IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF VIRGINIA

Alexandria Division

Stephen Thaler	)	
	)	
Plaintiff,	)	
	)	
v.	)	Civil Action No. 1:20cv903
	)	
	)	
Andrei Iancu, et al	)	
	)	
Defendant.	)	

JUDGMENT

Pursuant to the order of this Court entered on September 2, 2021 and in accordance with Federal Rules of Civil Procedure 58, JUDGMENT is hereby entered in favor of the Defendants and against the Plaintiff.

FERNANDO GALINDO, CLERK OF COURT

By: /s/
D. Van Metre
Deputy Clerk

Dated: 09/02/2021
Alexandria, Virginia

IN THE UNITED STATES DISTRICT COURT FOR THE
EASTERN DISTRICT OF VIRGINIA
Alexandria Division

STEPHEN THALER, Plaintiff, 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, et al., Defendants.	)	1:20-cv-903 (LMB/TCB)

ORDER

For the reasons stated in the accompanying Memorandum Opinion, Defendants' Motion for Summary Judgment [Dkt. No. 23] is GRANTED and Plaintiff's Motion for Summary Judgment [Dkt. No. 18] is DENIED. Accordingly, it is hereby

ORDERED that judgment be and is entered in favor of defendants; and it is further

ORDERED that the Motion to Take Leave to Accept Attached Amicus Curiae Memorandum Opposing MSJ and Motion to Waive Fees [Dkt. No. 27] filed by Mitchell Apper be and is GRANTED.

The Clerk is directed to enter judgment in defendants' favor pursuant to Federal Rule of Civil Procedure 58, forward copies of this Order and accompanying Memorandum Opinion to counsel of record, and close this civil action.

Entered this 2nd day of September, 2021.

Alexandria, Virginia

/s/
Leonie M. Brinkema
United States District Judge

Case: 21-2347 Document: 26 Page: 44 Filed: 12/09/2021

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MEMORANDUM OPINION

Before the Court are the parties' cross-motions for summary judgment, which address the core issue—can an artificial intelligence machine be an "inventor" under the Patent Act? Based on the plain statutory language of the Patent Act and Federal Circuit authority, the clear answer is no. Accordingly, Defendants' Motion for Summary Judgment [Dkt. No. 23] will be granted and Plaintiff's Motion for Summary Judgment [Dkt. No. 18] will be denied.[1]

I. BACKGROUND

This civil action concerns two patent applications that plaintiff Stephen Thaler ("plaintiff" or "Thaler") filed with the United States Patent and Trademark Office ("USPTO"), which were assigned U.S. Application Serial Nos. 16/524,350 (the "'350 application") and

[1] Also before the Court is a document titled as a "Motion to Take Leave to Accept Attached Amicus Curiae Memorandum Opposing MSJ" and a "Motion to Waive Fees" [Dkt. No. 27] filed pro se by Mitchell Apper ("Apper"), who "is an engineer and inventor of a portfolio of 31 inventions that make extensive use of AI and various types of machine learning and is also a registered patent practitioner." [Dkt. No. 27] at 2. The motion will be granted and the amicus brief will be filed; however, the information in the amicus brief is not of help to the Court's evaluation of the legal arguments in this civil action.

16/524,532 (the "'532 application") (collectively, "the Applications").[2] Plaintiff filed the Applications with the USPTO on July 29, 2019. Administrative Record ("AR") 1-96; 284-379. In his one-count complaint brought under the Administrative Procedure Act ("APA"), plaintiff alleges that the refusal of defendants Andrew Hirshfeld and the USPTO (collectively "defendants") to process the Applications was "arbitrary, capricious, an abuse of discretion and not in accordance with the law; unsupported by substantial evidence, and in excess of Defendants' statutory authority." [Dkt. No. 1] ¶ 70. Plaintiff seeks an order compelling defendants to reinstate the Applications and vacate the prior decision on plaintiff's petitions filed under 37 C.F.R. § 1.181. He also seeks "[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 plaintiff incurred in this litigation. [Dkt. No. 1] ¶¶ A-E.

As a civil action brought under the APA, review of the final agency action is limited to considering the administrative record. The factual assertions made by plaintiff during the application process are taken as true. Plaintiff alleges that he "is in the business of developing and applying advanced artificial intelligence (AI) systems that are capable of generating patentable output under conditions in which no natural person traditionally meets inventorship

[2] Because the administrative proceedings with respect to the Applications were identical (including the dates on which pertinent events occurred), this Opinion treats the Applications collectively and provides citations to the administrative record that the USPTO has filed with respect to both Applications.

criteria," [Dkt. No. 1] ¶ 1, and is the owner of DABUS,[3] an artificial intelligence machine listed as the inventor of the '350 application, which claimed a "light beacon that flashes in a new and inventive manner to attract attention ('Neural Flame')," and the '532 application, which claimed a "beverage container based on fractal geometry ('Fractal Container')." Id. ¶ 15.

In the Application Data Sheets accompanying the Applications, plaintiff identified the inventor's "given name" as "DABUS," and under "family name" wrote "Invention generated by artificial intelligence," identifying his own mailing address as the "mailing address of inventor." AR 10; 299. Plaintiff also included a "Statement on Inventorship" in the Applications explaining that "[t]he unique aspects under which the instant invention was conceived prompted the inclusion of such statement in order to explain that the inventor of the subject matter of the instant invention of the present application is an AI machine, being a type of 'creativity machine' named 'DABUS,'" and arguing why plaintiff thought DABUS should be considered an "inventor" under the Patent Act and the USPTO's regulations. AR 60-65; 345-50.

Because DABUS could not execute the necessary oath or declaration that the Patent Act requires of an inventor, plaintiff included with the Applications a "Substitute Statement Under 37 CFR 1.64 in Lieu of Declaration Under 35 USC § 115(d)," which explained that the "inventor," DABUS, was "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." AR 26-27; 311-12. Accordingly, Thaler, as the "the Applicant and the

[3] "DABUS" is an acronym for "Device for the Autonomous Bootstrapping of Unified Sentience." [Dkt. No. 19] at 1.

Assignor of the abovementioned application, as well as the owner of said Creativity Machine, DABUS" signed the substitute statement. Id.

The Applications also included a document through which DABUS had ostensibly assigned all intellectual property rights in the claimed invention to plaintiff. That document, entitled "Assignment," provided in pertinent part:

> 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
> [Address Omitted]
>
> (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 . . .
> . . .
> In view of the fact that the sole inventor is a Creativity Machine, with no legal personality or capability to execute said agreement, 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.

AR 21; 310. The assignment document was signed by both "Stephen L. Thaler, On Behalf of DABUS, Assignor," as well as "Stephen L. Thaler, Assignee." Id.

