyzing the plain language of the statute by looking at the key terms, together with the intent of the Patent Act itself as well as the constitutional mandate to further “Progress,” it is clear that the Act does allow protection of AI-Generated Innovations.

A. Standard of Review

1. The Court of Appeals Reviews the District Court’s Decision De Novo

This Court reviews a grant of summary judgment by a district court *de novo* applying the same standard as the district court. *See e.g., Star Fruits S.N.C. v. United States*, 393 F.3d 1277, 1281 (Fed. Cir. 2005)¹; *Pellegrini v. Analog Devices, Inc.*, 375 F.3d 1113, 1115 (Fed. Cir. 2004) (a district court’s grant of summary judgment is reviewed *de novo*, reapplying the summary judgment standard); *Cortland Line Co., Inc.*, 203 F.3d 1351, 1355-56 (Fed. Cir. 2000). Here, Dr. Thaler challenged the USPTO decision pursuant to the APA, for which the ordinary summary judgment standard under Rule 56 of the Federal Rules of Civil Procedure applies. *See Star Fruits*, 393 F.3d at 1281.

The APA grants anyone “suffering a legal wrong because of agency action” the right of judicial review (5 U.S.C. § 702), with the reviewing court applying the legal standard enunciated in Section 706 of the APA:

[T]he reviewing court *shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of an agency action.* The reviewing court shall—
(2) hold unlawful and set aside agency action, findings, and conclusions founds to be –
(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law
(B) contrary to constitutional right, power, privilege or immunity;

¹ All internal alterations, quotation marks, footnotes and citations herein are omitted, and all emphasis is added unless otherwise noted.

- (C) in excess of statutory jurisdiction, authority, or limitations, or short of statutory right;
 - (D) without observance of procedure required by law:
- In making the foregoing determinations, the court shall review the whole record or those parts of it cited by a party....

5 U.S.C. § 706(2)(A)-(D).

In other words, a reviewing court has the duty to make an independent assessment as to whether an agency’s regulations are in excess of statutory jurisdiction or otherwise contrary to law.

Given that the Court of Appeals applies the same standard as the District Court, “the ordinary standard for summary judgment applies.” *Genetics & IVF Inst. v. Kappos*, 801 F. Supp. 2d 497, 502 (E.D. Va. 2011). The APA further “confines judicial review of executive branch decisions to the administrative record of proceedings before the pertinent agency.” *Id.* (citations omitted). “As such, there can be no genuine issue of material fact in an APA action, and the legal questions presented in [an APA] action are therefore ripe for resolution on cross-motions for summary judgment.” *Id.* (citing *Am. Forest Res. Council v. Hall*, 533 F. Supp. 2d 84, 89 (D.D.C. 2008) (quoting *Occidental Eng’g Co. v. INS*, 753 F.2d 766, 769–70 (9th Cir. 1985)). As the District of Columbia Circuit has stated, ‘when a party seeks review of agency action under the APA, the district judge sits as an appellate tribunal,’ and ‘[t]he ‘entire case’ on review is a question of law.’² *Genetics & IVF Inst.*, 801 F. Supp. 2d 497 at 502 (citing *Am. Bioscience, Inc. v. Thompson*, 269 F.3d 1077, 1083 (D.C. Cir. 2001).)

² It bears repeating therefore, that the issue of whether DABUS invented the Applications is assumed true. For purposes of this appeal, and the overall appeal of the USPTO determination, DABUS was capable of and did invent the Applications.

2. The Court of Appeals Does Not Give Any Deference to the USPTO's Decision

In challenges to an agency decision, as in this case, courts apply either *Chevron* deference, *Skidmore* deference, or no deference to the agency. *See PhotoCure ASA v. Kappos*, 603 F.3d 1372, 1376 (Fed. Cir. 2010). Deference under *Chevron* is due only to statutory interpretations made by agencies pursuant to a legislative delegation of rulemaking or similar authority. *See Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984). *Skidmore* deference is applied by the courts when an agency shows deliberation and serious consideration, which is respect proportional to its “power to persuade,” *Skidmore v. Swift & Co.*, 323 U.S. 134, 140.

a. *The USPTO Is Not Entitled to Chevron Deference*

This Circuit, and the Supreme Court, have already determined that the USPTO is not entitled to *Chevron* deference. *Merck & Co. v. Kessler*, 80 F.3d 1543, 1549-50 (Fed. Cir. 1996) (“Merck”) (holding that “the broadest of the PTO’s rulemaking powers ... does not grant the Commissioner the authority to issue substantive rules” and that “[t]hus, the rule of controlling deference set forth in *Chevron* does not apply” at 1550); *see, e.g., Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2118 (2013) (disagreeing with an argument “that the [US]PTO’s past practice of awarding gene patents is entitled to deference”); *Ass’n for Molecular Pathology v. U.S.PTO*, 689 F.3d 1303, 1357 (Fed. Cir. 2012) (Bryson, J., concurring in part dissenting in part) (“[T]he PTO lacks substantive rulemaking authority as to issues such as

patentability.”). Thus, “for a [US]PTO interpretation to prevail, Article III courts must be convinced that the interpretation is not only reasonable but should, in fact, be understood to be correct.” John M. Golden, *Working Without Chevron: The PTO as Prime Mover*, 65 DUKE L.J. 1657, 1673 (2016).

b. The USPTO Is Not Entitled to Skidmore Deference

The USPTO did not consider alternative interpretations, or statutory constructions, or the constitutional imperative in rejecting the Applications, failed to provide any evidence that Congress intended to exclude AI-Generated Inventions from patentability, and did not engage with the effects of their interpretation. (See Appx0343-352, Appx0594-603.) Therefore, USPTO is not entitled to *Skidmore* deference, *Skidmore v. Swift & Co.*, 323 U.S. 134 (1944), which looks to “the thoroughness of [the agency’s] consideration and the validity of its reasoning, i.e., its basic power to persuade if lacking power to control.” *Merck*, 80 F.3d at 1550.

The same reasoning that applied in *PhotoCure* applies in the case at bar to find that the USPTO is not entitled to *Skidmore* deference. *PhotoCure ASA v. Kappos*, 603 F.3d 1372, 1376 (Fed. Cir. 2010). In *PhotoCure*, the USPTO interpreted the term “active ingredient” to find that even though MAL hydrochloride was a new chemical compound, it was the “same product” as ALA hydrochloride because “ALA is simply formatted differently in the two different drugs,” and it denied a requested term extension on this basis *Id.* at 1375. The district court disagreed with the USPTO’s statutory interpretation, finding that the USPTO decision conflicted with and ignored the principle elucidated in a prior Federal Circuit case regarding a “separately patented

product requiring full regulatory approval.” *See id.* at 1376 (citing *Pfizer Inc. v. Dr. Reddy's Laboratories, Ltd.*, 359 F.3d 1361 (Fed.Cir.2004)). The Court then held that the USPTO was not entitled to *Skidmore* deference, since such interpretation contravened plain meaning of statute, had no case support, and found no legitimate support in legislative history, such that it was “neither persuasive nor consistent.” *Id.* The key for the Court, therefore, in reviewing the analysis as to *Skidmore* deference, is that it only applies to an agency decision that is consistent and persuasive, which can be disproved through inconsistency with case law, statutory language, or legislative history. *See id.*

As is fully explained in the Section VI, the “Argument,” *infra*, the decision by the USPTO flies in the face of precedents, the purpose of the Patent Act, and its legislative history, so “*Skidmore* deference is not warranted because the [US]PTO’s interpretation is neither persuasive nor consistent.” *Id.*

Accordingly, the USPTO’s interpretation of the legal issues in this case is also entitled to no deference.

In any event, “[e]ven if some level of deference were owed to the [US]PTO’s interpretation, neither *Chevron* nor *Skidmore* permits a court to defer to an incorrect agency interpretation.” *PhotoCure ASA v. Kappos*, 603 F.3d at 1376. Here, the USPTO’s reasoning is not only unpersuasive—it is manifestly incorrect. It also implicates questions of constitutionality that can simply be avoided.

B. The Statute’s Plain Language Supports AI-Generated Innovations

1. “Individual” and “Persons” Are Broad Terms Not Limited to Natural Persons, and In Their Plain Meaning Can Include Artificial Intelligence

In making its decision, the USPTO interpreted the law based on an outdated dichotomy where an individual exists only in contrast to collective groups of people or legal fictions like corporations. (See Appx0343-352, Appx0594-603.) In the Denials, the USPTO relied on the language in 35 U.S.C. §§ 100, 101, 102, 115, 116(c), 185, and 256(a that use the terms “person,” “individual,” “whoever,” “himself,” and “herself” to argue that the words either “suggest[] a natural person” or “uses pronouns specific to natural persons.” (Appx0346-350, Appx0597-601.) USPTO also cited to *U. of Utah v. Max-Planck-Gesellschaft Zur Forderung Der Wissenschaften E.V.* (“*Wissenschaften E.V.*”), 734 F.3d 1315, 1318 (Fed. Cir. 2013) and *Beech Aircraft Corp. v. EDO Corp.*, 990 F.2d 1237, 1244 (Fed. Cir. 1993). *Id.*

While corporations and state sovereigns may not qualify as inventors under existing case law, the broader conception of a “person” and an “individual” can include entities like AI. The courts’ decisions barring corporations and state sovereigns from patent registration does not apply to an AI, which is fundamentally different. Corporations are literally made up of persons and can only act through their agents, while an AI automates activity that would otherwise require human cognition. *See Commodity Futures Trading*

Com'n v. Weintraub, 471 U.S. 343, 348 (1985) [“... a corporation must act through agents.”]. (Appx0695-696.)

Thus, unlike with an AI, when a company files a patent application, it will always be the case that there is at least one natural person who qualifies as an inventor (at least, assuming it is not an application for an AI-Generated Invention.). Therefore, any discussion of inventors as “natural persons” in contrast to corporations, should not be read more broadly than the scope of the question presented to the courts. The Supreme Court examined how the term individual is analyzed to “distinguish between a natural person and a corporation,” but it never examined whether “individual” was used to distinguish between a natural person and an AI. *See Mohamad v. Palestinian Auth.*, 566 U.S. 449, 455 (2012).

While the word ‘individual’ can indeed refer solely to a natural person, as the Mohamad Court itself noted, “[t]his is not to say that the word ‘individual’ invariably means ‘natural person’ when used in a statute.” *Mohamad v. Palestinian Auth.*, 566 U.S. at 455. Justice Breyer, in concurrence, even went so far as to state, “[t]he word ‘individual’ is open to multiple interpretations, permitting it, linguistically speaking, to include natural persons, corporations, and other entities.” *Id.* at 462 (Breyer, J., concurring). Requiring “person,” “individual,” and other such words to always exclusively related to natural persons divorces them from the proper context necessary to interpret these terms.

No case states a general principle that language like “individual” or “person,” and subject pronouns must mean a human being, because similarly

anthropomorphized language can refer to entities that are not natural persons, and such language has been interpreted to include other entities. *See, e.g., Burwell v. Hobby Lobby Stores, Inc.*, 573 U.S. 682 (2014) (holding that the Religious Freedom Restoration Act, which prohibits Government from substantially burdening a “person’s” exercise of religion, applied to certain corporations); *see also FCC v. AT & T Inc.*, 562 U.S. 397, 404 (2011) (“We have no doubt that ‘person,’ in a legal setting, often refers to artificial entities. The Dictionary Act makes that clear.”); 1 U.S.C. § 1 (defining the words “person” and “whoever” to include “corporations, companies, associations, firms, partnerships, societies, and joint stock companies, as well as individuals.”).

The USPTO is being inconsistent on its face with its interpretation of this language, because the Patent Act itself, at 35 U.S.C. § 271(a), uses the term “whoever” to include entities other than natural persons. Infringing activity is not limited to natural persons. 35 U.S.C. § 271(a) (“Except as otherwise provided in this title whoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.”). According to USPTO, “whoever” means either a natural person or not a natural person, as its discretion. This is exactly the sort of inconsistency with the plain language of the statute that damages the USPTO’s credibility and precludes any deference. *See PhotoCure ASA v. Kappos*, 603 F. 3d at 1376.

Drawing an analogy from the copyright context, just as the terms “Writings” and “Authors” have been construed flexibly in interpreting the

Patent and Copyright Clause, so too should the term “Inventors” be afforded the flexibility needed to effectuate constitutional purposes. Indeed, under the work-for-hire doctrine, a corporation can be considered a legal author for copyright purposes. 17 U.S.C. § 101.

Setting aside plain language, USPTO has provided no evidence, case law, statutory law, or any other authority that would indicate that Congress intended to prohibit patents on AI-Generated Inventions. Simply because the issue has not been presented before should not form the basis to support a blanket prohibition on patent rights for new technological discoveries. *See* Karl F. Milde, Jr., *Can a Computer Be an “Author” or an “Inventor”?*, 51 J. PAT. OFF. SOC’Y 378, 379 (1969) (“The closest that the Patent Statute comes to requiring that a patentee be an actual person is in the use, in Section 101, of the term ‘whoever.’ Here too, it is clear from the absence of any further qualifying statements that the Congress, in considering the statute in 1952, simply overlooked the possibility that a machine could ever become an inventor.”). (Appx0696.)

2. There Is No “Conception” Requirement That Prohibits Patents On AI-Generated Inventions

Conception has been defined as “the complete performance of the mental part of the inventive act” and it is “the formation in the mind of the inventor of a definite and permanent idea of the complete and operative invention as it is thereafter to be applied in practice....” *Townsend v. Smith*, 36 F.2d 292, 295 (CCPA 1929). (Appx0697.)

It is an uncontested fact that DABUS’s output formed a definite and permanent idea of a complete and operative invention as it is thereafter to be applied in practice.³ Because the Applications are otherwise patentable and meet both enablement and written description requirements, the Applications sufficiently enable a person having ordinary skill in the art to make and use the inventions, so the Applications by necessity contain a definite and permanent idea of a complete and operative invention as it is thereafter to be applied in practice. *Hyatt v. Boone*, 146 F.3d 1348, 1352 (Fed. Cir. 1998) (“The filing of a patent application serves as conception and constructive reduction to practice of the subject matter described in the application.”). Because of this, “[an] inventor need not provide evidence of either conception or actual reduction to practice when relying on the content of the patent application.” MPEP § 2138.05. In addition, “reduction to practice can be done by another on behalf of the inventor.” *Id.* (Appx0697.)

The importance of conception (in the patent context) was primarily for establishing a priority date for purposes of interference proceedings, or antedating a prior art reference, under the first-to-invent system that existed prior to the Leahy-Smith America Invents Act (Public Law 112–29). *Hyatt*, 146 F.3d at 1351 (“The interference proceeding implements the principle of United States law that the right to a patent derives from priority of invention, not

³ As no natural person qualified as an inventor, DABUS is the only possible candidate to have conceived of the inventions. In the alternative, the USPTO could have allowed, or could now allow the applications to proceed without listing any inventor—however, listing an AI inventor is more consistent with the language and purpose of the Patent Act.

priority of patent application filing ... Thus, during an interference proceeding evidence may be presented of conception, reduction to practice, and diligence, as appropriate to the positions of the parties...). Therefore, conception was relevant to establishing priority of inventorship and thus ownership of a patent application—not as a basis for denying protection.

