No. 21-209

In the
Supreme Court of the United States

HUPING HU, MAOXIN WU
Petitioners,

v.

DREW HIRSHFELD, Acting Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office, *Respondent.*

On Petition for a Writ of Certiorari to the United States Court of Appeals for the Federal Circuit

PETITION FOR A WRIT OF CERTIORARI

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QUESTIONS PRESENTED

The patent claims in Petitioners' four patent applications are based on their experimental discoveries related to quantum entanglement while conducting brain research. These discoveries were published in peer-reviewed scientific journals. However, the patent claims were all rejected by the PTO and the said rejections were then affirmed by the Federal Circuit under 35 U.S.C. § 101 on the grounds of operability by applying a "heightened standard" not found in the statutes nor any case decided by this Court, and judicial exception of natural phenomenon in one application. Indeed, this Court had scarcely considered the fundamental threshold question of operability under § 101 since the Patent Act of 1790. The Board stated that "[w]e have no doubt that if [Hu]'s invention is able to use quantum entanglement to ... it would be both groundbreaking and revolutionary" (App. 34a). Citing Hamlet by Shakespeare in a footnote, the Federal Circuit stated that "[s]hould further investigation bring peer recognition and verifiable results, the PTO ... would surely be interested" (App. 24a).

The questions presented are:

1. Whether the PTO's varied standards, buttressed by the decisional law of the lower reviewing courts, for determining operability under § 101 are biased towards conventional inventions but against groundbreaking inventions or discoveries, thus hindering the promotion of the "Progress of Science and Useful Arts" emanating from the Intellectual Property Clause of the U.S. Constitution.

QUESTIONS PRESENTED – Continued

2. Whether the Federal Circuit erred by applying a "heightened standard" of operability under § 101, "typically measured by reproducibility of results", when claimed inventions or discoveries are considered to contain concepts straining scientific principles, thus effectively raising the standard of proof on operability from "more likely than not true" to "beyond a reasonable doubt" or "as a matter of statistical certainty."

3. Whether the decisional law of the reviewing courts, creating judicial exceptions to patent eligibility under § 101, has no statuary basis and thus inapplicable in light of this Court's recent decision in Henry Schein, Inc. v. Archer & White Sales, Inc. 139 S. Ct. 524 (2019).

4. Whether the PTO personnel and the Federal Circuit can substitute their common sense and common knowledge for the specialized knowledge and expertise of a person having ordinary skill in the art ("PHOSITA") in determining operability under § 101.

PARTIES TO THE PROCEEDING

The parties to this proceeding are those listed on the cover: (1) Petitioners, Huping Hu and Maoxin Wu, and (2) Respondent, Drew Hirshfeld, Acting Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office.

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PETITION FOR A WRIT OF CERTIORARI

Huping Hu and Maoxin Wu respectfully petition for a writ of certiorari to review the decision of the Federal Circuit in this case.

OPINIONS BELOW

The nonprecedential opinion of the Federal Circuit (App. 1a-24a) was issued in the following four related appeals consolidated for briefing and argument by the said court:

CAFC Case No.	Board Case No.	Pat. App. Serial No.
2019-2104	2018-007211	11/944,631
2019-2105	2018-003398	13/449,739
2019-2106	2018-003401	13/492,830
2019-2107	2018-003120	11/670,996

The opinion is available at In re Huping Hu, 2021 U.S. App. LEXIS 7776 (Fed. Cir. Mar. 17, 2021).

The four written decisions of the Patent Trial and Appeal Board ("Board") of the Patent and Trademark Office ("PTO") are reproduced at App. 25a-97a.

JURISDICTION

The decision of the Federal Circuit was entered on March 17, 2021. App. 1a-24a. No petition for rehearing was filed. In the Order of July 19, 2021 by this Court, the time within which to file any petition for a writ of certiorari due before that date remains extended to 150 days. Petitioners invoke the jurisdiction of this Court under 28 U.S.C. § 1254(1).

CONSTITUTIONAL AND STATUTORY PROVISIONS INVOLVED

The pertinent constitutional and statutory provisions are as follows:

U.S. Constitution, Article I, Section 8

> Congress shall have power...[t]o promote the Progress of Science and useful Arts, by securing ... to Authors and Inventors the exclusive Right to their respective Writings and Discoveries[.]

35 U.S.C. § 101 - Inventions patentable

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent ....

5 U.S.C. § 706 - Scope of review

> ...the reviewing court shall decide all relevant questions of law, interpret constitutional and statutory provisions, and determine the meaning or applicability of the terms of an agency action. The reviewing court shall—
>
> ....
>
> (2) hold unlawful and set aside agency action, findings, and conclusions found to be—

(A) arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law;
(B) contrary to constitutional right, power, privilege, or immunity;

....

INTRODUCTION

Article I, Section 8, of the United States Constitution states that the Congress shall have power "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries" ("IP Clause").

In exercising that power, Congress enacted the Patent Act. § 101 of the Act states that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter..., may obtain a patent therefor, subject to the conditions and requirements of this title."

This Court observed that "in the patent context,...the ultimate purpose of promoting the 'Progress of Science and useful Arts'" should be served by patent laws. *Eldred v. Ashcroft*, 537 U.S. 186, 223 (2003). This Court also noted that "the primary purpose of our patent laws ... is 'to promote the progress of science and useful arts' ". *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917).

Therefore, the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause is the overarching goal of the patent system.

See, Sean B. Seymore, Patently Impossible, 64 *Vanderbilt Law Review* 1489, 1540 (2011).