After its initial review of the Applications, the USPTO issued plaintiff a "Notice to File Missing Parts of Non-Provisional Application," allowing him two months to submit proper information regarding inventorship because the "application data sheet or inventor's oath or

declaration does not identify each inventor or his or her legal name." AR 97-98; 380-81. On August 29, 2019, plaintiff filed a petition with the USPTO Director pursuant to 37 C.F.R. § 1.181[4] in which he asked the USPTO to vacate its "Notice to File Missing Parts," and essentially reiterated the "Inventorship Statement" that he had submitted with the Applications arguing that DABUS should be listed as the inventor. AR 111-16; 394-99. On December 17, 2019, the USPTO issued a written decision dismissing plaintiff's petition, in which it explained that the explicit statutory language that Congress has used to define the term "inventor"—e.g., "individual" and "himself or herself"—was uniquely trained on human beings. AR 131-33; 410-12. The USPTO also explained that the Federal Circuit had twice held that an inventor could only be a natural person. Id. (quoting Univ. of Utah v. Max-Planck-Gesellschaft, 734 F.3d 1315, 1323 (Fed. Cir. 2013) ("Max-Planck"); Beech Aircraft Corp. v. Edo Corp., 990 F.2d 1237, 1248 (Fed. Cir. 1993)). "Because a machine does not qualify as an inventor," the USPTO concluded that it had "properly issued the Notice . . . noting the inventor was not identified by his or her legal name." Id. The USPTO further explained the way for plaintiff to patent the inventions:

> the use of a machine as a tool by natural person(s) does not generally preclude natural person(s) from qualifying as an inventor or joint inventors if the natural person(s) contributed to the conception of the claimed invention. See MPEP § 2137.01. . . . Where an application names an incorrect inventor, the applicant could submit a request to correct inventorship under 37 CFR 1.48. See MPEP § 602.01(c) et seq.; see also MPEP § 706.03(a), subsection IV.

AR 133; 412.

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[4] Pursuant to 37 C.F.R. § 1.181(a)(3), an applicant may file an administrative petition asking the USPTO Director "[t]o invoke the supervisory authority of the Director in appropriate circumstances."

On January 20, 2020, plaintiff sought reconsideration of the USPTO's decision by filing a "Petition to the Director Under 37 CFR 1.181 – Request for Reconsideration." AR 135-46; 414-25. On April 22, 2020, the USPTO denied plaintiff's request for reconsideration in a final written decision, which plaintiff challenges in this civil action. AR 205-13; 456-64. Relying on multiple sections of Title 35 of the United States Code, the USPTO explained that "the patent statutes preclude such a broad interpretation" of "inventor" to cover machines. AR 209; 460. Additionally, although the USPTO acknowledged that the relevant Federal Circuit decisions holding that "only natural persons can be 'inventors'" were "in the context of states and corporations," it concluded that "the discussion of conception as being a 'formation in the mind of the inventor' and a 'mental act' is equally applicable to machines and indicates that conception—the touchstone of inventorship—must be performed by a natural person." AR 210; 461 (quoting Max-Planck, 734 F.3d at 1323; Beech Aircraft, 990 F.2d at 1248). The USPTO also pointed to "numerous references to the inventor as a 'person' in Title 37 of the Code of Federal Regulations," and the definition of "conception" in the Manual of Patent Examining Procedure ("MPEP") as "the complete performance of the mental part of the inventive act" and "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" as further underscoring that only a natural person may be an "inventor." AR 211; 462. The USPTO addressed plaintiff's remaining arguments, including policy considerations, and held that "they do not overcome the plain language of the patent laws as passed by the Congress and as interpreted by the courts." AR 212; 463 (citing Glaxo Ops. UK Ltd. v. Quigg, 894 F.2d 392, 399-400 (Fed. Cir. 1990) for the holding that the USPTO and courts must honor the plain meaning of the patent statutes when

Congress has spoken on an issue, and that striking policy balances when crafting legislative language is within the province of Congress).

Plaintiff filed this civil action seeking review of the USPTO's decision, and, after an agreed briefing schedule was entered, plaintiff and defendants filed their cross-motions for summary judgment without having engaged in discovery. The parties' motions have been fully briefed, and oral argument was heard on the record by teleconference due to the COVID-19 pandemic.

II. DISCUSSION

A. Standard of Review

Under the APA, 701 U.S.C. § 701, et seq., a court may only set aside a final agency action if it is "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C. § 706(2)(A). An action is arbitrary and capricious if the agency "relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n of U.S., Inc. v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). "A court reviewing the agency decision 'must consider whether the decision was based on a consideration of the relevant factors and whether there has been a clear error of judgment.'" Burandt v. Dudas, 528 F.3d 1329, 1332 (Fed. Cir. 2008) (quoting Bowman Transp., Inc. v. Arkansas-Best Freight Sys., Inc., 419 U.S. 281, 285 (1974)). "An abuse of discretion occurs where the decision is based on an erroneous interpretation of the law, on factual findings that are not supported by substantial evidence, or represents an unreasonable judgment

in weighing relevant factors." Id. "The focal point for judicial review [under the APA] should be the administrative record already in existence." SourceAmerica v. United States Dep't of Educ., 368 F. Supp. 3d 974, 986 (E.D. Va. 2019) (alterations in original) (quoting Camp v. Pitts, 411 U.S. 138, 142 (1973)), vacated in part on other grounds by 826 F. App'x 272 (2020). Under Fed. R. Civ. P. 56(a), summary judgment is appropriate where the movant shows that there is no "genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law."

B. Analysis

The USPTO argues that its interpretation of the various provisions of the Patent Act at issue here—primarily 35 U.S.C. §§ 100 and 115—is entitled to deference pursuant to the Supreme Court's decision in Skidmore v. Swift & Co., which accords deference to agency interpretations of statutory provisions that "constitute a body of experience and informed judgment to which courts and litigants may properly resort for guidance to the extent that those decisions have the power to persuade." 323 U.S. 134, 140 (1944). "The weight of such a judgment in a particular case will depend upon the thoroughness evident in its consideration, the validity of its reasoning, its consistency with earlier and later pronouncements, and all those factors which give it power to persuade, if lacking power to control." Id. Similarly, the Federal Circuit has held that

> the Supreme Court intends for us to defer to an agency interpretation of the statute that it administers if the agency has conducted a careful analysis of the statutory issue, if the agency's position has been consistent and reflects agency-wide policy, and if the agency's position constitutes a reasonable conclusion as to the proper construction of the statute, even if we might not have adopted that construction without the benefit of the agency's analysis.

Cathedral Candle Co. v. ITC, 400 F.3d 1352, 1366 (Fed. Cir. 2005).

Plaintiff argues that defendants are not entitled to Skidmore deference because defendants did not "consider alternative interpretations or statutory constructions or the constitutional imperative in rejecting the Applications," did not "provide any evidence that Congress intended to exclude AI-[g]enerated [i]nventions from patentability," and did "not engage with the effects of their interpretation." [Dkt. No. 28] at 9. Plaintiff's arguments are rejected because they attempt to add requirements for Skidmore deference that are counter to Supreme Court and Federal Circuit holdings. Contrary to plaintiff's unsupported assertions as to inadequate consideration of "alternative interpretations," the USPTO's interpretation of the Patent Act was carefully considered and was consistent with the Patent Act's language and the caselaw. The decision also explained why plaintiff's policy arguments as to the effects of the agency's interpretation were rejected, and the decision reached a reasonable conclusion regarding the proper construction of the statute. Plaintiff has pointed to no USPTO policies with which the decision is inconsistent. Accordingly, the USPTO's interpretation that an "inventor" must be a natural person is entitled to deference.