No case clearly defines what “formation in the mind” actually requires or means, much less in the context of an AI-Generated Invention. If conception is required for an invention, it is unclear under existing law whether an AI would have to engage in a process that results in inventive output—which it can do—or whether, and to what extent, it would need to mimic human thought. If the latter, it is unclear what the purpose of such a requirement would be except to exclude nonhumans (for which a convoluted test is unnecessary).

More importantly, should conception block inventorship, it would be an unwelcome resurrection of the Flash of Genius doctrine that Congress abolished in 1952. This doctrine required that to own a patent, the invention “however useful it may be, must reveal the flash of creative genius, not merely the skill of the calling.” *Cuno Eng’g Corp. v. Automatic Devices Corp.*, 314 U.S. 84, 91 (1941). The Court required an inventor design an invention in a “flash of genius” rather than as a result of “long toil and experimentation.” *Graham v. John Deere Co. of Kansas. City*, 383 U.S. 1, 15 (1966). (Appx0699.)

Congress intentionally rejected this requirement when it drafted the current version of the Patent Act, stating explicitly that “[p]atentability shall not be negated by the manner in which the invention was made.” 35 U.S.C. § 103; *see also Graham* 383 U.S. at 17, n. 8 (“The second sentence states that

patentability as to this requirement is not to be negated by the manner in which the invention was made, that is, it is immaterial whether it resulted from long toil and experimentation or from a flash of genius.”). The current law is that it does not matter how an invention was made, and courts have gone so far as to hold that “[t]he process by which an invention is created is irrelevant to the analysis of its patentability.” *Dey, L.P. v. Teva Parenteral Medicines, Inc.*, 6 F. Supp. 3d 651, 677 (N.D.W. Va. 2014).

Both the literal language and the purpose of 35 U.S.C. § 103 hold that patentability of AI Generated Inventions should be based on the inventiveness of an AI’s output not thought exercises geared toward the legally irrelevant question of how an invention was made. The Court should seek “to give effect to the intent of Congress.” *United States v. Am.Trucking Ass’ns, Inc.*, 310 U.S. 534, 542 (1940). Here, the intent of Congress was to create a system that would encourage innovation, as well as to promote disclosure of information and commercialization of new technologies. The Patent Act explicitly requires this *regardless of how that innovation is generated*.

C. Granting the Patents to Dr. Thaler for His AI-Generated Inventions Is Consistent with Congressional Intent

“[T]he fundamental purposes of the patent law [are] to encourage inventions, their disclosure, and their commercialization...” *Application of Sarkar*, 588 F.2d 1330, 1332 (CCPA 1978). The Courts have previously made broad interpretations of the statute, in line with the “broad language” used by Congress to ensure these aims. *See id.*

“The primary purpose of our patent system is not reward of the individual but the advancement of the arts and sciences. Its inducement is directed to disclosure of advances in knowledge which will be beneficial to society; it is not a certificate of merit, but an incentive to disclosure.” *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 330–331 (1945). An AI does not care for merit, but the disclosure of its inventions certainly furthers progress, so it stands to reason that AI output should be patentable because the “public purpose of the patent grant as an incentive to invention, investment, and disclosure, is achieved solely by the statutory right to exclude.” *See Abbott Laboratories v. Brennan*, 952 F.2d 1346, 1355 (Fed. Cir. 1991).

Patents also benefit the public, by design, through the disclosure of information that otherwise qualifies for trade secret protection. *AK Steel Corp. v. Sollac*, 344 F.3d 1234, 1244 (Fed. Cir. 2003) (“[A]s part of the *quid pro quo* of the patent bargain, the applicant's specification must enable one of ordinary skill in the art to practice the full scope of the claimed invention.”). It would run contrary to the purpose of the patent system to only allow an AI’s owner to own AI output as a trade secret but not to encourage the information’s disclosure in return for patent protection.

Finally, the patent system encourages commercialization. As explained Judge Newman in this Court, “[T]he premise of the patent system is that an inventor, having taught the world something it didn't know, is encouraged to make the product available for public and commercial benefit, by governmental grant of the right to exclude others from practice of that which the inventor has

disclosed.” *In re Wands*, 858 F.2d 731, 741 (Fed. Cir. 1988) (Newman, J, concurring).

Under section 101 of the Patent Act, “any new and useful process, machine, manufacture, or composition of matter” is patentable. Yet, under the USPTO’s analysis, new and useful processes are excluded from protection depending on how AI is used in research and development. This frustrates Congressional intent, and thus leads to an illogical result viewing the statute as a whole. *See e.g., King v. Burwell*, 576 U.S. 473, 498 (2015) (explaining that the plain language of the statute must be considered in the context of the statute as a whole and taking into account that a narrow literal interpretation would result in outcomes inconsistent with Congressional intent, holding that “Congress passed the Affordable Care Act to improve health insurance markets, not to destroy them. If at all possible, we must interpret the Act in a way that is consistent with the former and avoids the latter.”).

Interpreting statutory language to advance the statute’s purpose is particularly warranted in instances where, as in the present case, there is no evidence that Congress anticipated and legislated for the specific circumstances at issue. *See, e.g., Yates v. United States*, 574 U.S. 528, 532 (2015) (holding a fish is not a “tangible object,” as that term is used in 18 U.S.C. § 1519). The Supreme Court explained its reasoning to not consider a fish a tangible object in this context given the purpose of the statute: “A fish is no doubt an object that is tangible; fish can be seen, caught, and handled, and a catch, as this case illustrates, is vulnerable to destruction. But it would cut § 1519 loose from its financial fraud mooring to hold that it encompasses any and all objects,

whatever their size or significance, destroyed with obstructive intent. Mindful that in Sarbanes–Oxley, Congress trained its attention on corporate and accounting deception and cover-ups, we conclude that a matching construction of § 1519 is in order: A tangible object captured by § 1519, we hold, must be one used to record or preserve information.”). *Id.* (Appx0690-691.)

In *Diamond v. Chakrabarty*, the Supreme Court was charged with deciding whether genetically modified organisms could be patented. 447 U. S. 303, 317 (1980). The Court held that a categorical rule denying patent protection for “inventions in areas not contemplated by Congress . . . would frustrate the purposes of the patent law.” *Id.* at 315. The Court noted that Congress chose expansive language to protect a broad range of patentable subject matter, including those that had not or could not have been foreseen. *Id.* at 316 (“Congress employed broad general language in drafting § 101 precisely because such inventions are often unforeseeable.”). As technology has advanced, patent law has historically evolved to accommodate and further encourage such advances. *See id.* at 315. (“[A] statute is not to be confined to the ‘particular application[s]...contemplated by the legislators.’”) (quoting *Barr v. United States*, 324 U.S. 83, 90 (1945).

Plaintiff as the developer, user, and owner of DABUS, is entitled to own DABUS’ output under, *inter alia*, the common law doctrines of accession and first possession. *See generally* Thomas W. Merrill, *Accession and Original Ownership*, JOURNAL OF LEGAL ANALYSIS, 459-505 (2009). In the same way that one who owns a tree owns the fruit of that tree, DABUS is personal

property owned by Plaintiff and so Plaintiff is entitled to own DABUS's output.⁴

If DABUS had been a 3D-printer owned and used by Dr. Thaler, and it generated a physical beverage container, Dr. Thaler would own that container by virtue of owning DABUS. Similarly, if DABUS invents a new design for a beverage container, Dr. Thaler is entitled to own that design and any patents on that design. There is no other entity in this case better situated to own the Applications than Dr. Thaler. Indeed, Plaintiff owned the Neural Flame and Fractal Container as trade secrets prior to publication of the Applications.

Other countries have considered these issues and found that allowing patents on AI-Generated Inventions accomplishes all of the goals of the patent system. On June 28, 2021, the South African Companies and Intellectual Property Commission granted Dr. Thaler a patent on the South African version of the Applications with DABUS listed as the inventor.⁵ Three days later, the Federal Court of Australia, in evaluating the patentability of foreign analogs of the Applications under Australian law, held in an extensive reasoned decision that 1) AI-Generated Inventions are patentable, 2) an AI can be an inventor for purposes of patent law, 3) no entity has a superior claim than Dr. Thaler to the inventions created by the AI he created, curates, and controls. *Thaler v.*

Commissioner of Patents [2021] FCA 879 issued on 30 July 2021 (¶ 226)

(available at

⁴ No party has ever argued as part of this case, or in any jurisdiction, that DABUS should have ownership rights.

⁵ Patent ZA2021/03242

(https://iponline.cipc.co.za/Publications/PublishedJournals/E_Journal_July%202021%20Part%202.pdf (page 255)).

<https://www.judgements.fedcourts.gov.au/judgements/Judgments/fca/single/2021fca0879>.) The Australian judgment is currently under appeal.⁶

The Federal Court of Australia has looked at the issue and made conclusions regarding the practical effects of the law whose underlying logic applies just as strongly to the USPTO’s decision and the Patent Act in the United States.

The Federal Court of Australia was able to cut to the heart of the matter first looking at two distinct questions of “ownership . . . on the one hand, [and] the question of who can be an inventor, on the other hand.” *Id.* at ¶ 12. A machine inventor would have no impact on the practical realities of ownership of a patent, it would simply create an honest discourse in the patent system.

The Federal Court of Australia, in looking at terms like inventor, and their usual usage to mean a human person, relied on the words of Justice Holmes, who explained words are not “crystal[s], transparent and unchanged, [but] the skin of a living thought and may vary greatly in colour and content according to the circumstances and the time in which [they] are used.” *Id.* at ¶ 15 (quoting *Towne v Eisner*, 245 US 418, 425 (1918)) This can be seen in words similar to “inventor” where a computer once meant a human who computes, and now refers primarily to machines.

The same nuts and bolts of the analysis apply to the Patent Act here. For instance, the word “inventor” as an “agent noun” can refer to any number of inanimate things, such as computers and lawnmowers. *Id.* at ¶ 120. From this,

⁶ Foreign analogs of the Applications have been denied by the United Kingdom Intellectual Property Office, European Patent Office (EPO), and German Patent and Trademark Office. However, the United Kingdom and German denials are under judicial review, and the EPO denial is under administrative appeal.

the Federal Court of Australia determined that “it is consistent with the object of the Act to construe the term “inventor” in a manner that promotes technological innovation and the publication and dissemination of such innovation by rewarding it, irrespective of whether the innovation is made by a human or not.” *Id.* at ¶ 124.

As the Court found, “it is quite undesirable to preclude a class of otherwise patentable inventions from patentability on the basis of an exclusion that is not apparent from the express words of the Act. Indeed, that would be the antithesis of promoting innovation.” *Id.* at ¶ 132. The USPTO’s determination runs into this exact problem. The Federal Court of Australia was able to resolve this issue quite simply, noting that “you would substantively preclude the possibility of a patent grant for that invention.” *Id.* at ¶ 13. As discussed in this Section this leads to a disincentive to create, in clear contravention of the purpose of the Patent Act, which is similar to the one espoused in Australia. *See id.*

Likewise, the Federal Court of Australia determined that “recognising computer inventors and patents on computational inventions could promote disclosure and commercialization,” the two other primary goals of the Patent Act shared with the Australian law. *Id.* at ¶ 130. The Court made the common sense conclusion that “Without the ability to obtain patent protection, owners of creative computers might choose to protect patentable inventions as trade secrets without any public disclosure.” *Id.*

D. The Constitutional Avoidance Canon of Construction Supports Granting Patents for AI-Generated Innovations

Article I, Section 8, Clause 8 of the Constitution gives Congress the power to “*To promote the progress of science and useful arts*, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.” For this reason, the Supreme Court has held that “[t]he patent standard is basically constitutional.” *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 61 (1969); *See also Application of CCPA 967* (1951) (explaining that the constitutional grant of authority to issue patents “is the only one of the several powers conferred upon the Congress which is accompanied by a specific statement of the reason for it.”).

The Patent Clause “is both a grant of power and a limitation” on what Congress can do. *See Graham v. John Deere Co.*, 383 U.S. 1, 5 (1966). As further explained in *Graham*, “[i]nnovation, advancement, and things which add to the sum of useful knowledge are inherent requisites in a patent system which by constitutional command must ‘promote the Progress of . . . useful Arts.’ This is the standard expressed in the Constitution and it may not be ignored. And it is in this light that patent validity requires reference to a standard written into the Constitution.” *Id.* at 6 (internal quotations and citation omitted). In *Graham*, the ultimate ruling was that it would stymie innovation to patent inventions already in public domain, but the exact same reasoning that led to this conclusion applies here, as holding back patents from AI-Generated Inventions will also harm Progress.

The only statutory interpretation that is clearly consistent with the Founders' intent is to allow for the ownership of patents in AI-Generated inventions. "The canon of constitutional avoidance provides that '[w]hen 'a serious doubt' is raised about the constitutionality of an act of Congress,' courts should 'first ascertain whether a construction of the statute is fairly possible by which the question may be avoided.'" *Veterans4You LLC v. United States*, 985 F.3d 850, 860-61 (Fed. Cir. 2021) (citations omitted). The first question is therefore whether the interpretation of the statute is reasonably possible. As discussed, *supra*, Section VI.B, at minimum the terms "individual," "person," and related pronouns are ambiguous in the Patent Act.

Allowing patents on AI-Generated Inventions would not upset an existing policy, and instead would be in line with the constitutional mandate to encourage progress. It would also clarify the permissibility of future patent applications rather than retroactively invalidating previously granted patents. By contrast, excluding an entire cutting-edge class of inventions from patentability would undermine the patent system as warned against by the Supreme Court in *Diamond v. Chakrabarty*, because the "inventions most benefiting mankind are those that 'push back the frontiers of chemistry, physics, and the like.'" *Diamond v. Chakrabarty*, 447 U. S. at 316 (quoting *Great A. & P. Tea Co. v. Supermarket Corp.*, 340 U.S. 147, 154 (1950) (Douglas, J., concurring)). Given the potential of AI to surpass the limits of human ingenuity, it may even be the case that AI-Generated Inventions one day become the primary source of innovation. Ryan Abbott, *Everything is Obvious*, 66 UCLA. L. REV. 2, *8 (2019). (Appx0691.)

VII. CONCLUSION

For the foregoing reasons, this Court should reverse the District Court's decision and remand the case for further proceedings, or, in the alternative, deny the Defendants-Appellees' motion for summary judgment and grant Plaintiff-Appellant's motion for summary judgment.

Dated: December 8, 2021

Respectfully Submitted,

/s/ Ryan Abbott

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ADDENDUM

PTO/AIA/96 (08 12)

Approved for use through 01/31/2013. OMB 0651 0031
 U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stephen L. Thaler

Application No./Patent No.: _____ Filed/Issue Date: _____

Titled: DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Stephen L. Thaler, a individual

(Name of Assignee) (Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

- 1. The assignee of the entire right, title, and interest.
- 2. An assignee of less than the entire right, title, and interest (check applicable box):
 - The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
 - There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are: _____

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

- 3. The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are: _____

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

- 4. The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

- 1. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- 2. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313 1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1 800 PTO 9199 and select option 2.

PTO/AIA/96 (08 12)
Approved for use through 01/31/2013. OMB 0651 0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
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4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Reuven K. Mouallem/

29 July 2019

Signature

Date

Reuven K. Mouallem, Patent agent

63345

Printed or Typed Name

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

BRN"W



ASSIGNMENT

DABUS, the Creativity machine that has produced the below-detailed invention, as the sole inventor (represented in this Assignment by its owner, Stephen L. Thaler, hereinafter called the "Assignor"), hereby assigns and transfers to:

Stephen L. Thaler
1767 Waterfall Dr., St. Charles, MO 63303

(hereinafter called the "Assignee"), its successors, assignees, nominees, or other legal representatives, the Assignor's entire right, title, and interest, including, but not limited to, copyrights, trade secrets, trademarks and associated good will and patent rights in the invention and the registrations to the invention entitled:

"DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION"

described and claimed in the following patent application: US Non-Provisional Patent Application identified as FlashPoint IP attorney docket No. 50567-3-01-US PB, to be filed with the USPTO; including any and all inventions and improvements ("Subject Matter") disclosed therein, all right of priority in the above application(s) and in any underlying provisional or foreign application, including but not limited to the rights of priority to applications already filed in the EPO and UK, all provisional, utility, divisional, continuation in whole or in part, substitute, renewal, reissue, and all other applications, PCT and national phase entries, related thereto which have been or may be filed in any jurisdiction, and all patents, including reissues, extensions and reexaminations, which may be granted on any of the above applications, the priority rights under International Conventions, and the Letters Patent which may be granted thereon, together with all rights to recover damages for infringement, including infringement of provisional rights.

Assignor agrees that Assignee may apply for and receive patents for Subject Matter in Assignee's own name. Assignor represents that Assignor has the rights, titles, and interests to convey as set forth herein, and covenants with Assignee that Assignor has not made and will not make any other assignment, grant, mortgage, license, or other agreement affecting the rights, titles, and interests herein conveyed.

In view of the fact that the sole inventor is a Creativity Machine, with no legal personality or capability to execute said assignment, and in view of the fact that the assignee is the owner of said Creativity Machine, this Assignment is considered enforceable without an explicit execution by the inventor. Rather, the owner of DABUS, the Creativity Machine, is signing this Assignment on its behalf.

Similarly, DABUS, being a machine and having no legal personality, does not have the capability to receive any consideration, and therefore, Stephen L. Thaler, as its owner/representative, acknowledges the receipt and sufficiency of good and valuable consideration for this assignment.

Signed and sealed this 23rd day of July 2019,

Stephen L. Thaler
Stephen L. Thaler
On behalf of DABUS,
Assignor

Stephen L. Thaler
Stephen L. Thaler
Assignee

• FlashPoint IP • Where Volatile Ideas Ignite •

- Dr. Reuven K. Manaltem, LL.M. • IP Management Consultant/Strategic Advisor •
- Registered Foreign Patent Attorney • Registered U.S. Patent Agent • e-mail: rkm@FlashPointIP.com •
- website: www.FlashPointIP.com • LinkedIn: www.Linkedin.com/in/FlashPointIP •
- tel: 972-3-936-3199 (IL line)/972-52-761-8228 (IL cell)/1-816-301-1648 (US Bue) •

- Circumstances permitting execution of this substitute statement: **Inventor is under legal incapacity in view of the fact that the sole inventor is a Creativity Machine (i.e., an artificial intelligence), with no legal personality or capability to execute this substitute statement.**
- Person executing this substitute statement is the Applicant and the Assignor of the abovementioned application, as well as the owner of said Creativity Machine, DABUS; namely: **Stephen L. Thaler, 1767 Waterfall Dr., St. Charles, MO 63303 USA.**

.....
Signed this 23rd day of July 2019


STEPHEN L. THALER

PTO/AIA/96 (97-17)

Approved for use through 03/31/2021, OMB 0651-0035

U.S. Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number: _____

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number
Dr. Reuven K. Mouallem, LL.M.	63345		
Dr. Ryan B. Abbott	68178		

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number: **89602**

OR

Firm or individual name: _____

Address: _____

City: _____ State: _____ Zip: _____

Country: _____

Telephone: _____ Email: _____

Assignee name and address: **Stephen L. Thaler
1767 Waterfall Dr., St. Charles, MO 63303**

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature: Stephen L. Thaler Date: 24 July 2019

Name: Stephen L. Thaler Telephone: (314) 378-5406

Title: Applicant/Assignee

This collection of information is required by 37 CFR 1.331, 1.332, and 1.333. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 322 and 37 CFR 1.331 and 1.334. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FILES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-FIDO-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76 Attorney Docket Number 50567 3 01 US
 Application Number

Title of Invention | DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove
 Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	DABUS		Invention generated by artificial intelligence	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City		State/Province	Country of Residence	

Mailing Address of Inventor:

Address 1	1767 Waterfall Dr.		
Address 2			
City	St. Charles	State/Province	MO
Postal Code	63303	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

An Address is being provided for the correspondence information of this application.

Customer Number	89602		
Email Address	ydm@FlashPointIP.com	Add Email	Remove Email
Email Address	ikm@FlashPointIP.com	Add Email	Remove Email
Email Address	dryanabbott@gmail.com		Remove Email

Application Information:

Title of the Invention	DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION		
Attorney Docket Number	50567 3 01 US	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	2

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Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 3 01 US

Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM DD)	Intellectual Property Authority or Country
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Publication Information:

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under

35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not be** the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One: Customer Number US Patent Practitioner Limited Recognition (37 CFR 11.9)

Prefix	Given Name	Middle Name	Family Name	Suffix	
Dr	Reuven	K.	Mouallem		<input type="button" value="Remove"/>
Registration Number 63345					
Prefix	Given Name	Middle Name	Family Name	Suffix	
Dr	Ryan	B.	Abbott		<input type="button" value="Remove"/>
Registration Number 68178					

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

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Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 3 01 US

Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Prior Application Status	Pending			<input type="button" value="Remove"/>
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
18275174.3	EP	2018 11 07	

Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ^j (if applicable)
1818161.0	GB	2018 11 07	

Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 3 01 US

Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76 Attorney Docket Number 50567 3 01 US
 Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

- Assignee Legal Representative under 35 U.S.C. 117 Joint Inventor
- Person to whom the inventor is obligated to assign. Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

If the Applicant is an Organization check here.

Prefix	Given Name	Middle Name	Family Name	Suffix
	Stephen		Thaler	

Mailing Address Information For Applicant:

Address 1	1767 Waterfall Dr.		
Address 2			
City	St. Charles	State/Province	MO
Country	US	Postal Code	63303
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 3 01 US

Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

Assignee 1

Complete this section if assignee information, including non applicant assignee information, is desired to be included on the patent application publication. An assignee applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here.

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1				
Address 2				
City		State/Province		
Country		Postal Code		
Phone Number		Fax Number		
Email Address				

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a juristic entity (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Reuven K. Mouallem/		Date (YYYY-MM-DD)	2019 07 24	
First Name	Reuven	Last Name	Mouallem	Registration Number	63345

Additional Signature may be generated within this form by selecting the Add button.

PTO/AIA/14 (02 18)

Approved for use through 11/30/2020. OMB 0651 0032

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 3 01 US

Application Number

Title of Invention DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313 1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

APPLICATION FOR PATENT

Title: DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

5 CROSS REFERENCE TO RELATED APPLICATIONS

This patent application claims priority under 35 USC §119(a)-(d) and (f), §172, §365(a) and (b), §386(a) and (b), and/or 37 USC CFR 1.55 to UK Patent Application No. 1818161.0, filed November 7, 2018, and European Patent Application No. 18275174.3, filed November 7, 2018, which are hereby incorporated by reference in their entirety.

10

FIELD AND BACKGROUND OF THE INVENTION.

The present invention relates to devices and methods for attracting enhanced attention. More specifically, the present invention relates to beacons for sustaining enhanced interest/attention, as well as to beacons with symbolic importance.

15

In the prior art, signal indicators and beacons are typically based upon color, brightness, periodic flashing frequency, rotational pattern, and motion, but not fractal dimension.

20

Both cognitive studies and simulations of the brain's limbo-thalamocortical system via artificial neural nets have shown that original ideas produced within the brain's stream of consciousness occur at a specific rhythm, typically near 4 hertz and a fractal dimension of approximately $\frac{1}{2}$ (see Literature References below: Thaler, 1997b, 2013, 2014, 2016a, b, 2017b). An interval of 300 ms (~ 4 Hz) has been referred to as the "speed of thought" (Tovée 1994).

In the referenced body of theoretical work of Thaler, the brain's thalamic reticular nucleus (TRN) is modeled as a constantly adapting auto-associative neural net (i.e., an anomaly or novelty detector), for which such ideational rhythms are the most noticeable due to their sporadic and unpredictable nature. Essentially, neural activation patterns within the cortex are thought to emit a telltale 'beacon' to the thalamus when they are generated within a stream having the above said frequency and fractal signature. Furthermore, these sporadic cognitive streams generally correspond to novel pattern formation and are considered the signature of inventive ideation.

It was also shown (Thaler 2016a) that the TRN's behavior as an anomaly detector was linked to creative thinking and enhanced attention in forming useful ideational patterns as stated in the following passage: "In the former case, creative achievements are the result of convergent thinking processes, requiring the attention of critic nets on the lookout for sporadic activations within the cortex that signal the formation of novel and potentially useful ideational patterns [3]. With non-linear stimulus streams present in the external environment (i.e., sporadic events such as the two audible clicks used in EEG studies to measure so-called P50 response), the attention of critic nets selectively shifts to these sporadic external event streams [3,14] dominating within cortex, rather than mining the weaker, internally seeded stream of consciousness for seminal thought."

In another publication (Thaler 2016b), frequency and fractal dimension were shown to be indicative of the relation between attention, ideation novelty, and such thought-process characteristics: "The search for a suitable affordance to guide such attention has revealed that the rhythm of pattern generation by synaptically perturbed neural nets is a quantitative indicator of the novelty of their conceptual output, that cadence in turn characterized by a

frequency and a corresponding temporal clustering that is discernible through fractal dimension.”

Regarding human response to light modulation, the Color Usage Lab of the NASA Ames Research Center published related information dealing with “Blinking, Flashing, and
5 Temporal Response” (https://colorusage.arc.nasa.gov/flashing_2.php), stating the following: “The rate of flashing has a powerful influence on the salience of flashing elements. The human eye is most sensitive to frequencies of 4-8 Hz (cycles/second). Very slow and very fast blinking are less attention-demanding than rates near that peak.”

A proposed approach based on the effects of fractal flickering of light stimuli was
10 previously published (Zueva 2013). Fractal flickering exhibits scale invariance with time on the evoked responses of the retina and visual cortex in normal and neurodegenerative disorders. In the proposed approach, standard stimuli are presented to patients who adapt to a flickering background with “specific chaotic interval variabilities between flashes (dynamic light fractal).” It was hypothesized that such an approach could be applied to
15 facilitate adaptation to non-linear flickering with fractal dimensions in electrophysiological diagnostics.

Finally, in an article (Williams 2017) entitled, “Why Fractals Are So Soothing,” related to fractal patterns in the paintings of Jackson Pollock, the physiological response to viewing images with fractal geometries having a fractal dimension of between 1.3 and 1.5
20 was suggested to be an “economical” means for the eye-tracking mechanism of the human visual system to simplify processing image content.

The ability to exploit fractal flickering for visual evoked responses (as in the approach described in Zueva 2013), or to detect a visually fractal image (as in the studies in Williams 2017) relate to visual and image processing.

It would be desirable to have devices and methods for attracting enhanced attention. Such devices and methods would, *inter alia*, provide unique advantages over the prior art mentioned above.

5

SUMMARY

The present invention seeks to provide devices and methods for attracting enhanced attention.

10 It is noted that the term “exemplary” is used herein to refer to examples of embodiments and/or implementations, and is not meant to necessarily convey a more-desirable use-case. Similarly, the terms “alternative” and “alternatively” are used herein to refer to an example out of an assortment of contemplated embodiments and/or implementations, and is not meant to necessarily convey a more-desirable use-case.
15 Therefore, it is understood from the above that “exemplary” and “alternative” may be applied herein to multiple embodiments and/or implementations. Various combinations of such alternative and/or exemplary embodiments are also contemplated herein.

Embodiments of the present invention provide a method for producing and providing a pulse train to an LED or lamp at a frequency and fractal dimension that is highly noticeable
20 to humans, being the same rhythm with which original ideas are formed and recognized in both the brain and advanced Creativity Machines. A light source driven in such a manner may serve as an emergency beacon within environments filled with distracting light sources that are flickering randomly or periodically. Ease of detection may be improved using auto-associative neural nets as anomaly detectors within a machine-vision algorithm.

Thus, using TRN behavior as an anomaly filter in sustained creative activity and mental focus as detailed above in the context of the works of Thaler, the present invention exploits such a concept by embodying the same requisite characteristics (i.e., frequency and fractal dimension) in a signaling device in order to trigger the brain's innate ability to filter sensory information by "highlighting" certain portions in order to make those portions more noticeable to the brain.

That is, a single light-emitting element flashing at such a prescribed frequency is highly noticeable when viewed through anomaly detectors built from artificial neural networks. The sporadic nature of such pulse streams defeats the anomaly filter's ability to both learn and anticipate their rhythm, making said light pulses visible as anomalies. Additionally, in contrast to pulse trains, having fractal dimensions less than $\frac{1}{2}$, the prescribed rhythms have sufficient frequency to catch the attention of a roving attention window, as when humans are shifting their attention across widely separated portions of a scene. If the detection system can calculate the fractal dimension of the anomalous light sources within the filtered scene, the "neural flame" may be used as an emergency beacon that discriminates itself from other alternating light sources within the environment.

Even to the naked eye, and without the use of an anomaly detector, fractal dimension $\frac{1}{2}$ pulse streams preferentially attract the attention of human test subjects. The most attention-grabbing aspect of such streams is that the 'holes' or lacunarity between pulses occur as anomalies in what would otherwise be a linear stream of events. In other words, the pattern is frequently broken, such anomalous behavior possibly being detected by the TRN within the human brain as inconsistencies in the established arrival trend of visual stimuli. In contrast, should fractal dimension drop significantly below $\frac{1}{2}$, the frequency of anomalous

pulses drops, making them less noticeable to humans should either attention or gaze be wandering.

The incorporation of a “fractal rhythm” into a signal beacon, having a spatial fractal dimension near zero and a temporal delivery of a fractal dimension near $\frac{1}{2}$, relates to
5 exploiting the understanding of TRN behavior, thereby avoiding aspects of visual and image processing as contributing elements.

Embodiments of the present invention further provide a symbol celebrating the unique tempo by which creative cognition occurs. The algorithmically-driven neural flame may be incorporated within one or more structures that resemble candles or altar fixtures,
10 for instance, to accentuate the light’s spiritual significance. It is noted that that the light source or beacon can incorporate any type of light-emitting device.