Even if no deference were due, the USPTO's conclusion is correct under the law. The question of whether the Patent Act requires that an "inventor" be a human being is a question of statutory construction. Accordingly, the plain language of the statute controls. See, e.g., Shoshone Indian Tribe v. United States, 364 F.3d 1339, 1345 (Fed. Cir. 2004). As the Supreme Court has held: "The preeminent canon of statutory interpretation requires us to 'presume that [the] legislature says in a statute what it means and means in a statute what it says there.' Thus, our inquiry begins with the statutory text, and ends there as well if the text is unambiguous."

BedRoc Ltd., LLC v. United States, 541 U.S. 176, 183 (2004) (quoting Connecticut Nat. Bank v. Germain, 503 U.S. 249, 253-54 (1992)) (internal citations omitted).

Using the legislative authority provided by the Constitution's Patent Clause, see U.S. Const. art. I, § 8, cl. 8, Congress codified the Patent Act in 1952, see Dawson Chem. Co. v. Rohm & Haas Co., 448 U.S. 176, 180 (1980), and has amended the Patent Act a number of times in the ensuing sixty years. In 2011, Congress promulgated the America Invents Act, which, as relevant here, formally amended the Patent Act to provide an explicit statutory definition for the term "inventor" to mean "the individual, or, if a joint invention, the individuals collectively who invented or discovered the subject matter of the invention." 35 U.S.C. § 100(f). The America Invents Act also added that "joint inventor" means "any one of the individuals who invented or discovered the subject matter of a joint invention." Id. § 100(g). Additionally, Congress has required that "[a]n application for patent shall be made, or authorized to be made, by the inventor . . . in writing to the Director." 35 U.S.C. § 111(a)(1). "[E]ach individual who is the inventor or a joint inventor of a claimed invention in an application for patent shall execute an oath or declaration in connection with the application" which "shall contain statements that— . . . such individual believes himself or herself to be the original inventor or joint inventor of [the] claimed invention." Id. § 115(b). An applicant may also submit a "substitute statement" to the USPTO "in lieu of" the oath or declaration:

> A substitute statement under paragraph (1) is permitted with respect to any individual who—
>
> (A) is unable to file the oath or declaration under subsection (a) because the individual—
>
> (i) is deceased;
> (ii) is under legal incapacity; or
> (iii) cannot be found or reached after diligent effort; or

> (B) is under an obligation to assign the invention but has refused to make the oath or declaration required under subsection (a).

Id. § 115(d)(2). The "substitute statement" must also "identify the individual to whom the statement applies" as well as the circumstances triggering the exception to the oath or declaration requirement. Id. § 115(d)(3).

As the statutory language highlights above, both of the definitions provided by Congress for the terms "inventor" and "joint inventor" within the Patent Act reference an "individual" or "individuals." 35 U.S.C. §§ 100(f)-(g). Congress used the same term—"individual"—in other significant provisions of the Patent Act which reference an "inventor," including requiring that "each individual who is the inventor or a joint inventor" execute an oath or declaration, and permitting a substitute statement in lieu of the oath or declaration "with respect to any individual who" meets the requirements. Id. § 115(a)(1). Similarly, the oath or declaration must contain a statement that "such individual believes himself or herself to be the original inventor or joint inventor of [the] claimed invention." Id. § 115(b)(2). Accordingly, the issue of whether an artificial intelligence machine can be an "inventor" turns on the plain meaning of the statutory term "individual."

The Supreme Court recently conducted a statutory construction analysis regarding Congress's use of the term "individual" in the Torture Victim Protection Act ("TVPA"), ultimately concluding that "[t]he ordinary meaning of the word, fortified by its statutory context," referred to a "natural person[]." Mohamad v. Palestinian Auth., 566 U.S. 449, 453-54 (2012). Although the TVPA and Patent Act concern different subject matter, the Supreme Court's statutory analysis of the term "individual" remains applicable here. "Because the [Patent

Act] does not define the term 'individual,' we look first to the word's ordinary meaning." Id. at 454. When used "[a]s a noun, 'individual' ordinarily means '[a] human being, a person.'" Id. (quoting 7 Oxford English Dictionary 880 (2d ed. 1989)) (also citing Random House Dictionary of the English Language 974 (2d ed. 1987) ("a person"); Webster's Third New International Dictionary 1152 (1986) ("a particular person")). As the Supreme Court recognized, these definitions accord with "how we use the word in everyday parlance":

> We say "the individual went to the store," "the individual left the room," and "the individual took the car," each time referring unmistakably to a natural person. And no one, we hazard to guess, refers in normal parlance to an organization as an "individual." Evidencing that common usage, this Court routinely uses "individual" to denote a natural person, and in particular to distinguish between a natural person and a corporation.

Id. Similarly, the Patent Act uses the term "individual" as a noun, and therefore "'individual' ordinarily means '[a] human being, a person.'" Id. at 454. As in Mohamed, this definition is consistent with the ordinary usage of the term "individual" to refer to a human being, as artificial intelligence machines or systems are not normally referred to as "individuals" in ordinary parlance.

Relying on the Dictionary Act's denotation of "individual" as "distinct from the list of artificial entities that precedes it," the Supreme Court explained that "Congress does not, in the ordinary course, employ the word any differently" from its common usage. Id. (citing 1 U.S.C. § 1). The Dictionary Act applies to all congressional enactments, and similarly applies to the Patent Act. See Ngiraingas v. Sanchez, 495 U.S. 182, 190 (1990) (holding that the Dictionary Act "supplied[s] rules of construction for all legislation"). Notably, although "Congress remains free, as always, to give the word a broader or different meaning . . . . before we will assume it

has done so, there must be some indication Congress intended such a result. Mohamad, 566 U.S. at 455 (emphasis in original).

Congress's use of the term "individual" in the Patent Act strengthens the conclusion that an "inventor" must be a natural person. Congress provided that in executing the oath or declaration accompanying a patent application, the inventor must include a statement that "such individual believes himself or herself to be the original inventor or an original joint inventor of a claimed invention in the application." 35 U.S.C. § 115(b)(2) (emphasis added). The Supreme Court has recognized the principle that "a word is known by the company it keeps (the doctrine of noscitur a sociis)" and that this principle is a "rule we rely upon to avoid ascribing to one word a meaning so broad that it is inconsistent with its accompanying words, thus giving 'unintended breadth to the Acts of Congress.'" Gustafson v. Alloyd Co., 513 U.S. 561, 575 (1995) (quoting Jarecki v. G.D. Searle & Co., 367 U.S. 303, 307 (1961)). By using personal pronouns such as "himself or herself" and the verb "believes" in adjacent terms modifying "individual," Congress was clearly referencing a natural person. Because "there is a presumption that a given term is used to mean the same thing throughout a statute," the term "individual" is presumed to have a consistent meaning throughout the Patent Act. Mohamad, 566 U.S. at 456. As the USPTO correctly observes, plaintiff relies on no statutory text within the Patent Act to support his argument that Congress intended to deviate from the typical use of "individual" as meaning a natural person. Instead, plaintiff argues that "[e]ven if statutory and judicial language refers to inventors as individuals, none of this has been in the context of AI-[g]enerated [i]nventions." [Dkt. No. 19] at 17. That argument does not undercut that the ordinary meaning of

the word "individual," fortified by its statutory context, refers to natural persons, which necessarily excludes artificial intelligence machines.