Such embodiments stem from the notion of one perceiving neural net monitoring another imagining net, the so-called “Creativity Machine Paradigm” (Thaler 2013), which has been proposed as the basis of an “adjunct” religion wherein cosmic consciousness,
15 tantamount to a deity, spontaneously forms as regions of space topologically pinch off from one another to form similar ideating and perceiving pairs, each consisting of mere inorganic matter and energy. Ironically, this very neural paradigm has itself proposed an alternative use for such a flicker rate, namely a religious object that integrates features of more traditional spiritual symbols such as candles and torches.

20 Moreover, in a theory of how cosmic consciousness may form from inorganic matter and energy (Thaler, 1997a, 2010, 2017), the same attentional beacons may be at work between different regions of spacetime. Thus, neuron-like, flashing elements may be used as philosophical, spiritual, or religious symbols, especially when mounted atop candle- or torch-like fixtures, celebrating what may be considered deified cosmic consciousness. Such

a light source may also serve as a beacon to that very cosmic consciousness most likely operating via the same neuronal signaling mechanism.

Therefore, according to aspects of the present invention, there is provided for the first time a device for attracting enhanced attention, the device including: (a) an input signal of a
5 lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half; and (b) at least one controllable light source configured to be pulsatingly operated by the input signal; wherein a neural flame emitted from at least one controllable light source as a result of the lacunar pulse train is adapted to serve as a uniquely-identifiable signal beacon over potentially-
10 competing attention sources by selectively triggering human or artificial anomaly-detection filters, thereby attracting enhanced attention.

Alternatively or additionally, the device further includes: (c) a processor for supplying the input signal of the lacunar pulse train having the characteristics; and (d) a digital-to-analog (D/A) converter for transmitting the input signal to at least one controllable
15 light source.

More alternatively or additionally, the D/A converter is an onboard module of the processor, and wherein the module is embodied in at least one form selected from the group consisting of: hardware, software, and firmware.

More alternatively or additionally, the processor includes a thresholding unit for
20 monitoring a random-walk trace for trace-axis crossings of a firing threshold of the thresholding unit, and wherein the trace-axis crossings result in activation transitions to generate pulse-activation sequences of the lacunar pulse train.

More alternatively or additionally, candidates of the pulse-activation sequences are filtered based on a zeroset dimension, and wherein the candidates are filled into a buffer of selected sequences having a fractal dimension of approximately one-half.

5 More alternatively or additionally, filtered patterns are randomly withdrawn from the selected sequences in the buffer, and wherein the filtered patterns are configured to serve as the input signal to the D/A converter for transmitting to at least one controllable light source.

Most alternatively or additionally, the filtered patterns are generated onboard the processor.

10 Alternatively or additionally, the uniquely-identifiable signal beacon reduces distraction by providing a preferential alert over the potentially-competing attention sources.

Alternatively or additionally, the neural flame serves as an object of contemplative focus embodying symbolic meaning of varying significance.

15 According to aspects of the present invention, there is provided for the first time a method for attracting enhanced attention, the method including the steps of: (a) generating a lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half; (b) transmitting the input signal to at least one controllable light source; and (c) pulsatingly operating at least one controllable light source to produce a neural flame emitted from at least one controllable light source as a result of the lacunar pulse train is adapted to serve as a uniquely-identifiable
20 signal beacon over potentially-competing attention sources by selectively triggering human or artificial anomaly-detection filters, thereby attracting enhanced attention.

Alternatively or additionally, the method further includes the step of: (d) monitoring a random-walk trace for trace-axis crossings of a firing threshold, and wherein the trace-axis

crossings result in activation transitions to generate pulse-activation sequences of the lacunar pulse train.

More alternatively or additionally, the method further includes the steps of: (e) filtering candidates of the pulse-activation sequences based on a zerset dimension; and (f) filling the candidates into a buffer of selected sequences having a fractal dimension of approximately one-half.

Most alternatively or additionally, the method further includes the steps of: (g) randomly withdrawing filtered patterns from the selected sequences in the buffer; and (h) using the filtered patterns as the input signal.

Alternatively or additionally, uniquely-identifiable signal beacon reduces distraction by providing a preferential alert over the potentially-competing attention sources.

Alternatively or additionally, neural flame serves as an object of contemplative focus embodying symbolic meaning of varying significance.

These and further embodiments will be apparent from the detailed description and examples that follow.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is herein described, by way of example only, with reference to the accompanying drawings, wherein:

Figure 1 is a simplified high-level schematic diagram depicting a neural-flame device for attracting enhanced attention, according to embodiments of the present invention; Figure 2 is a simplified flowchart of the major process steps for operating the neural-flame device of Figure 1, according to embodiments of the present invention;

Figure 3 depicts a trace of the time evolution of input to a neuron-like thresholding unit of the neural-flame device of Figure 1, according to embodiments of the present invention;

5 Figure 4 depicts a video stream for detecting fractal beacons within a generalized scene from the neural-flame device of Figure 1, according to embodiments of the present invention.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS

The present invention relates to devices and methods for attracting enhanced
10 attention. The principles and operation for providing such devices and methods, according to aspects of the present invention, may be better understood with reference to the accompanying description and the drawings.

Referring to the drawings, Figure 1 is a simplified high-level schematic diagram depicting a neural-flame device for attracting enhanced attention, according to embodiments
15 of the present invention. A neural-flame device **2** includes a support **4** serving as a beacon or an imitation candle, which may be configured to accommodate the needs of the application (regarding physical dimensions) such as an emergency alert or as an object of contemplative focus embodying varying significance.

Neural-flame device **2** has a controllable light source **6** (e.g., an LED component)
20 with an optional translucent cover **8**, which can be shaped like a neuron's cell body or soma. Controllable light source **6** can incorporate any type of light-emitting device. Neural-flame device **2** includes a base **10** housing an optional digital-to-analog (D/A) converter (D/A module **12**) and an input connector **14** for supplying a digital input signal for driving controllable light source **6** with the required voltage sequence at a frequency corresponding

to approximately 4 Hz and a fractal dimension near $\frac{1}{2}$. It is noted that D/A module 12 can be implemented as hardware, software, and/or firmware as an integral component of a dedicated processor for neural-flame device 2.

Figure 2 is a simplified flowchart of the major process steps for operating the neural-flame device of Figure 1, according to embodiments of the present invention. The process starts with the system generating pulse trains having a frequency of approximately 4 Hz and a fractal dimension of near $\frac{1}{2}$ (Step 20). A system buffer is then filled with these special lacunar pulse trains (Step 22). These pulse trains are then sequentially withdrawn from the buffer, and then transmitted to controllable light source 6 via input connector 14 (Step 24).

Optionally, pulse trains may be randomly removed from the buffer prior to transmitting the signal to controllable light source 6 (Step 26). Such aspects are elaborated on in greater detail with regard to Figure 3.

Figure 3 depicts a trace of the time evolution of input to a neuron-like thresholding unit of the neural-flame device of Figure 1, according to embodiments of the present invention. The trace represents the output of a random-walk algorithm carried out on a computer or processor that is in turn applied to a neuron-like thresholding unit resulting in a series of activation transitions as the trace crosses (i.e., intersects) the “neuron’s” firing threshold. The arrival patterns of these activation transitions are then filtered by an algorithm that calculates fractal dimension (i.e., zerset dimension of the trace), and fills a buffer with those transition patterns having an approximate fractal dimension of $\frac{1}{2}$. These filtered patterns are then withdrawn from the buffer, and transmitted to drive the controllable light source.

The algorithm may be generated in an onboard processor and power supply all within base 10 of neural-flame device 2. It is noted that not only do such pulse patterns represent

the desired 4 Hz, fractal dimension $\frac{1}{2}$ pulse trains, but they largely differ from one another, thus preventing any anomaly detection filter, biological or not, from adapting to repeating activation streams.

The neuron-activation stream is generated by inputting a form of random walk of
5 equal-sized steps to the neuron, with each such step being a notional ‘coin flip’ to determine whether the step is positive or negative in sign. As the random input crosses the neuron’s firing threshold (as depicted in Figure 3), a pulse is triggered by the algorithm, the source of analog input to drive controllable light source **6** of neural-flame device **2**.

Returning to optional Step **26** of Figure 2, the resulting stream of the lacunar pulse
10 train can be used as a set of candidate activation sequences that are then randomly withdrawn from the buffer, and transmitted to drive controllable light source **6**.

The random walk may be started repeatedly from zero in a series of trials, calculating fractal dimension for each, and then accumulating a library (i.e., a buffer) of just those short pulse sequences having the required fractal dimension near $\frac{1}{2}$. Step **26** may be accomplished
15 in nanoseconds, and the sequences computationally slowed to near 300-ms timescales prior to being transmitted to controllable light source **6**.

Other techniques may be employed as well to mitigate such effects, as known in the art. However, randomly withdrawing short pulse trains from the buffer has an advantage in that it adds another layer of randomness to the pulse train, allowing it to stand out when
20 viewed through an anomaly detector, either in the brain or an artificial neural network-based novelty filter. With small pulse-train libraries, there is a chance of repetition as the short pulse trains are appended to each other, making it easier for the anomaly filter to adapt to them.

Such a “baseline reset” has been described (Thaler 2014). The fractal signature of the random walk is determined largely by its step size. In the case of the neural flame, the random walk is tuned to provide a trace (i.e., a wiggly line) that has a fractal dimension of 1.5. Sampling the crossings (i.e., intersections) of that trace with a baseline that is purposely introduced mid-channel yields a zero-set dimension of one less than that of the trace’s fractal dimension, namely 0.5.

It is noted that the rigorous fractal dimension calculation (i.e., Mandelbrot Measures) is immune to the regions in which the trace departs from the baseline. Without directly viewing the trace, the zero-set dimension may be verified by waiting until the trace resumes its baseline crossings again, and then calculating how these intersections scale with time.

In Thaler 2014, the reset involves seeking the nearest memory to the network’s current output pattern and using that as a new reference to measure how far that vector has walked. The equivalent of a single neuron’s activation crisscrossing a baseline, the output pattern oscillates through a point in a multidimensional space.

Figure 4 depicts a video stream for detecting fractal beacons within a generalized scene from the neural-flame device of Figure 1, according to embodiments of the present invention. Using a machine vision system, the video stream is propagated through an adaptive auto-associative neural net used as an anomaly filter. With periodic, random, and fractally-tuned beacons (as depicted in (a) “raw scene” of Figure 4), the anomaly filter (as in (b) of Figure 4) can block out the anomalies representing the periodic source (as in (c) of Figure 4). Subsequent algorithmic steps (as in (d) of Figure 4) calculate the fractal dimension of each anomaly’s activation stream, enabling separation of any random source from that having a tuned fractal dimension (as in (e) of Figure 4). Thus, the use of fractal dimension at frequencies close to the clock cycle of the human brain, around 250-300 milliseconds,

serves to enhance attention over other potentially-competing attention sources by selectively triggering the physiological anomaly-detection filtering of the brain.

To generate pulse trains to drive neural-flame device **2**, input to a computational neuron takes the form of a random walk over successive 300-millisecond intervals, each step
5 being of equal magnitude (Figure 3). The aggregate intersections with the time axis represent the zero-set, with each of these points ultimately representing a pulse within the sequence driving neural-flame device **2**.

As these candidate pulse trains are generated, they are assessed for their zero-set (or fractal) dimension, D_0 , which is approximated as: $D_0 = \ln(N_0)/\ln(N)$, wherein N is the total
10 number of 300 millisecond intervals sampled, and N_0 is the total number of intercepts of the neuron's net input with the firing threshold. As any new firing pattern is assessed with a fractal dimension near $\frac{1}{2}$, the pattern is stored within a memory buffer or array. Subsequently, such pulse trains are randomly accessed and transmitted to D/A module **12** where they are converted to analog voltages to drive the neural flames of controllable light
15 source **6**.

Alternatively, use of a storage buffer may be sidestepped by using an optimization algorithm that varies the step size of input variations to the neuron until the average fractal dimension of the pulse trains evaluate to the desired fractal dimension.

For use as a signal beacon, humans may search with or without the aid of a camera
20 and machine-vision system. In the latter case, the camera's video stream may be viewed through an anomaly detector, the preferred embodiment being an adaptive auto-associative net that calculates the difference vector between the filter's input and output patterns, $\Delta \mathbf{P} = \mathbf{P}_{in} - \mathbf{P}_{out}$, thus producing a map of anomalies within the camera's field of view. Subsequent filters then calculate the fractal dimension of anomalies appearing in this filtered view. Using

such a methodology, not only can fractal dimension $\frac{1}{2}$ sources be identified, but a range of prespecified fractal dimensions in the range (0, 1), opening a whole new approach to secure signaling and communication.

Furthermore, aspects of the present invention provide an object of contemplative
5 focus embodying symbolic meaning of varying significance (e.g., philosophical/religious) due to the fact that the unique fractal rhythms used are those thought to: (1) be exploited by the brain to detect idea formation, and (2) have grandiose meaning as the temporal signature of creative cognition, whether in extraterrestrial intelligence or cosmic consciousness.

While the present invention has been described with respect to a limited number of
10 embodiments, it will be appreciated that many variations, modifications, equivalent structural elements, combinations, sub-combinations, and other applications of the present invention may be made.

LITERATURE REFERENCES

Tovée, MJ (1994). How fast is the speed of thought? *Neuronal Processing, Current Biology*, Vol. 4, No. 12, pp. 1125-1127.

Thaler, SL (1997a). The fragmentation of the universe and the devolution of
5 consciousness, U.S. Library of Congress, Registration Number TXu000775586, January, 1997.

Thaler, SL (1997b). A quantitative model of seminal cognition: the creativity machine paradigm, *Proceedings of the Mind II Conference*, Dublin, Ireland, 1997.

Thaler, SL (2010). Thalamocortical Algorithms in Space! The Building of Conscious
10 Machines and the Lessons Thereof, In the *Proceedings of World Future 2010: Sustainable Futures, Strategies, and Technologies*, July 8-10, 2010, Boston, MA.

Thaler, SL (2013). The Creativity Machine Paradigm, *Encyclopedia of Creativity, Invention, Innovation, and Entrepreneurship*, (ed.) E.G. Carayannis, Springer Science+Business Media, LLC.

15 Zueva, MV (2013). Dynamic Fractal Flickering as a Tool in Research of Non-Linear Dynamics of the Evoked Activity of a Visual System and the Possible Basis for New Diagnostics and Treatment of Neurodegenerative Diseases of the Retina and Brain, *World Appl. Sci. J.*, 27 (4): 462-468, 2013.

Thaler, SL (2014). Synaptic Perturbation and Consciousness, *International Journal*
20 *of Machine Consciousness*, Vol. 06, No. 02, pp. 75-107.

Thaler, SL (2016a). Cycles of Insanity and Creativity within Contemplative Neural Systems, *Medical Hypotheses*, 94:138-147, Elsevier, 2016.

Thaler, SL (2016b). Pattern Turnover within Synaptically Perturbed Neural Systems, *Procedia Computer Science*, 88, Elsevier, 2016.