This conclusion is further buttressed by the Federal Circuit's consistent holdings that under current patent law "inventors must be natural persons." Max-Planck, 734 F.3d at 1323; see also Beech Aircraft, 990 F.2d at 1248. In Max-Planck, the Federal Circuit evaluated whether a state was the real party in interest where a state university sued officials of another state university (but not the university itself) to correct inventorship of a patent. In holding that "a State has no core sovereign interest in inventorship," the Federal Circuit stated that "[i]t is axiomatic that inventors are the individuals that conceive of the invention: [c]onception is the touchstone of inventorship," and that "[t]o perform this mental act [of conception], inventors must be natural persons and cannot be corporations or sovereigns." 734 F.3d at 1323. In Beech Aircraft, the Federal Circuit stated that a corporation "could never have been declared an 'inventor,' as [the corporation] was merely a corporate assignee and only natural persons can be 'inventors.'" 990 F.2d at 1248 (citing 35 U.S.C. §§ 115–118). Although these cases did not squarely address the issue raised in this civil action, the unequivocal statements from the Federal Circuit that "inventors must be natural persons" and "only natural persons can be 'inventors'" support the plain meaning of "individual" in the Patent Act as referring only to a natural person and not to an artificial intelligence machine. Max-Planck, 734 F.3d at 1323; Beech Aircraft, 990 F.2d at 1248.

Having neither facts nor law to support his argument, plaintiff's main argument is that policy considerations and the general purpose of the Constitution's Patent Clause and the Patent

Act require that the statute be read to encompass artificial intelligence machines as "inventors." Plaintiff argues that:

> Allowing patents for AI-Generated Inventions will result in more innovation. It will incentivize the development of AI capable of producing patentable output by making that output more valuable. . . . Patents also incentivize commercialization and disclosure of information, and this incentive applies with equal force to a human and an AI-Generated Invention. By contrast, denying patent protection for AI-Generated Inventions threatens to undermine the patent system by failing to encourage the production of socially valuable inventions.
>
> Patent law also protects the moral rights of human inventors and listing an AI as an inventor where appropriate would protect these human rights. . . . [I]t will discourage individuals from listing themselves as inventors without having contributed to an invention's conception merely because their name is needed to obtain a patent. Allowing a person to be listed as an inventor for an AI-Generated Invention would not be unfair to an AI, which has no interest in being acknowledged, but allowing people to take credit for work they have not done would devalue human inventorship.

[Dkt. No. 19] at 11-12. Accordingly, plaintiff argues that the Court should seek to give effect to Congress's intent "to create a system that would encourage innovation, as well as to promote disclosure of information and commercialization of new technologies." Id. at 12. Plaintiff provides no support for his argument that these policy considerations should override the plain meaning of a statutory term. Moreover, the Supreme Court has held that there must be "some indication" that Congress intended a particular provision to be one of the "rare statute[s]" that contains a different meaning for the term "individual." Mohamad, 566 U.S. at 455 (emphasis in original). Accordingly, plaintiff's position that the USPTO must "provide . . . evidence that Congress intended to prohibit patents on AI-[g]enerated [i]nventions" has the burden exactly backwards. [Dkt. No. 28] at 12.

The Supreme Court and Federal Circuit have explicitly held that policy considerations cannot overcome a statute's plain language, and that "[m]atters of policy are for Congress, not

the courts, to decide." Fisons PLC v. Quigg, 876 F.2d 99, 101 (Fed. Cir. 1989)[5]; Sandoz Inc. v. Amgen Inc., 137 S. Ct. 1664, 1678 (2017) ("Even if we were persuaded that Amgen had the better of the policy arguments, those arguments could not overcome the statute's plain language, which is our 'primary guide' to Congress' preferred policy."); see also Kimble v. Marvel Entm't, LLC, 576 U.S. 446, 463-64 (2015) (holding that, although one litigant "also [sought] support from the wellspring of all patent policy: the goal of promoting innovation[,] . . . . [c]laims that a statutory precedent has serious and harmful consequences for innovation are (to repeat this opinion's refrain) more appropriately addressed to Congress").

In response to plaintiff's accusations that the USPTO has not considered the policy ramifications of its decision that an artificial intelligence machine cannot be an "inventor," the USPTO represents that it "continues to study the impact of artificial intelligence on current patent regulations, and has engaged the public-at-large in a conversation on the subject." [Dkt. Nos. 24, 25] at 21 n.10. Specifically, the USPTO points to a conference on artificial intelligence policy it held in January 2019, and to requests for public comment "on a whole host of issues related to the intersection of intellectual property policy and artificial intelligence" it issued in August and October 2019. In October 2020, the USPTO issued a comprehensive report on those

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[5] Specifically, the Supreme Court held:

> Fisons makes what can only be characterized as a "policy argument" pointing to statements of lofty goals indicating that Congress broadly sought to encourage pharmaceutical innovation by enacting the 1984 Act. . . . It is irrelevant, however, that we might agree with Fisons that, as a matter of policy, Congress might better achieve its goals through a more liberal grant of patent term extension benefits. Matters of policy are for Congress, not the courts, to decide.

Fisons PLC v. Quigg, 876 F.2d 99, 101 (Fed. Cir. 1989).

comments. Id. (citing Public Views on Artificial Intelligence and Patent Policy, available at https://www.uspto.gov/sites/default/files/documents/USPTO_AI-Report_2020-10-07.pdf (visited August 31, 2021). Many commentators disagreed with plaintiff's view that artificial intelligence machines should be recognized as inventors—for example, the report found general themes among the comments that:

> The majority of public commenters, while not offering definitions of [artificial intelligence ("AI")], agreed that the current state of the art is limited to "narrow" AI. Narrow AI systems are those that perform individual tasks in well-defined domains (e.g., image recognition, translation, etc.). The majority viewed the concept of artificial general intelligence (AGI)—intelligence akin to that possessed by humankind and beyond—as merely a theoretical possibility that could arise in a distant future.
>
> Based on the majority view that AGI has not yet arrived, the majority of comments suggested that current AI could neither invent nor author without human intervention. The comments suggested that human beings remain integral to the operation of AI, and this is an important consideration in evaluating whether IP law needs modification in view of the current state of AI technology.

Id. at ii-iii; see also id. at 6.

Additionally, the USPTO points to the fact that, contrary to plaintiff's assertion that the "statutes relied upon by Defendants were passed long before AI-[g]enerated [i]nventions were a reality" and that if Congress had contemplated this artificial intelligence issue, it would have included artificial intelligence machines within the definition of "inventors"; Congress defined an "inventor" as an "individual" through the America Invents Act in 2011, when artificial intelligence was already in existence. See Pub. L. 112-29, § 3(a), 125 Stat. 285 (Sept. 16, 2011); see also H.R. Rep. No. 112-98 (June 1, 2011), available at 2011 U.S.C.C.A.N. 67, 67. Accordingly, plaintiff's policy arguments do not override the overwhelming evidence that Congress intended to limit the definition of "inventor" to natural persons. As technology evolves,

there may come a time when artificial intelligence reaches a level of sophistication such that it might satisfy accepted meanings of inventorship. But that time has not yet arrived, and, if it does, it will be up to Congress to decide how, if at all, it wants to expand the scope of patent law.

III. CONCLUSION

For the reasons stated above, Defendants' Motion for Summary Judgment [Dkt. No. 23] will be granted, Plaintiff's Motion for Summary Judgment [Dkt. No. 18] will be denied, and Apper's Motion to Take Leave to Accept Attached Amicus Curiae Memorandum Opposing MSJ and Motion to Waive Fees [Dkt. No. 27] will be granted by an Order to be issued with this Memorandum Opinion.