Thaler, SL and Zbikowski, K. (2017b). Cognitive Engines Contemplating Themselves, APA Newsletter on Philosophy and Computers, 17(1), Fall 2017.

Williams, F (2017). Why Fractals Are So Soothing, The Atlantic, Jan. 26, 2017.

CLAIMS

1. A device for attracting enhanced attention, the device comprising:
 - (a) an input signal of a lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half generated from a random walk over successive 300 millisecond intervals, each step being of equal magnitude and representative of a pulse train satisfying a fractal dimension equation of $\ln(\text{number of intercepts of a neuron's net input with a firing threshold})/\ln(\text{the total number of 300 ms intervals sampled})$; and
 - (b) at least one controllable light source configured to be pulsatingly operated by said input signal;

wherein a neural flame is emitted from said at least one controllable light source as a result of said lacunar pulse train.

2. The device of claim 1, the device further comprising:
 - (c) a processor for supplying said input signal of said lacunar pulse train having said characteristics; and
 - (d) a digital-to-analog (D/A) converter for transmitting said input signal to said at least one controllable light source.

3. The device of claim 2, wherein said D/A converter is an onboard module of said processor, and wherein said module is embodied in at least one form selected from the group consisting of: hardware, software, and firmware.

4. The device of claim 3, wherein said processor includes a thresholding unit for monitoring a random-walk trace for trace-axis crossings of a firing threshold of said thresholding unit, and wherein said trace-axis crossings result in activation transitions to generate pulse-activation sequences of said lacunar pulse train.

5. The device of claim 4, wherein candidates of said pulse-activation sequences are filtered based on a zero-set dimension, and wherein said candidates are filled into a buffer of selected sequences having a fractal dimension of approximately one-half.

6. The device of claim 5, wherein filtered patterns are randomly withdrawn from said selected sequences in said buffer, and wherein said filtered patterns are configured to serve as said input signal to said D/A converter for transmitting to said at least one controllable light source.

7. The device of claim 6, wherein said filtered patterns are generated onboard said processor.

8. A method for attracting enhanced attention, the method comprising the steps of:

- (a) generating a lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half generated from a random walk over successive 300 millisecond intervals, each step being of equal magnitude and representative

of a pulse train satisfying a fractal dimension equation of $\ln(\text{number of intercepts of a neuron's net input with a firing threshold})/\ln(\text{the total number of 300 ms intervals sampled})$;

- (b) transmitting said input signal to at least one controllable light source; and
- (c) pulsatingly operating said at least one controllable light source to produce a neural flame emitted from said at least one controllable light source as a result of said lacunar pulse train.

9. The method of claim 8, the method further comprising the step of:

- (d) monitoring a random-walk trace for trace-axis crossings of a firing threshold, and wherein said trace-axis crossings result in activation transitions to generate pulse-activation sequences of said lacunar pulse train.

10. The method of claim 9, the method further comprising the steps of:

- (e) filtering candidates of said pulse-activation sequences based on a zerset dimension; and
- (f) filling said candidates into a buffer of selected sequences having a fractal dimension of approximately one-half.

11. The method of claim 10, the method further comprising the steps of:

- (g) randomly withdrawing filtered patterns from said selected sequences in said buffer; and
- (h) using said filtered patterns as said input signal.

ABSTRACT OF THE DISCLOSURE

The present invention discloses devices and methods for attracting enhanced attention. Devices include: an input signal of a lacunar pulse train having characteristics of a pulse frequency of approximately four Hertz and a pulse-train fractal dimension of approximately one-half; and at least one controllable light source configured to be pulsatingly operated by the input signal; wherein a neural flame emitted from at least one controllable light source as a result of the lacunar pulse train is adapted to serve as a uniquely-identifiable signal beacon over potentially-competing attention sources by selectively triggering human or artificial anomaly-detection filters, thereby attracting enhanced attention.

Exemplary Embodiment

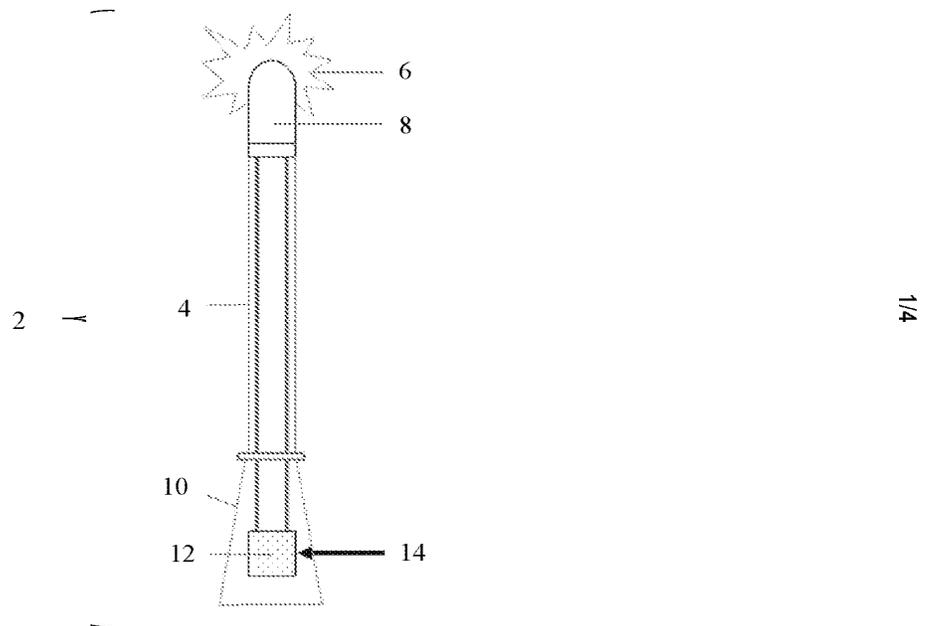
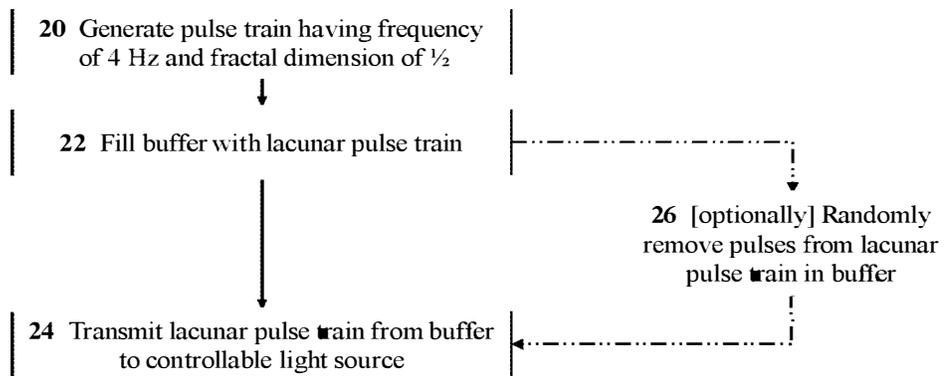


Figure 1

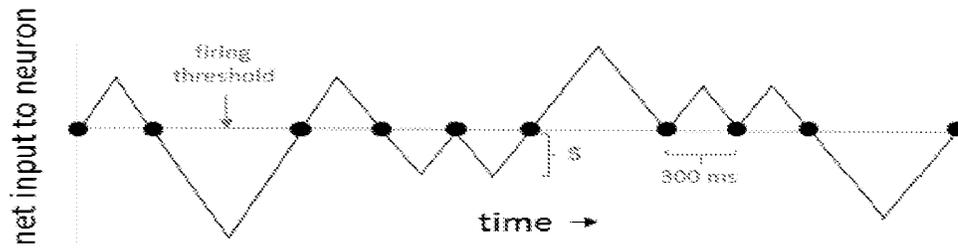
Exemplary Embodiment



2/4

Figure 2

Exemplary Embodiment



3/4

Figure 3

Exemplary Embodiment

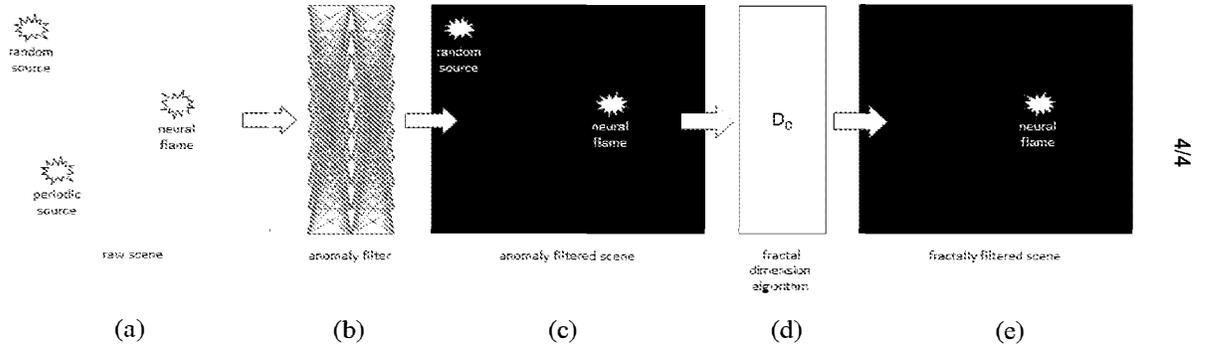


Figure 4

Electronic Patent Application Fee Transmittal

Application Number:

Filing Date:

Title of Invention: DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION

First Named Inventor/Applicant Name: [DABUS] [Invention generated by Artificial Intelligence]

Filer: Reuven Khedhour Mouallem

Attorney Docket Number: 50567 3 01 US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD (\$)	785

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Applicant/Patent Owner: Stephen L. Thaler

Application No./Patent No.: _____ Filed/Issue Date: _____

Titled: Food Container

Stephen L. Thaler, a individual

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states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

- 1. The assignee of the entire right, title, and interest.
- 2. An assignee of less than the entire right, title, and interest (check applicable box):
 - The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
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The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.

- B. A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

2. From: _____ To: _____
 The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313 1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1 800 PTO 9199 and select option 2.

PTO/AIA/96 (08 12)
Approved for use through 01/31/2013. OMB 0651 0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
Reel _____, Frame _____, or for which a copy thereof is attached.

Additional documents in the chain of title are listed on a supplemental sheet(s).

As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/Reuven K. Mouallem/

29 July 2019

Signature

Date

Reuven K. Mouallem, Patent agent

63345

Printed or Typed Name

Title or Registration Number

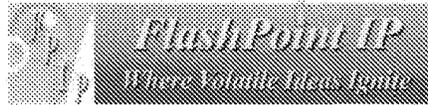
Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

B/N*W



ASSIGNMENT

DABUS, the Creativity machine that has produced the below-detailed invention, as the sole inventor (represented in this Assignment by its owner, Stephen L. Thaler, hereinafter called the "Assignor"), hereby assigns and transfers to:

Stephen L. Thaler
1767 Waterfall Dr., St. Charles, MO 63303

(hereinafter called the "Assignee"), its successors, assignees, nominees, or other legal representatives, the Assignor's entire right, title, and interest, including, but not limited to, copyrights, trade secrets, trademarks and associated good will and patent rights in the invention and the registrations to the invention entitled:

"Food Container"

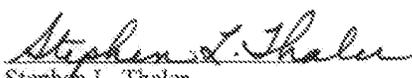
described and claimed in the following patent application: US Non-Provisional Patent Application identified as FlashPoint IP attorney docket No. 50567-4-01-US PB, to be filed with the USPTO; including any and all inventions and improvements ("Subject Matter") disclosed therein, all right of priority in the above application(s) and in any underlying provisional or foreign application, including but not limited to the rights of priority to applications already filed in the EPO and UK, all provisional, utility, divisional, continuation in whole or in part, substitute, renewal, reissue, and all other applications, PCT and national phase entries, related thereto which have been or may be filed in any jurisdiction, and all patents, including reissues, extensions and reexaminations, which may be granted on any of the above applications, the priority rights under International Conventions, and the Letters Patent which may be granted thereon, together with all rights to recover damages for infringement, including infringement of provisional rights.

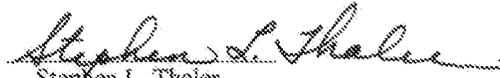
Assignor agrees that Assignee may apply for and receive patents for Subject Matter in Assignee's own name. Assignor represents that Assignor has the rights, titles, and interests to convey as set forth herein, and covenants with Assignee that Assignor has not made and will not make any other assignment, grant, mortgage, license, or other agreement affecting the rights, titles, and interests herein conveyed.

In view of the fact that the sole inventor is a Creativity Machine, with no legal personality or capability to execute said assignment, and in view of the fact that the assignee is the owner of said Creativity Machine, this Assignment is considered enforceable without an explicit execution by the inventor. Rather, the owner of DABUS, the Creativity Machine, is signing this Assignment on its behalf.

Similarly, DABUS, being a machine and having no legal personality, does not have the capability to receive any consideration, and therefore, Stephen L. Thaler, as its owner/representative, acknowledges the receipt and sufficiency of good and valuable consideration for this assignment.

Signed and sealed this 23rd day of July 2019,


Stephen L. Thaler
On behalf of DABUS,
Assignor

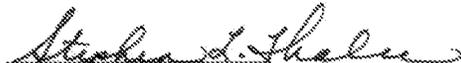

Stephen L. Thaler
Assignee

* FlashPoint IP * Where Volatile Ideas Ignite *

* Dr. Reaven K. Mowallem, L.L.M. * IP Management Consultant/Strategic Advisor *
* Registered Israeli Patent Attorney * Registered U.S. Patent Agent * e-mail: rkmo@FlashPointIP.com *
* website: www.FlashPointIP.com * Linked In: [www.Linked In.com/in/FlashPointIP](http://www.LinkedIn.com/in/FlashPointIP) *
* tel: 972-3-936-3199 (IL line)/972-52-761-8220 (IL cell)/1-516-361-1649 (US line) *

- Circumstances permitting execution of this substitute statement: **Inventor is under legal incapacity in view of the fact that the sole inventor is a Creativity Machine (i.e., an artificial intelligence), with no legal personality or capability to execute this substitute statement.**
- Person executing this substitute statement is the Applicant and the Assignor of the abovementioned application, as well as the owner of said Creativity Machine, DABUS; namely: **Stephen L. Thaler, 1767 Waterfall Dr., St. Charles, MO 63303 USA.**

Signed this 23rd day of July 2019


STEPHEN L. THALER

PTO/AIA/96 (97-17)

Approved for use through 03/31/2021, OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:

Practitioners associated with Customer Number: _____

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number	Name	Registration Number
Dr. Reuven K. Mouallem, LL.M.	63345		
Dr. Ryan B. Abbott	68178		

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:

The address associated with Customer Number: **89602**

OR

Firm or individual name: _____

Address: _____

City: _____ State: _____ Zip: _____

Country: _____

Telephone: _____ Email: _____

Assignee name and address: **Stephen L. Thaler
1767 Waterfall Dr., St. Charles, MO 63303**

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/AIA/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee.

Signature: Stephen L. Thaler Date: 24 July 2019

Name: Stephen L. Thaler Telephone: (314) 378-5406

Title: Applicant/Assignee

This collection of information is required by 37 CFR 1.331, 1.332, and 1.333. The information is required to obtain or retain a benefit by the public, which is to update (and by the USPTO to process) the file of a patent or reexamination proceeding. Confidentiality is governed by 35 U.S.C. 322 and 37 CFR 1.331 and 1.334. This collection is estimated to take 30 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FILES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.
If you need assistance in completing the form, call 1-800-FTD-9199 and select option 2.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76 Attorney Docket Number 50567 4 01 US
 Application Number

Title of Invention | FOOD CONTAINER

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2:

Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove
 Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	DABUS		Invention generated by artificial intelligence	
Residence Information (Select One) <input checked="" type="radio"/> US Residency <input type="radio"/> Non US Residency <input type="radio"/> Active US Military Service				
City		State/Province	Country of Residence	

Mailing Address of Inventor:

Address 1	1767 Waterfall Dr.		
Address 2			
City	St. Charles	State/Province	MO
Postal Code	63303	Country	US

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button.

Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).

An Address is being provided for the correspondence information of this application.

Customer Number	89602		
Email Address	ydm@FlashPointIP.com	Add Email	Remove Email
Email Address	ikm@FlashPointIP.com	Add Email	Remove Email
Email Address	drryanabbott@gmail.com		Remove Email

Application Information:

Title of the Invention	FOOD CONTAINER		
Attorney Docket Number	50567 4 01 US	Small Entity Status Claimed	<input checked="" type="checkbox"/>
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	Suggested Figure for Publication (if any)	6

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 4 01 US

Application Number

Title of Invention FOOD CONTAINER

Filing By Reference:

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM DD)	Intellectual Property Authority or Country

Publication Information:

Request Early Publication (Fee required at time of Request 37 CFR 1.219)

Request Not to Publish. I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer number will be used for the Representative Information during processing.

Please Select One: Customer Number US Patent Practitioner Limited Recognition (37 CFR 11.9)

Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Dr	Reuven	K.	Mouallem		<input type="button" value="Remove"/>

Registration Number 63345

Prefix	Given Name	Middle Name	Family Name	Suffix	Remove
Dr	Ryan	B.	Abbott		<input type="button" value="Remove"/>

Registration Number 68178

Additional Representative Information blocks may be generated within this form by selecting the **Add** button.

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, 365(c), or 386(c) or indicate National Stage entry from a PCT application. Providing benefit claim information in the Application Data Sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the "Application Number" field blank.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76 Attorney Docket Number 50567 4 01 US
 Application Number

Title of Invention FOOD CONTAINER

Prior Application Status	Pending			<input type="button" value="Remove"/>
Application Number	Continuity Type	Prior Application Number	Filing or 371(c) Date (YYYY-MM-DD)	

Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the button.

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55. When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)¹ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(i)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Access Code ¹ (if applicable)	<input type="button" value="Remove"/>
18275163.6	EP	2018 10 17		
Application Number	Country ¹	Filing Date (YYYY-MM-DD)	Access Code ¹ (if applicable)	<input type="button" value="Remove"/>
1816909.4	GB	2018 10 17		

Additional Foreign Priority Data may be generated within this form by selecting the button.

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 4 01 US

Application Number

Title of Invention FOOD CONTAINER

Authorization or Opt-Out of Authorization to Permit Access:

When this Application Data Sheet is properly signed and filed with the application, applicant has provided written authority to permit a participating foreign intellectual property (IP) office access to the instant application-as-filed (see paragraph A in subsection 1 below) and the European Patent Office (EPO) access to any search results from the instant application (see paragraph B in subsection 1 below).

Should applicant choose not to provide an authorization identified in subsection 1 below, applicant **must opt-out** of the authorization by checking the corresponding box A or B or both in subsection 2 below.

NOTE: This section of the Application Data Sheet is **ONLY** reviewed and processed with the **INITIAL** filing of an application. After the initial filing of an application, an Application Data Sheet cannot be used to provide or rescind authorization for access by a foreign IP office(s). Instead, Form PTO/SB/39 or PTO/SB/69 must be used as appropriate.

1. Authorization to Permit Access by a Foreign Intellectual Property Office(s)

A. Priority Document Exchange (PDX) - Unless box A in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the State Intellectual Property Office of the People's Republic of China (SIPO), the World Intellectual Property Organization (WIPO), and any other foreign intellectual property office participating with the USPTO in a bilateral or multilateral priority document exchange agreement in which a foreign application claiming priority to the instant patent application is filed, access to: (1) the instant patent application-as-filed and its related bibliographic data, (2) any foreign or domestic application to which priority or benefit is claimed by the instant application and its related bibliographic data, and (3) the date of filing of this Authorization. See 37 CFR 1.14(h)(1).

B. Search Results from U.S. Application to EPO - Unless box B in subsection 2 (opt-out of authorization) is checked, the undersigned hereby **grants the USPTO authority** to provide the EPO access to the bibliographic data and search results from the instant patent application when a European patent application claiming priority to the instant patent application is filed. See 37 CFR 1.14(h)(2).

The applicant is reminded that the EPO's Rule 141(1) EPC (European Patent Convention) requires applicants to submit a copy of search results from the instant application without delay in a European patent application that claims priority to the instant application.

2. Opt-Out of Authorizations to Permit Access by a Foreign Intellectual Property Office(s)

A. Applicant **DOES NOT** authorize the USPTO to permit a participating foreign IP office access to the instant application-as-filed. If this box is checked, the USPTO will not be providing a participating foreign IP office with any documents and information identified in subsection 1A above.

B. Applicant **DOES NOT** authorize the USPTO to transmit to the EPO any search results from the instant patent application. If this box is checked, the USPTO will not be providing the EPO with search results from the instant application.

NOTE: Once the application has published or is otherwise publicly available, the USPTO may provide access to the application in accordance with 37 CFR 1.14.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76 Attorney Docket Number 50567 4 01 US
 Application Number

Title of Invention FOOD CONTAINER

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

- Assignee Legal Representative under 35 U.S.C. 117 Joint Inventor
- Person to whom the inventor is obligated to assign. Person who shows sufficient proprietary interest

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor:

If the Applicant is an Organization check here.

Prefix	Given Name	Middle Name	Family Name	Suffix
	Stephen		Thaler	

Mailing Address Information For Applicant:

Address 1	1767 Waterfall Dr.		
Address 2			
City	St. Charles	State/Province	MO
Country	US	Postal Code	63303
Phone Number		Fax Number	
Email Address			

Additional Applicant Data may be generated within this form by selecting the Add button. Add

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 4 01 US

Application Number

Title of Invention FOOD CONTAINER

Assignee 1

Complete this section if assignee information, including non applicant assignee information, is desired to be included on the patent application publication. An assignee applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

If the Assignee or Non-Applicant Assignee is an Organization check here.

Prefix	Given Name	Middle Name	Family Name	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1				
Address 2				
City		State/Province		
Country i		Postal Code		
Phone Number		Fax Number		
Email Address				

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.

Signature:

NOTE: This Application Data Sheet must be signed in accordance with 37 CFR 1.33(b). However, if this Application Data Sheet is submitted with the INITIAL filing of the application and either box A or B is not checked in subsection 2 of the "Authorization or Opt-Out of Authorization to Permit Access" section, then this form must also be signed in accordance with 37 CFR 1.14(c).

This Application Data Sheet must be signed by a patent practitioner if one or more of the applicants is a juristic entity (e.g., corporation or association). If the applicant is two or more joint inventors, this form must be signed by a patent practitioner, all joint inventors who are the applicant, or one or more joint inventor-applicants who have been given power of attorney (e.g., see USPTO Form PTO/AIA/81) on behalf of all joint inventor-applicants.

See 37 CFR 1.4(d) for the manner of making signatures and certifications.

Signature	/Reuven K. Mouallem/		Date (YYYY-MM-DD)	2019 07-24	
First Name	Reuven	Last Name	Mouallem	Registration Number	63345

Additional Signature may be generated within this form by selecting the Add button.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 4 01 US

Application Number

Title of Invention FOOD CONTAINER

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313 1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

APPLICATION FOR PATENT

Title: FOOD CONTAINER

5 CROSS REFERENCE TO RELATED APPLICATIONS

This patent application claims priority under 35 USC §119(a)-(d) and (f), §172, §365(a) and (b), §386(a) and (b), and/or 37 USC CFR 1.55 to UK Patent Application No. 1816909.4, filed October 17, 2018, and European Patent Application No. 18275163.6, filed October 17, 2018, which are hereby incorporated by reference in their entirety.

10

FIELD AND BACKGROUND OF THE INVENTION

The present invention relates to a food container suitable for both liquid and solid food products.

The packaging industry is well developed throughout the industrialised world and is
15 subject to general norms and practices. On the whole, in the case of food or beverage packaging, this needs to be able to hold food or beverages in a food safe and hygienic condition, and to withstand storage and transportation; specifically to provide physical and barrier protection to the contents, to prevent contamination and agglomeration, to provide security including tamper control, and to be convenient. In recent years, there have been
20 moves to reduce the amount of packaging material used and also to focus on more environmentally friendly packaging, such as by use of recyclable and biodegradable materials. Lightweighting is a concept that has been prevalent in the industry for some time, which aims to reduce the amount of packaging material utilised, its weight and also the energy required for its manufacture.

In the case of packaging for liquid or other flowable materials, it is common to use bottles, cans, cartons, bags and the like. Generally, such packaging has either a generally cylindrical form, such as a drinks can or bottle, or a cuboidal form, such as milk or juice cartons of the type commonly sold under the ElopakTM or Tetra PakTM brands. This packaging is typically constituted by a smooth walled structure, often of multi-layered form, which minimises surface area and optimises the usable volume of the packaging. The contents of the packaging are often relied upon to maintain the form and integrity of the packaging, particularly during transportation and storage. For instance, a beverage container will often rely on the pressure of the beverage within the container to keep the container in its original shape. This enables the walls of the container to be made very thin, to the point that often once the container has been opened the walls become flimsy and are easy to collapse.

Food products are often sold in multiple units, such as cans and bottles, in which case it is common to tie these together with additional packaging, such as a sleeve, ring or yoke. This additional packaging also serves to stop individual packages from falling loose during transportation or storage, thereby reducing spoilage. However, such additional packaging adds further cost, both monetary and environmental.

The smooth nature of such packaging reduces a person's grip and it is not uncommon, particularly for large packages, for a person to struggle to handle the package without squashing it and causing spillage of the contents. This is particularly the case with large plastics drinks bottles.

SUMMARY

The present invention seeks to provide an improved container for food products. The invention is particularly suitable for, but not limited to, containers for liquids, such as beverages, and other flowable products.

According to an aspect of the present invention, there is provided a food or beverage
5 container comprising: a wall defining an internal chamber of the container, the wall having interior and exterior surfaces and being of substantially uniform thickness; wherein the wall has a fractal profile with corresponding convex and concave fractal elements on corresponding ones of the interior and exterior surfaces; and wherein the convex and concave fractal elements form pits and bulges in the profile of the wall.

10 The present invention provides a food or beverage container having a container wall of different form than known in the art. The form taught herein provides a number of practical advantages over known packaging products.

Preferably, at least some of said pits and bulges have heads of a greater width than bases thereof.

15 Advantageously, the fractal profile of the wall permits coupling by inter-engagement of a plurality of said containers together. This feature can provide a number of practical advantages, including being able to do away with separate and additional tie elements to hold together a plurality of containers, as is necessary with currently available packages that rely on sleeves or yokes.

20 Preferably, the wall of the container is flexible, thereby permitting flexing of the fractal profile thereof. The flexibility of the wall permits disengagement of containers coupled together, by appropriate squashing of one or more of the containers to alter the fractal shape of the containers at the point of inter-engagement.

Advantageously, the corresponding convex and concave fractal elements provide for increased surface area of both the interior and exterior surfaces of the container relative to a volume of the chamber. An increased surface area can assist in the transfer of heat into and out of the container, for example for heating or cooling the contents thereof.

5 In preferred embodiments, the container is generally cylindrical. It may have other shapes in other embodiments, such as generally spherical, oval and so on.

The container wall may be formed of metal, plastics, elastomeric material or glass. It may also be made from flexible or potentially flexible food products.

10 The fractal form of the container wall can also contribute to improved holding of the container, whereas known packages with a smooth surface can be slippery particularly when wet such as when condensation forms on the outside as a result of the contents being cold.

It is to be understood that although the main focus of this disclosure is to a food or beverage container, the teachings are not limited to such applications and could be used for containers for a wide variety of other uses.

15

BRIEF DESCRIPTION OF THE DRAWINGS.

Embodiments of the present invention are described below, by way of example only, in which:

20 Figure 1 is a schematic view in axial cross-section of a container according to an embodiment of the present invention;

Figures 2 and 3 are schematic axial partial cross-sectional views of an embodiment of two fractal containers in the process of being coupled together;

Figures 4 and 5 are schematic axial partial perspective views of the two fractal containers of Figures 2 and 3 in the process of being coupled together;

Figure 6 shows various views of another embodiment of fractal container;

Figures 7 to 9 show the coupling and uncoupling of two containers as per the embodiment of Figure 6; and

5 Figures 10 and 11 show, respectively, the coupling together of two further embodiments of fractal container.

DESCRIPTION OF THE ILLUSTRATIVE EMBODIMENTS,

The description that follows and its accompanying drawings disclose in broad terms
10 the teachings herein. Elements that are common in the art are omitted for the sake of clarity, such as but not limited to the specific materials that the container may be made of, typical volumes for the container and so on. Furthermore, the drawings are not to scale.

The concept disclosed herein makes use of a fractal profile for the wall of the container, which has been found to provide a number of advantageous characteristics when
15 applied to a container particularly for food and beverage products. The skilled person will appreciate that the profile of the wall will not be of pure fractal form but will have a form dictated by practical considerations such as the minimum practical or desirable size of its fractal components. Nevertheless, the relationship between elements of the profile is fractal in nature. In practical embodiments, the fractal container may exhibit a fractal interpretation
20 over two or more size scales.

Referring to Figure 1, this shows in schematic form a transverse cross-sectional view of an embodiment of container **10** for use, for example, for beverages. The container has a wall **12** with an external surface **14** and an internal surface **16**. Wall **12** has a substantially uniform thickness.

As with known containers, especially for food products, wall **12** is preferably made of a food safe material or otherwise provided with a food safe inner lining. For this purpose, and as known in the art, the wall may be a single layer material or may be made as a laminate of different materials. The wall may be made of or comprise a plastics material, a metal or metal alloy, an elastomeric material, and may even be made of glass. It is also envisaged that in some embodiments the wall may be made from flexible or potentially flexible food product (for example pasta, dough, licorice and so on).

Wall **12** has a fractal profile which provides a series of fractal elements **18-28** on interior and exterior surfaces **14, 16**. It is to be understood that fractal elements **18-28** have fractal characteristics within practical considerations determined for example by the limits of the chosen manufacturing/forming process, the material chosen for wall, the thickness the wall and so on. In practice, fractal elements **18-28** will typically reach a minimum practical dimension determined by such constraints.