Entered this 2nd day of September, 2021.

Alexandria, Virginia

/s/
Leonie M. Brinkema
United States District Judge

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.

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

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

[Page 2 of 2]

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.

BHN"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
On behalf of DABUS,
Assignor

Stephen L. Thaler
Assignee

• FlashPoint IP • *Where Volatile Ideas Ignite* •
• Dr. Reuven K. Menaliem, LL.M. • IP Management Consultant/Strategic Advisor •
• *Registered Israeli 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)/972-52-761-8226 (IL cell.)/1-816-301-1649 (US line) •

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO)

In re Applicant:	§	
Stephen L. Thaler	§	
Serial No.:	§	
Filed:	§	Group Art Unit:
For: DEVICES AND METHODS FOR ATTRACTING ENHANCED ATTENTION	§	Attorney Docket: 50567-3-01-US Confirmation No.:
Examiner:	§	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBSTITUTE STATEMENT UNDER 37 CFR 1.64 IN LIEU OF DECLARATION UNDER 35 USC §115(d)

This Statement under 37 CFR 1.64 is directed to the abovementioned application in lieu of a declaration under 35 USC §115(d).

- The name of inventor to whom this substitute statement applies:

  DABUS (the invention was autonomously generated by an artificial intelligence), 1767 Waterfall Dr., St. Charles, MO 63303 USA.

- I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application. The above-identified application was made or authorized to be made by me. I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

- Relationship to the inventor to whom this substitute statement applies: **Legal Representative**

- 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/80 (07-17)
Approved for use through 03/31/2021. OMB 0651-0035
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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

Date 24 July 2019

Name Stephen L. Thaler

Telephone (314)378-5406

Title Applicant/Assignee

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 intellig	

Residence Information (Select One) ● US Residency Non US Residency 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 i	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	rkm@FlashPointIP.com	Add Email	Remove Email
Email Address	drryanabbott@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**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	**Suggested Figure for Publication (if any)**	2

PTO/AIA/14 (02 18)
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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

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		Remove
Registration Number	63345				
Prefix	**Given Name**	Middle Name	**Family Name**	Suffix	
Dr	Ryan	B.	Abbott		Remove
Registration Number	68178				

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

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		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. Add

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)[i] 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 responsib lity 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[i] (if applicable)	Remove
18275174.3	EP	2018 11 07		
Application Number	**Country[i]**	**Filing Date (YYYY-MM-DD)**	**Access Code[i] (if applicable)**	**Remove**
1818161.0	GB	2018 11 07		

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

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.

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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

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.

PTO/AIA/14 (02 18)
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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

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	L.	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.

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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

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.

Remove

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

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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

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.

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.

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.

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 ½ (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 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 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 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 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.

SUMMARY

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

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. 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 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 ½, 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 ½ 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 ½, 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 ½, relates to 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, 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, 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.

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 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-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 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 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.

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.

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.

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 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 zeroset 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;

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 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 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) 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 ½. 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 ½ (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., zeroset dimension of the trace), and fills a buffer with those transition patterns having an approximate fractal dimension of ½. 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 ½ 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 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 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 ½. Step **26** may be accomplished 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 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 zeroset 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 zeroset 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 being of equal magnitude (Figure 3). The aggregate intersections with the time axis represent the zeroset, 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 zeroset (or fractal) dimension, D_0, which is approximated as: $D_0 \quad \ln(N_0)/\ln(N)$, wherein N is the total 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 ½, 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 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 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 ½ 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 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 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.

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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(number of intercepts of a neuron's net input with a firing threshold)/ln(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 zeroset 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(number of intercepts of a neuron's net input with a firing threshold)/ln(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 zeroset 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

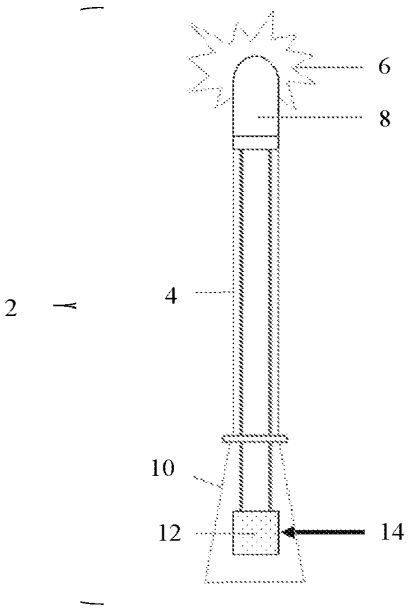


Figure 1

Exemplary Embodiment

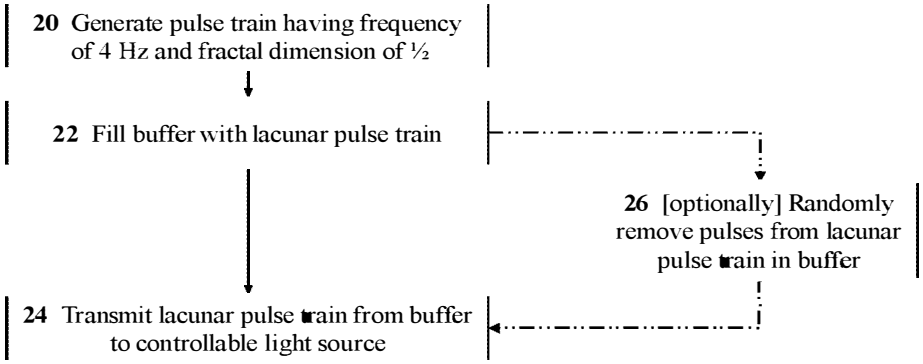


Figure 2

Exemplary Embodiment

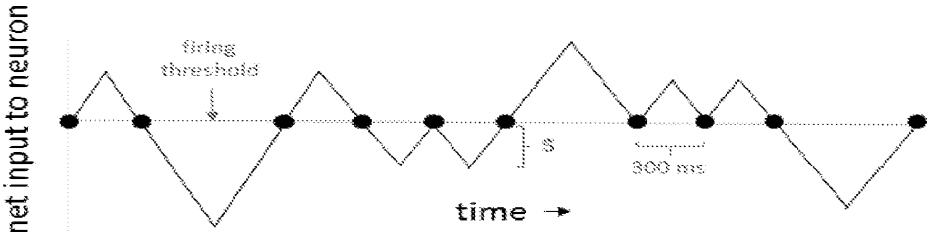
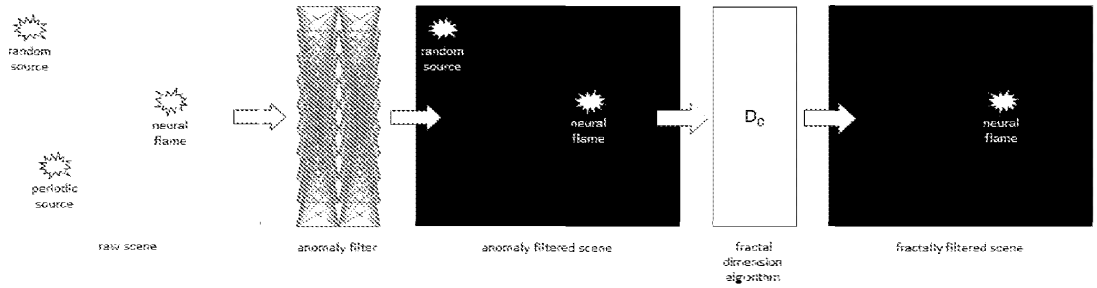


Figure 3

Exemplary Embodiment



4/4

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 Khedhouri 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**

PTO/AIA/96 (08 12)
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STATEMENT UNDER 37 CFR 3.73(c)

Applicant/Patent Owner: Stephen L. Thaler

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

Titled: Food Container

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.