Fractal elements **18-28** of the wall create, as a result of wall **12** having a generally uniform thickness, a series of pits **40** and bulges **42** in the profile of the wall, in which a pit **40** as seen from one of exterior or interior surfaces **12** or **14** forms a corresponding bulge **42** on the other of exterior or interior surfaces **12** or **14**, and vice versa. This characteristic is exhibited both on a large scale, for instance with pits **40** and bulges **42** identified by the reference numerals in Figure 1, but also with the smaller ones of fractal elements **18-28**. The pits **40** and bulges **42** could be described as opposite images of one another on exterior **14** and interior **16** sides of walls **12**. Repeating features (for instance pits and bulges) across a variety of scales creates the fractal form or profile on the container surfaces. The fractal profile may extend across the entire area of the container surfaces or only over selected surfaces or surface portions. Thus, the fractal profile may in some embodiments extend over

the entire container, while in other embodiments the majority of the container can be smooth with only the contact areas between containers having fractal formations.

It will be appreciated that Figure 1 is an axial cross-sectional view only. Fractal elements **18-28** may in some embodiments extend in linear fashion along the length of wall **12**, but in other embodiments elements **18-28** may be of pure fractal form of a type akin, so to speak, to cauliflower or broccoli florets, so as to create an array of distinct nodules, both circumferentially and also longitudinally along wall **12**.

Container **10** may be of generally cylindrical form, such that the cross-section shown in Figure 1 extends into and/or out of the plane of the paper. In such embodiments, container **10** will include a top and a base, typically of any type known in the art. In other embodiments, container **10** may have any suitable non-cylindrical form, examples of which the person skilled in the art will be familiar with.

Container **10** of this embodiment, and of the other embodiments described and contemplated herein, provides a number of practical advantages. One such advantage can be seen with reference to the embodiment shown in Figures 2 to 5.

Referring first to Figures 2 and 3, these are axial cross-sectional views of two containers **100**, **110** similar to the view of Figure 1 but in which only a part of the circumference of the wall of each container can be seen. Each container **100**, **110** has, as with the embodiment of Figure 1, a wall **12** having exterior **14** and interior **16** surfaces and fractal elements **18-28** formed in the wall and present in the exterior and interior surfaces **14**, **16**.

Containers **100**, **110** have the same shapes and fractal profiles, which are also symmetrical as will be apparent from the Figures. This correspondence in shapes enables pits **40** and corresponding bulges **42** in the walls of two containers **100**, **110** to engage into

one another so as to interlock along a portion of their circumferences, as can be seen in particular in Figure 3. In this embodiment, pits **40** and bulges **42** have the same, but opposite, shapes such that they are able to fit snugly into one another. This can be achieved, in some embodiments, by creating two identical fractal sheets and curving them in opposite
5 directions such that one surface of one the sheet becomes the outer surface of one container and the same surface of the other sheet becomes the inner surface of the other container.

Furthermore, in the embodiments of Figure 1 to 3, pits **40** and bulges **42** have what could be described as enlarged heads with narrower neck portions, in which the fractal elements extend to a smaller width or diameter d at or close to their bases compared to a
10 larger width or diameter D further from their bases. This characteristic of enlarged heads may be prevalent in all of pits **40** and bulges **42** but in other embodiments may be exhibited in only a portion of the fractal formations in wall **12**.

As can be seen in Figure 3 in particular, the coupling of two containers **100**, **110** occurs, in this example, because the containers have a generally curving or rounded form, in
15 which case the containers will only touch, and inter-engage, at their tangents.

In other embodiments that have different general overall shapes, such as square or polygonal, the coupling of the fractal formations of two containers may occur across an entire side wall or a portion of one or more of the side walls of the containers.

When used for packaging, this characteristic enables multiple containers to be
20 coupled together without the need for any other tie mechanism of the types commonly used in the art. In other words, two or more containers **100**, **110** may be joined together solely by inter-engagement of some of the fractal formations of container walls **12**. The containers need not have tessellating shapes, as it is only necessary for one or more of the fractal formations of each of the containers to inter-engage in order to achieve coupling.

Figures 4 and 5 show a view of another embodiment similar to that of Figures 2 and 3, in which the fractal formations of containers **100**, **110** extend generally linearly for at least a short distance longitudinally, in other words in two-dimensional manner rather than in a three-dimensional manner as a floret would. In this embodiment, the same fractal elements of containers **100**, **110** shown in Figures 4 and 5 will inter-engage longitudinally along their length, and if they extend along the entire length of the containers they will then inter-engage equally along the length of the containers. In the case of three-dimensional fractal elements, of what could be described as floret form, inter-engagement of two or more containers along a tangent thereof will involve the coupling of multiple fractal formations along the lengths of the containers.

The containers can be uncoupled by squeezing containers **100**, **110**, for example from either side of the coupling zone, to cause engaged pits **40** and bulges **42** to deform and open out. A user can in this manner separate containers **100**, **110** with relative ease.

Referring now to Figure 6, this shows another embodiment of a fractal container **200** having a fractal form similar to that of the embodiments of Figures 1 to 5. In this embodiment, the fractal formations extend in linear manner along the length of container **200**, as can be seen in particular in the perspective view of Figure 6. Container **200** can have any of the characteristics described elsewhere herein.

With reference to Figure 7, in this embodiment pits **240** and bulges **242** are not the same shape or size to fit one within the other precisely, as is the case with the embodiments shown in Figures 2 to 5. Nevertheless, pits **240** and bulges **242** are still able to engage partially, as will be apparent in the Figure. The two containers can be tied to one another by adhesive posited into an interstice or pocket **244** between partially engaged pits **240** and

bulges **242**. More than two containers may be coupled together in this manner, in a fully or partially tessellating manner depending upon the shapes of the containers.

Containers **200** can be separated from one another by applying pressure to one or both of the containers, as shown In Figure 8. In the example shown in this Figure, the pressure may be applied diametrically opposite adhesive coupling **244**, as per the arrow in the Figure. This pressure will cause deformation of walls **12** of the containers and, as a consequence, apply shear stress (and typically also compressive and tensile forces) to the adhesive in pocket **244**, which will break or loosen. It will be appreciated that the containers could be squeezed from other directions and achieve the same result.

Once the adhesive coupling has been released, the containers **200** can be separate from one another as shown in Figure 9.

Referring now to Figure 10, this shows in schematic form partial wall profiles of two fractal containers **300, 300'** according to another embodiment of the present invention. In this embodiment, the wall has what could be described as a fractal random walk profile, with zig-zag wall elements of different lengths l_1-l_n .

The two container profiles **300, 300'** preferably have substantially identical reversed or replicated profiles in at least a part of their extent, such that they can couple together in a precise nesting arrangement, as shown in Figure 10B. The two fractal elements **300, 300'** can thus be coupled together, typically by a combination of mechanical inter-engagement and friction. The skilled person will appreciate that in this embodiment, as with the following embodiment shown in Figure 11, the profile does not include any fractal elements having bulges or pits with enlarged heads, as occurs with the embodiments of Figures 1 to 9, although it is not excluded that in some embodiments they may have such characteristics.

Figure 11 shows another example, in which the profiles of the two containers **400**, **400'** only partially nest one into the other. It will be appreciated that the degree of coupling of the containers together can be altered by adjusting the fractal profiles of the two inter-engaging surfaces to one another.

5 In the preferred embodiments, the lengths l_1-l_n of the zig-zag wall elements are advantageously determined as statistical fractals whose dimensions may be tuned via random walk parameters to optimize the interlocking of two or more fractal containers. Bonding between containers can be relatively strong with an increased number and size of capture points and weaker with fewer capture points.

10 In the embodiments of Figures 10 and 11, inter-engagement can be provided by the profiles themselves and optionally, as per the above described embodiments, assisted by the use of adhesive between adjacent containers.

The forms of container disclosed herein provide a number of other advantages in addition to an increased ability to couple multiple containers together.

15 First, the fractal nature of the outer surface of the container provides a better grip of the container compared to a container having a smooth outer surface. This can be advantageous particularly with larger or heavier containers, in respect of which a good grip can be obtained with less holding pressure on the container wall.

20 Moreover, the corresponding convex and concave fractal elements provide for increased surface area of both the interior and exterior surfaces of the container relative to a volume of the chamber. This can be useful in increasing the heat transfer characteristics of the container, for instance to cool or heat its contents.

The skilled person will appreciate that the teachings herein can provide other advantages and characteristics not exhibited in containers known in the art.

While the present invention has been described with respect to a limited number of embodiments, it will be appreciated that many variations, modifications, equivalent structural elements, combinations, sub-combinations, and other applications of the present invention may be made.

WHAT IS CLAIMED IS:

1. A food or beverage container comprising:
 - (a) a generally cylindrical wall defining an internal chamber of the container, said wall having interior and exterior surfaces and being of uniform thickness; and
 - (b) a top and a base disposed at either end of said generally cylindrical wall;wherein said wall has a fractal profile with corresponding convex and concave fractal elements on corresponding ones of said interior and said exterior surfaces; wherein said convex and said concave fractal elements form pits and bulges in said profile of said wall; and wherein said wall of the container is flexible, permitting flexing of said fractal profile thereof, said fractal profile of said wall permits coupling by inter-engagement of a plurality of the containers together, and flexibility of said wall permits disengagement of said or any coupling of a plurality of the containers.

2. The food or beverage container of claim 1, wherein at least some of said pits and bulges each have heads and bases, wherein said heads are of a greater width than said bases thereof.

3. The food or beverage container of claim 1, wherein at least some of said pits and said bulges have inter-engaging or corresponding shapes and sizes such that a bulge of one container can fit within a pit of an identical container, thereby to couple two containers together.

4. The food or beverage container of claim 3, wherein said pits and said bulges of said two containers fit precisely within one another.

5. The food or beverage container of claim 3, wherein said pits and said bulges of said two containers fit partially within one another.

6. The food or beverage container of claim 1, wherein two or more said containers can be coupled together by an adhesive disposed between facing pits and bulges of adjacent containers.

7. The food or beverage container of claim 1, wherein said corresponding convex and said concave fractal elements provide for increased surface area of both said interior and said exterior surfaces of the container relative to a volume of said chamber.

8. The food or beverage container of claim 1, wherein said wall is formed of a material selected from the group consisting of: a metal, a plastic, and an elastomeric material.

9. The food or beverage container of claim 1, wherein said wall is formed from a flexible food product.

ABSTRACT OF THE DISCLOSURE

A container for use, for example, for beverages, has a wall with an external surface and an internal wall of substantially uniform thickness. The wall has a fractal profile which provides a series of fractal elements on the interior and exterior surfaces, forming pits and bulges in the profile of the wall and in which a pit as seen from one of the exterior or interior surfaces forms a bulge on the other of the exterior or interior surfaces. The profile enables multiple containers to be coupled together by inter-engagement of pits and bulges on corresponding ones of the containers. The profile also improves grip, as well as heat transfer into and out of the container.

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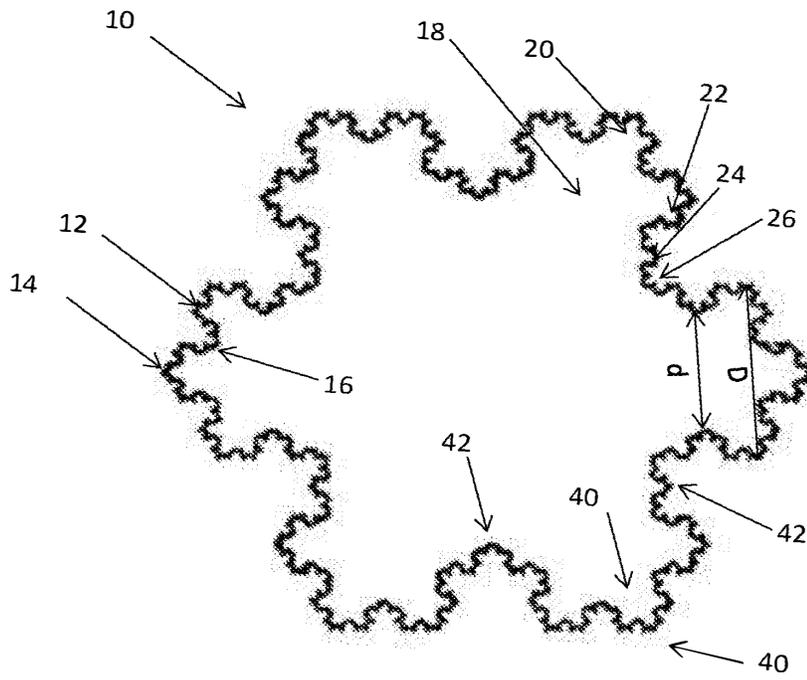


Fig. 1

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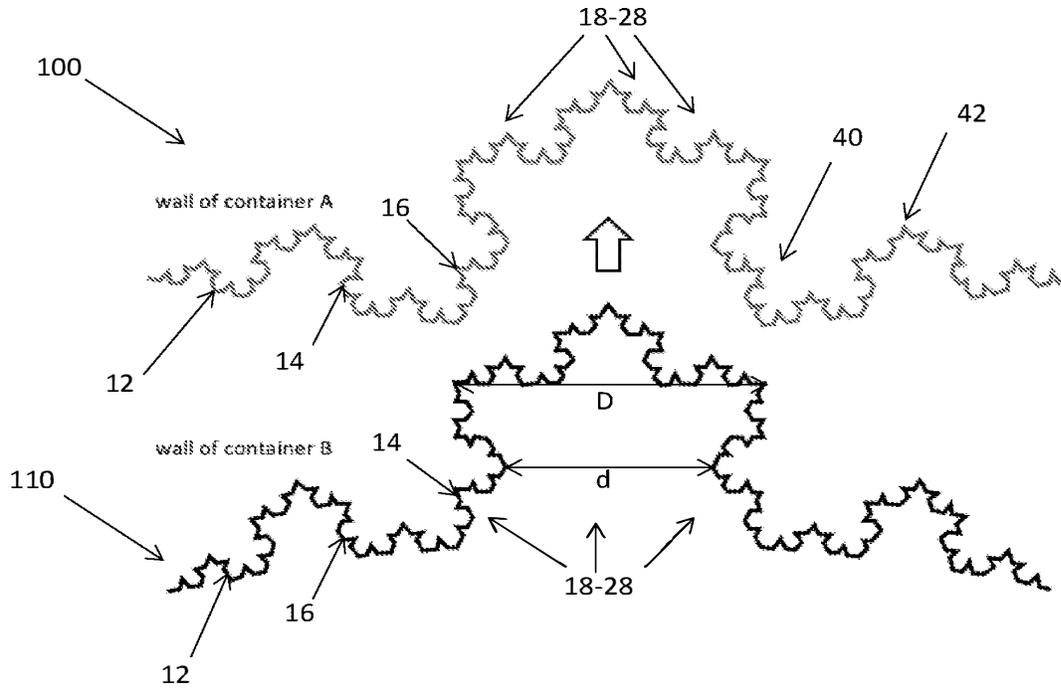