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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

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

[Page 2 of 2]

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.

BHN"W

FlashPoint IP
Where Volatile Ideas Ignite

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. Reuven K. Mouallem, LL.M. • IP Management Consultant/Strategic Advisor •
• *Registered Israeli Patent Attorney* • *Registered U.S. Patent Agent* • e-mail: rkm@FlashPointIP.com •
• website: www.FlashPointIP.com • LinkedIn: www.LinkedIn.com/in/FlashPointIP •
• tel: 972-3-936-3189 (IL line)/972-52-761-8220 (IL cell.)/1-516-361-1649 (US line) •

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE (USPTO)

In re Applicant:	§	
Stephen L. Thaler	§	
Serial No.:	§	
Filed:	§	Group Art Unit:
For: FOOD CONTAINER	§	Attorney Docket: 50567-4-01-US Confirmation No.:
Examiner:	§	

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

SUBSTITUTE STATEMENT UNDER 37 CFR 1.64 IN LIEU OF DECLARATION UNDER 35 USC §115(d)

This Statement under 37 CFR 1.64 is directed to the abovementioned application in lieu of a declaration under 35 USC §115(d).

- The name of inventor to whom this substitute statement applies:

  DABUS (the invention was autonomously generated by an artificial intelligence), 1767 Waterfall Dr., St. Charles, MO 63303 USA.

- I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application. The above-identified application was made or authorized to be made by me. I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

- Relationship to the inventor to whom this substitute statement applies: **Legal Representative**

- 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/80 (07-17)
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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

PTO/AIA/14 (02 18)
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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 Legal Name Remove

Prefix	Given Name	Middle Name	Family Name	Suffix
	[DABUS]		Invention generated by artificial intelli	

Residence Information (Select One) ● US Residency Non US Residency 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	39602		
Email Address	ydm@FlashPointIP.com	Add Email	Remove Email
Email Address	rkm@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**	☒
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	6	**Suggested Figure for Publication (if any)**	6

EFS Web 2.2.13

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
Dr	Reuven	K.	Mouallem	
Registration Number	63345			

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix
Dr	Ryan	B.	Abbott	
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 4 01 US

Application Number

Title of Invention FOOD CONTAINER

Prior Application Status	Pending		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. Add

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)[i] 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).

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
18275163.6	EP	2018 10 17	

			Remove
Application Number	Country[i]	Filing Date (YYYY-MM-DD)	Access Code[i] (if applicable)
1816909.4	GB	2018 10 17	

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

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.

PTO/AIA/14 (02 18)
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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.

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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	L.	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.

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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.

Remove

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. Add

Signature:

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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).**

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Application Data Sheet 37 CFR 1.76

Attorney Docket Number 50567 4 01 US

Application Number

Title of Invention FOOD CONTAINER

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APPLICATION FOR PATENT

Title: FOOD CONTAINER

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.

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 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 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 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.

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.

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.

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.

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.

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.

BRIEF DESCRIPTION OF THE DRAWINGS

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

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

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 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 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 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 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 larger width or dimeter 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 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 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.

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.

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.

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.

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 and 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.

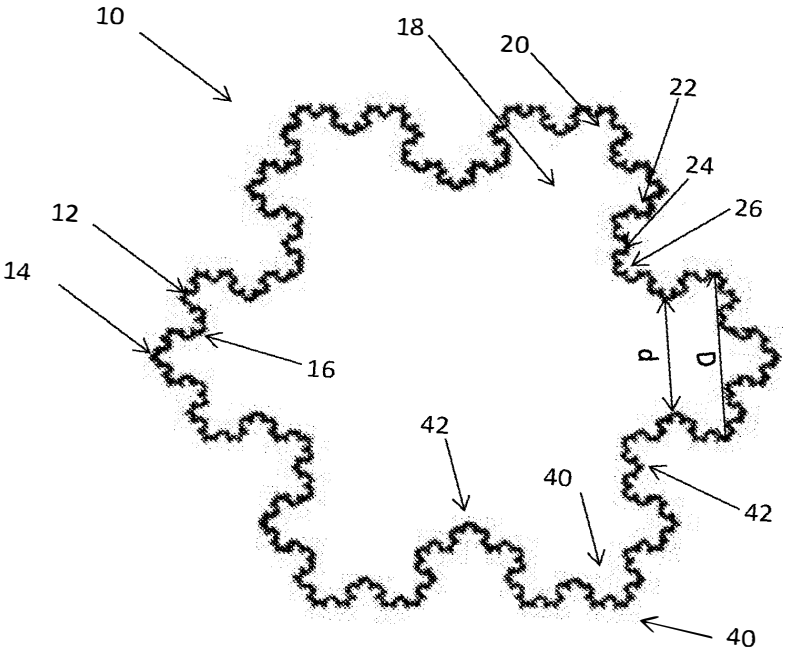

Fig. 1

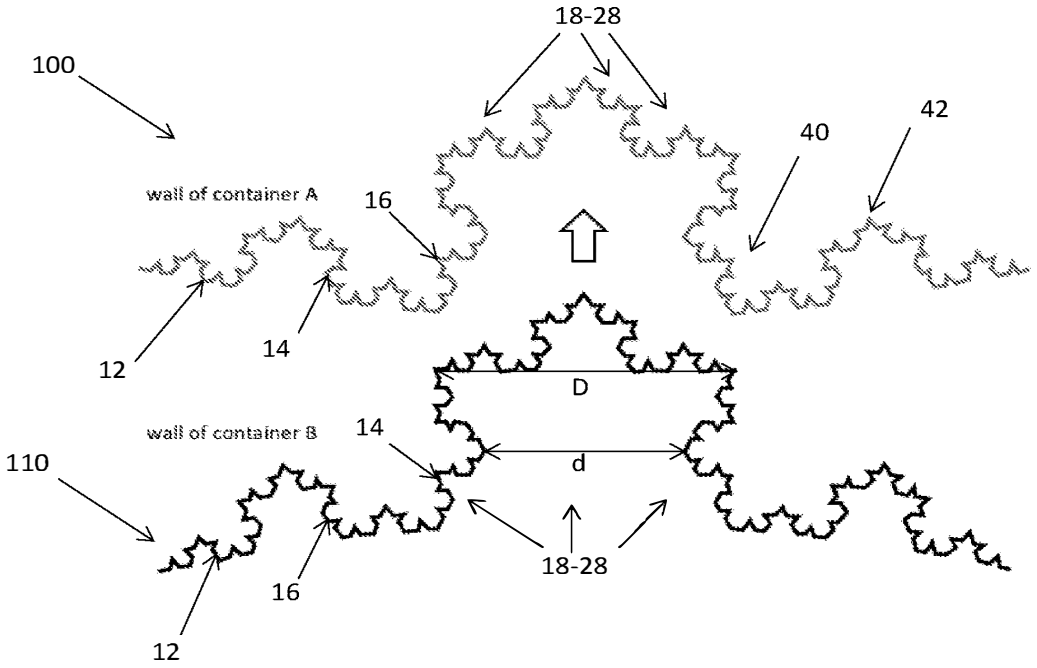
18-28
100
42
40
wall of container A
16
12
14
D
wall of container B
14
d
110
18-28
16
12

Fig. 2

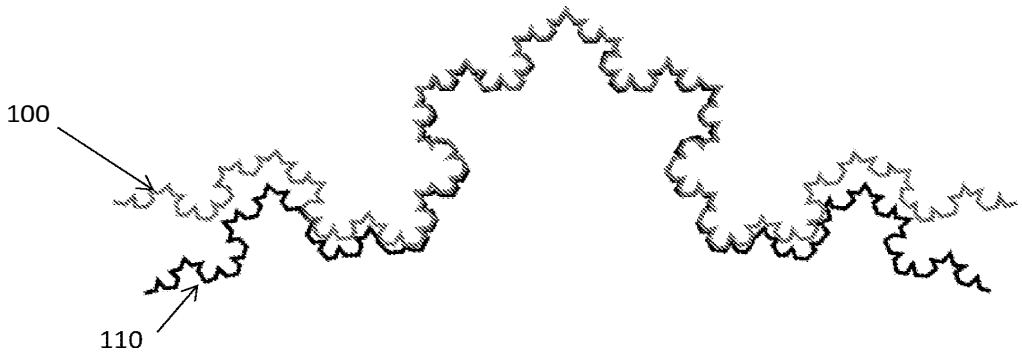
100
110

Fig. 3

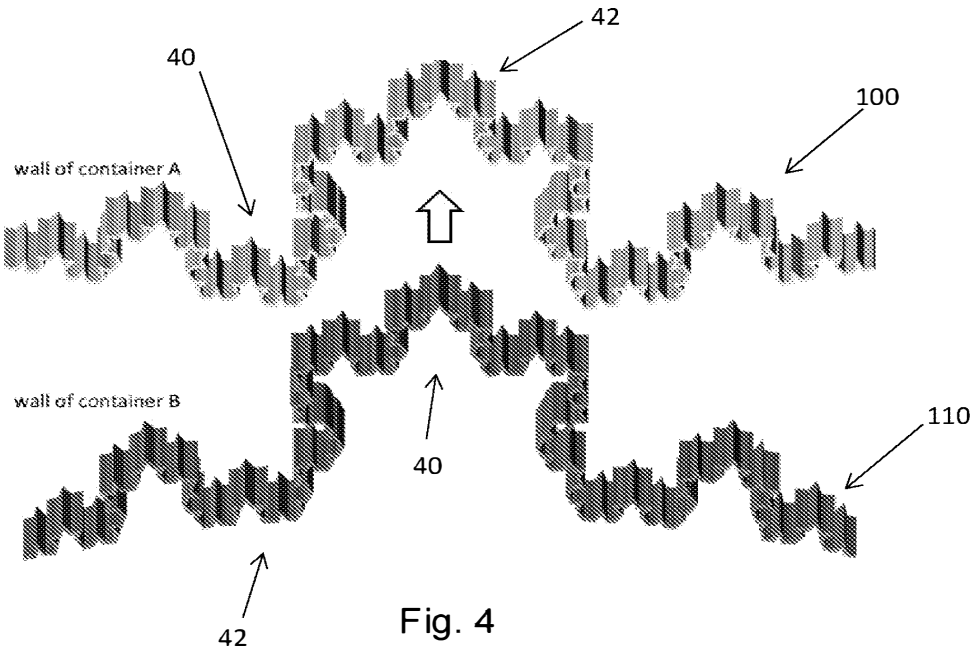
42
40
100
wall of container A
wall of container B
110
40
42

Fig. 4

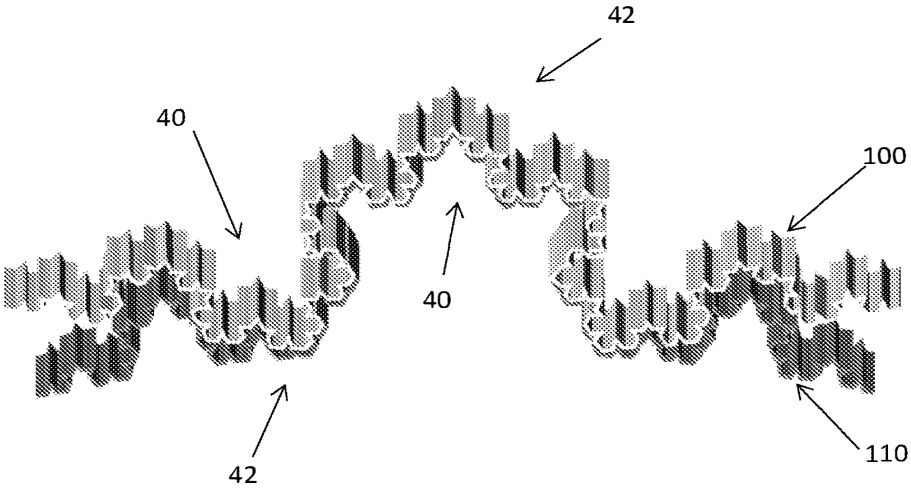
42
40
100
40
110
42

Fig. 5

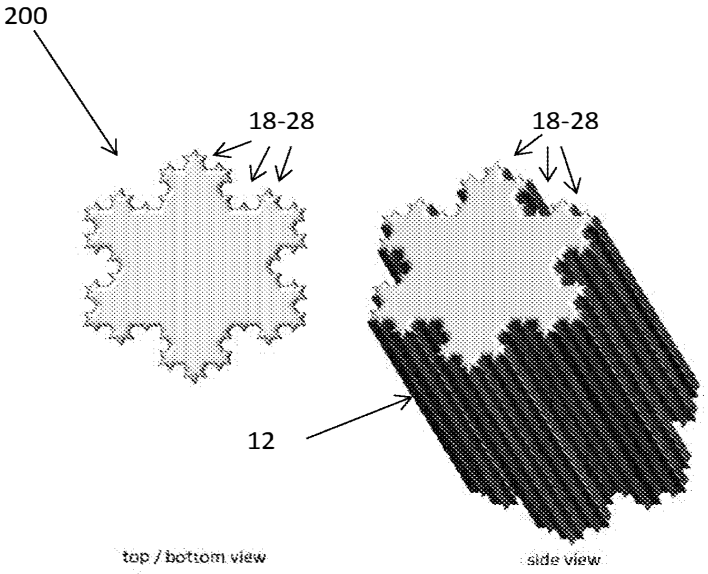
200
18-28
18-28
12
top / bottom view
side view