Fig. 2

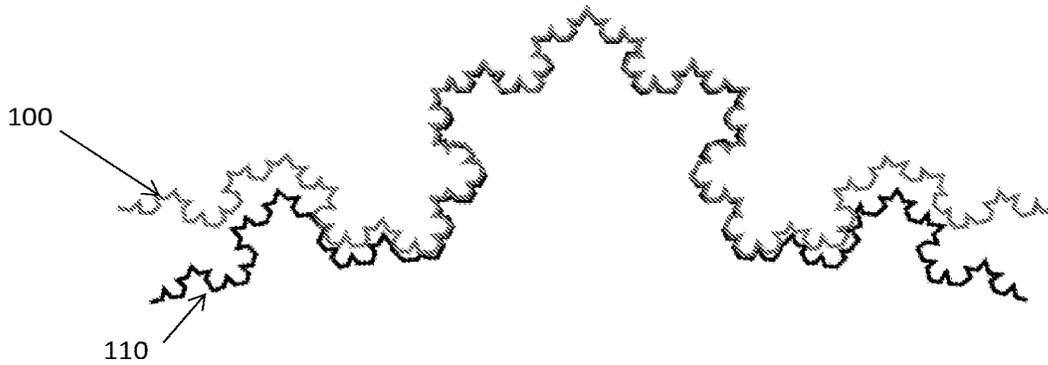


Fig. 3

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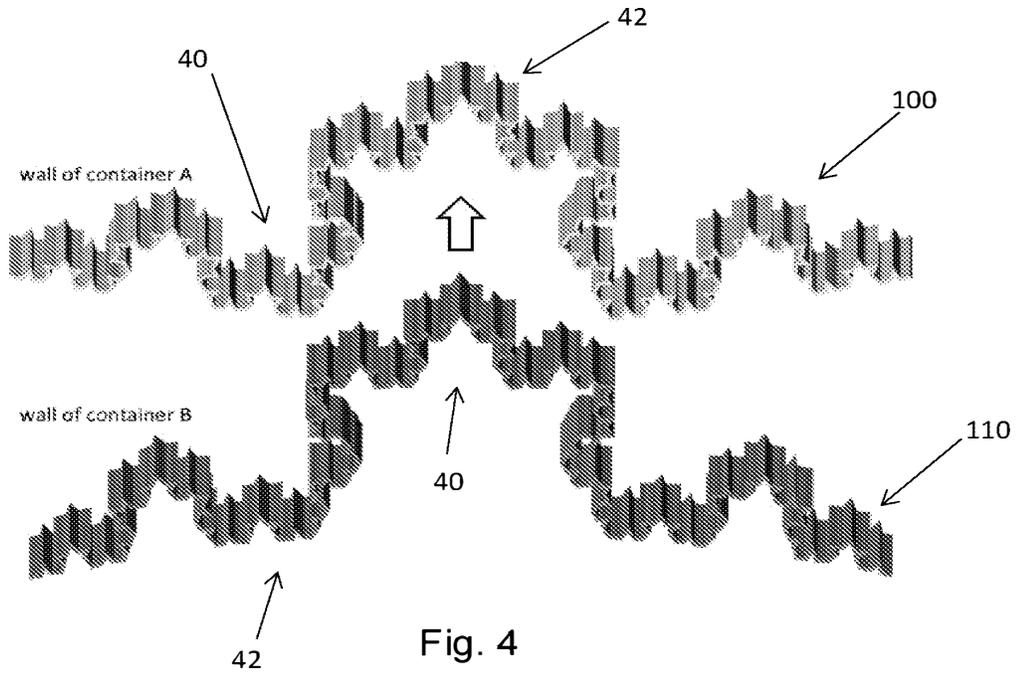


Fig. 4

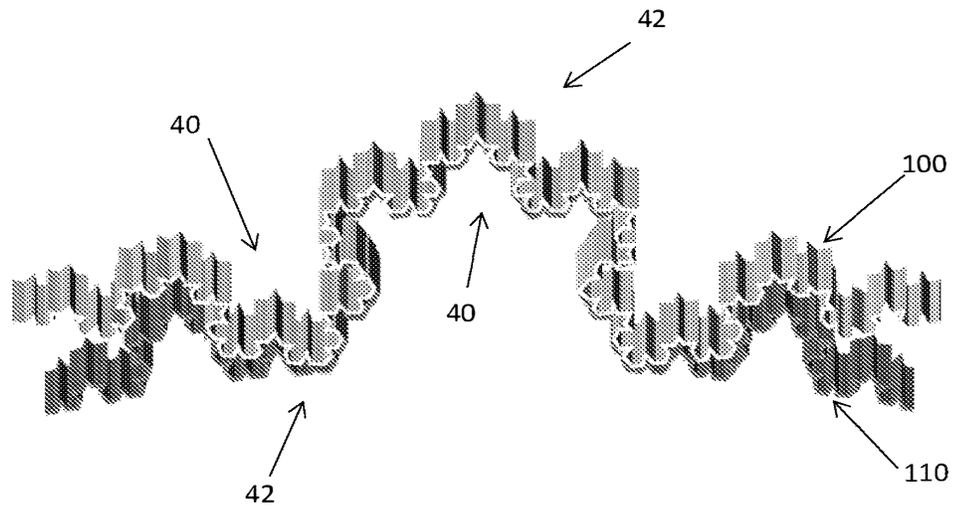


Fig. 5

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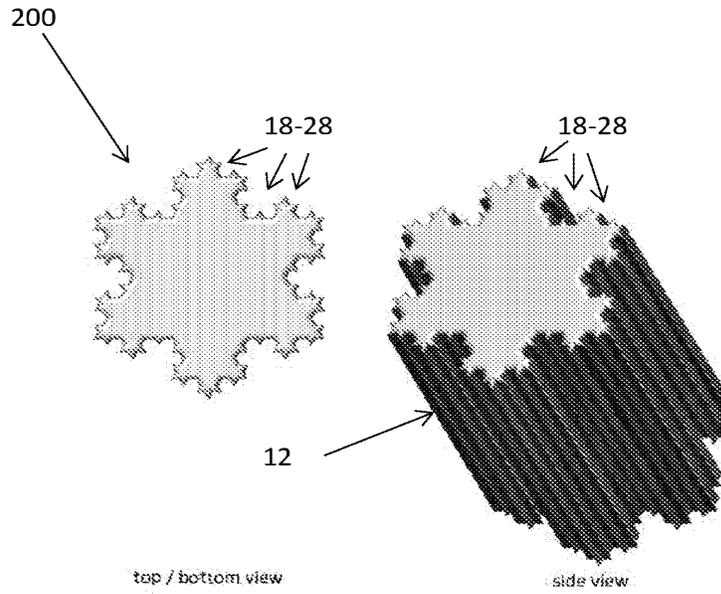


Fig. 6

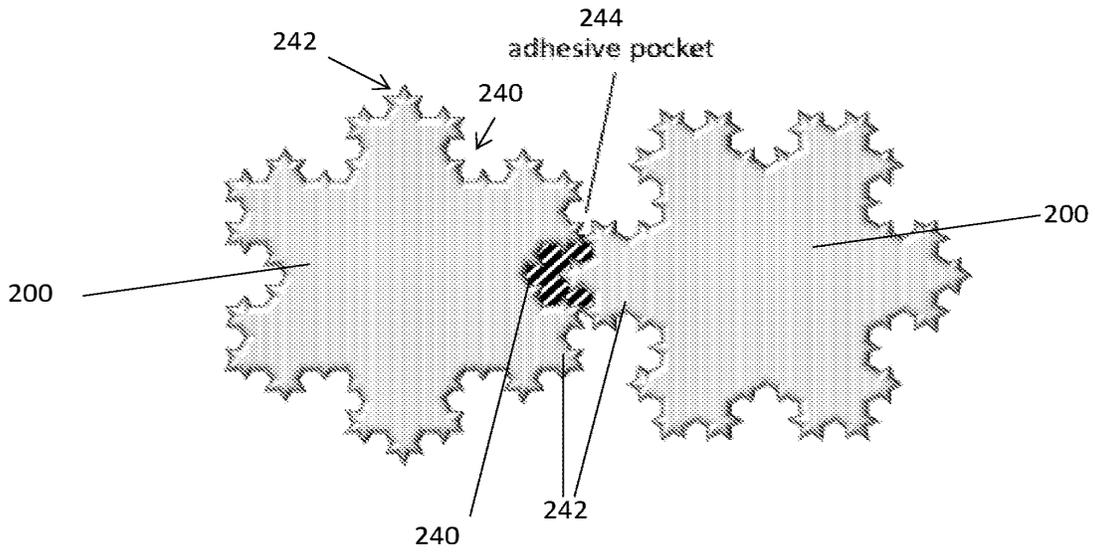


Fig. 7

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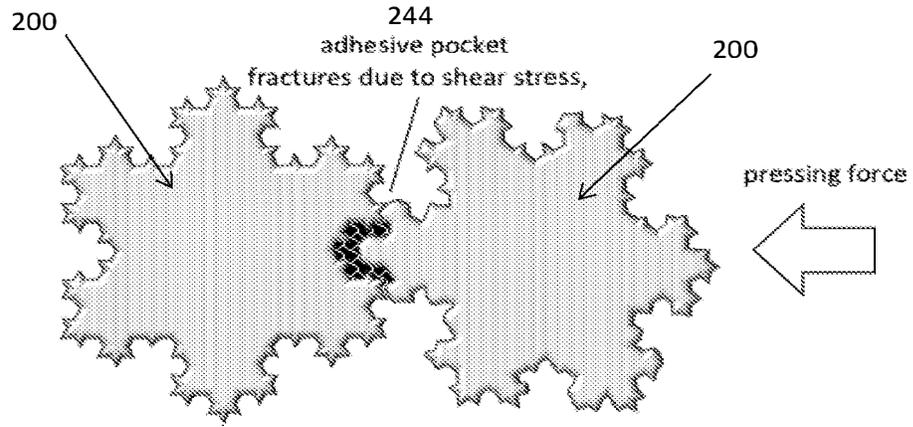


Fig. 8

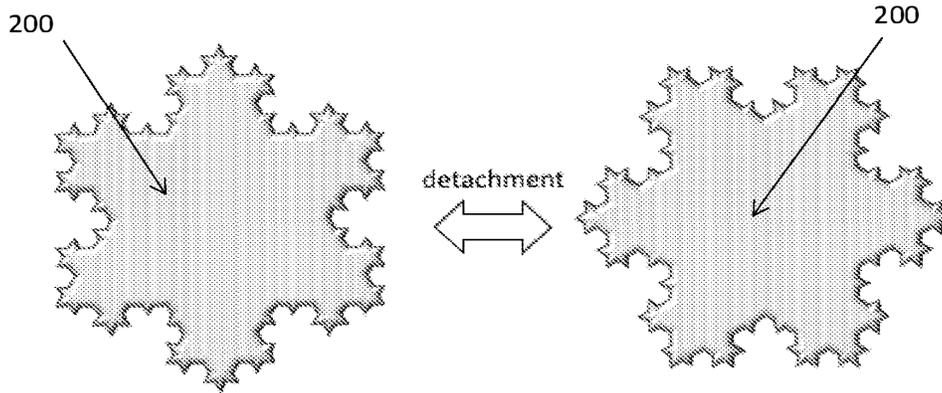


Fig. 9

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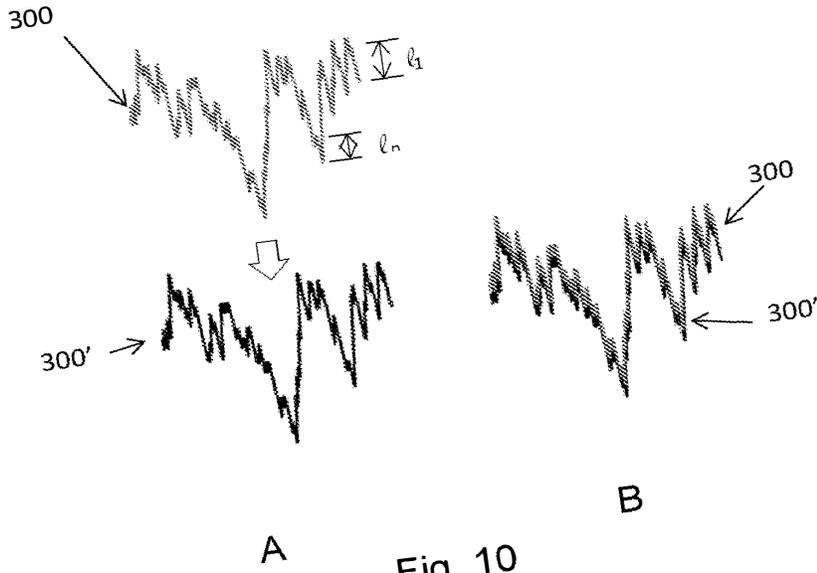


Fig. 10

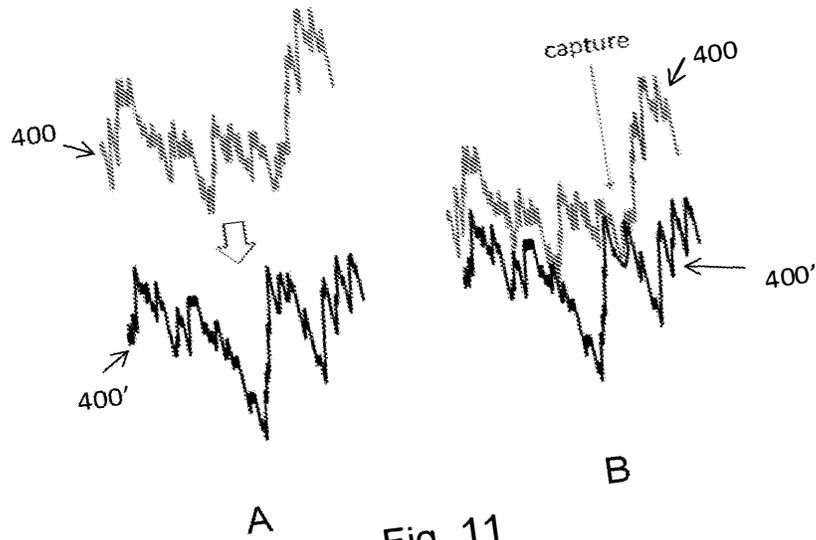


Fig. 11

Electronic Patent Application Fee Transmittal

Application Number:

Filing Date:

Title of Invention: Food Container

First Named Inventor/Applicant Name: [DABUS] (Invention generated by Artificial Intelligence)

Filer: Reuven Khedhour Mouallem

Attorney Docket Number: 50567 4 01 US

Filed as Small Entity

Filing Fees for Utility under 35 USC 111(a)

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
UTILITY FILING FEE (ELECTRONIC FILING)	4011	1	75	75
UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380

Pages:

Claims:

Miscellaneous-Filing:

Petition:

Patent-Appeals-and-Interference:

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
			Total in USD (\$)	785

**UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATIONS

Case Number: 2021-2347

Short Case Caption: Thaler v. Hirshfeld

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