Fig. 6

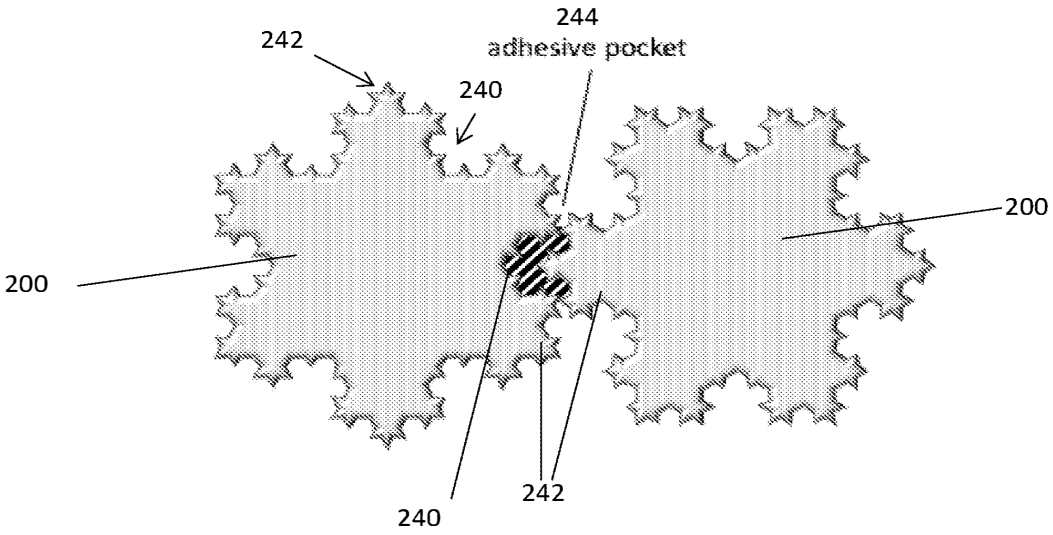
242
244
adhesive pocket
240
200
200
240
242

Fig. 7

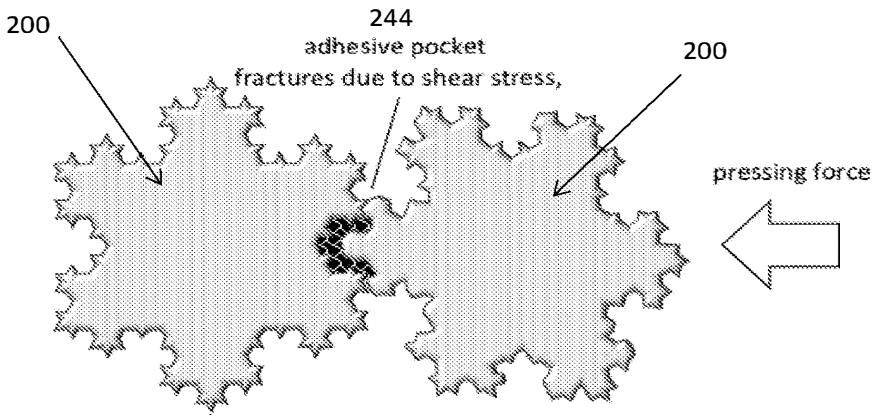
200
244
adhesive pocket
fractures due to shear stress,
200
pressing force

Fig. 8

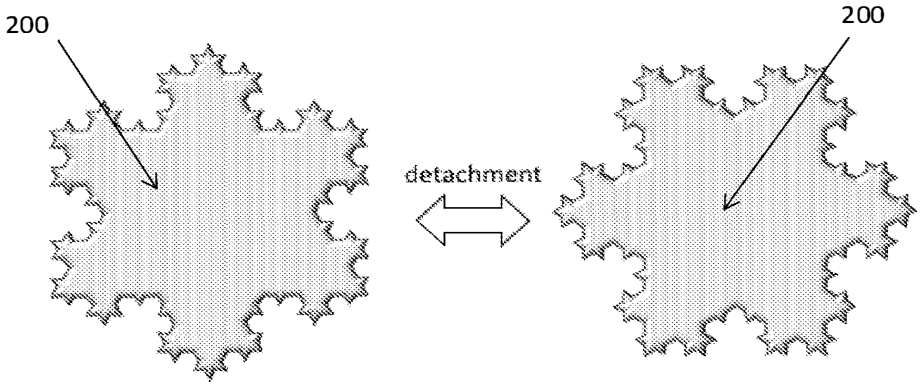
200
detachment
200

Fig. 9

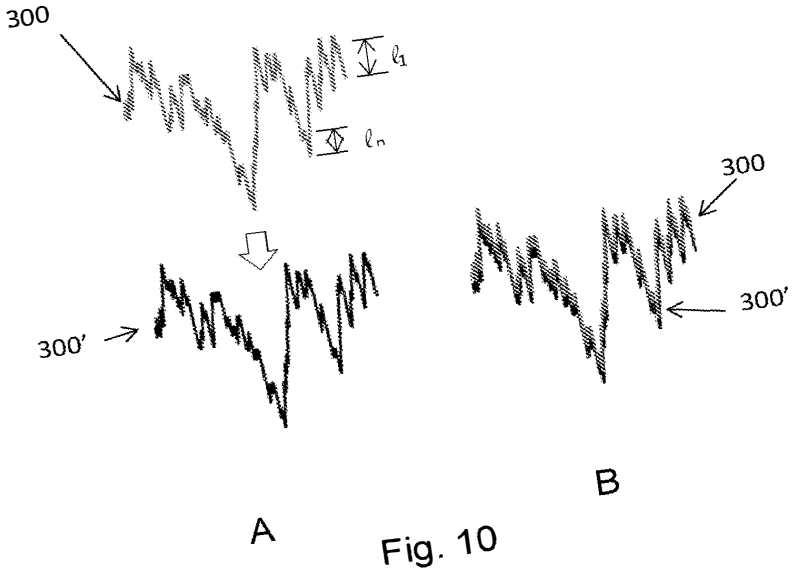

Fig. 10

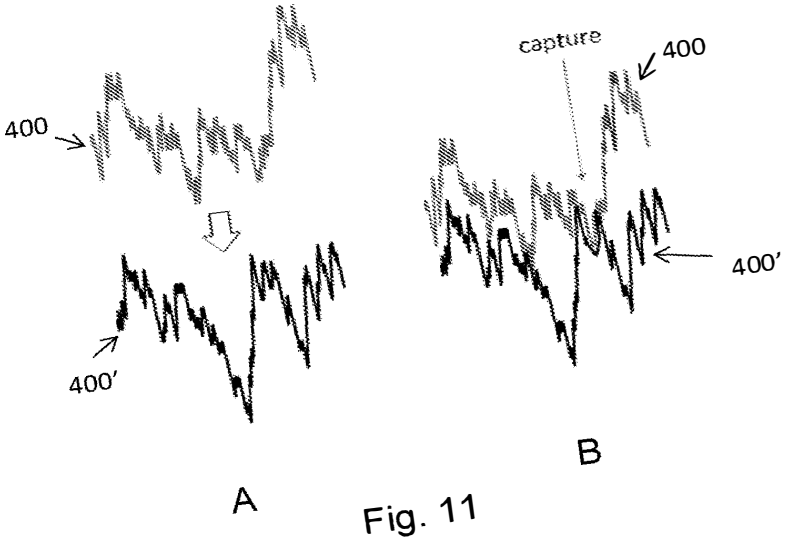

Fig. 11

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 Khedhouri Mouallem

Attorney Docket Number: 50567 4 01 US

Filed as Small Entity

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UTILITY SEARCH FEE	2111	1	330	330
UTILITY EXAMINATION FEE	2311	1	380	380

Pages:

Claims:

Miscellaneous-Filing:

Petition:

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Miscellaneous:				
		Total in USD ($)		**785**