This case raises the crucial question of whether the PTO's varied standards, buttressed by the decisional law of the lower reviewing courts, for determining operability under § 101 are biased towards conventional inventions but against groundbreaking inventions or discoveries, thus hindering the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause.

Prior to the mid-20th century, a de minimis utility standard applied to almost all inventions. Sean B. Seymore, The Research Patent, 74 *Vanderbilt Law Review* 143, 150 (2021). However, since that time, the utility threshold is technology-specific—de minimis for some inventions but more stringent for others. See §2107 (App. 100a-114a) in PTO's Manual of Patent Examining Procedure ("MPEP"); *Id.* at 145. "For example, mechanical and electrical inventions almost never face utility hurdles, [b]ut the opposite is true for chemical inventions..." (footnotes omitted). *Id.*

In this case, the Federal Circuit held that "[t]he PTO, as the nation's guardian of technologic invention, must be receptive to unusual concepts, for the core of invention is unobviousness," but applied a "heightened standard" of operability under § 101, "typically measured by reproducibility of results", because the Petitioners' claimed inventions and discoveries are considered to contain concepts which strain scientific principles. App. 23a-24a. In so doing, the Federal Circuit has effectively raised the standard of proof on operability under § 101 in this

case from "more likely than not true" in MPEP §2107 to "beyond a reasonable doubt" or "as a matter of statistical certainty" through independent verification and peer recognitions.

Surprisingly, this Court had scarcely considered the fundamental threshold question of operability under § 101 since the Patent Act of 1790[1]. This situation might have been due to the reason that the patent applicants had not mount a meaningful challenge in this Court[2]. But not being meaningful challenged in or reviewed by this Court does not means that the threshold question of operability under § 101 is unimportant or the actions of the PTO as the gatekeeper and the decisional law of the lower reviewing courts have been correct, just or constitutional since the Patent Act of 1790, especially, in this age of rapidly advancing sciences and technologies.

In contrast, this Court has been active regarding judicial exceptions to patentability under § 101[3]. This Court recently also held that there is no

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[1] This Court mentioned in Mitchell v. Tilghman, a case later being overruled, the operability requirement. 86 U.S. (19 Wall.) 287, 396 (1873) ("[a unpatentable invention] is not capable of being used to effect the object proposed", citing Curtis on Patents, 4th edition, § 449).

[2] See, *e.g.*, cert. denied in No. 02-1565 and No. 18-961 filed by Petitioner, Mitchell R. Swartz, *pro se*.

[3] At the request of four Senators, the PTO "is undertaking a study on the current state of patent eligibility jurisprudence ... and how [it] has impacted investment and innovation, particularly in critical technologies like quantum computing..." https://www.federalregister.gov/documents/2021/07/09/2021-14628/patent-eligibility-jurisprudence-study

statutory authority for judicial exceptions under the Federal Arbitration Act. Henry Schein, Inc. v. Archer & White Sales, Inc. 139 S. Ct. 524, 528 (2019) ("The Act does not contain a 'wholly groundless' exception, and we are not at liberty to rewrite the statute passed by Congress and signed by the President").

In this case, the Federal Circuit affirmed without discussion the Board's finding that the claimed invention for an apparatus in the '739 application is directed to the judicial exception of a natural phenomenon.

Petitioners respectfully submit that the decisional law of the reviewing courts, creating judicial exceptions to patent eligibility under § 101, also has no statuary basis and thus inapplicable in light of this Court's decision in *Id.*.

This case also raises the question of whether the PTO personnel and the Federal Circuit can substitute common sense and common knowledge for the specialized knowledge and expertise of a person having ordinary skill in the art ("PHOSITA") in determining operability under § 101.

Petitioners respectfully submit that the record in this case shows that the concepts allegedly straining scientific principles do not actually exist from the standpoint of a PHOSITA but are mere opinions of the PTO personnel and the Federal Circuit from their non-expert standpoints.

However, neither the PTO personnel nor the reviewing courts should add additional burdens on the patent applicants that are not sanctioned by the

Congress in its statutory scheme; nor should they assume that they are the experts in a particular art and their own views can substitute those of a PHOSITA. Sadly, this is what happened in this case.

The severe and irreparable harm is that, instead of compensating the Petitioners and many other discoverers and pioneers similarly situated with patents, their discoveries made with toils, sweat and financial drains (and with themselves as "guinea pigs") are thrown out.

Even more consequential is the severe and irreparable harm to the promotion of "Progress of Science and useful Arts" and American innovation and technological competitiveness on the world stage, if the situation continues, for investment is the fuel in the engine propelling the aforesaid Progress and innovation but no one would put fuel in the engine if it just runs in vain.

This state of affairs is contrary to the constitutional purpose of the IP Clause, and unjustly denies Petitioners' rights and those of other discoverers and pioneers similarly situated for patents. Only this Court can reverse this sad and depressing situation short of congressional action.

This case provides this Court the rare opportunity to consider the fundamental threshold question of operability under § 101 since the Patent Act of 1790 and reverse the biased and/or unconstitutional aspects of § 101 jurisprudence which hinder the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause and unjustly deny patents to inventors and

discoverers for their pioneering, groundbreaking or revolutionary inventions and discoveries.

STATEMENT OF THE CASE

I. The Claimed Inventions

Petitioners' inventions and discoveries are in the fields of brain research and quantum entanglement research and development. R&D in these fields are crucial in the coming quantum revolution following the industrial, technological and digital revolutions.

Petitioners are U.S. Citizens. Hu is a trained experimental biophysicist with a Ph.D. in biophysics from University of Illinois at Champaign-Urbana, and M.S. in biophysics and B.S. in chemistry from universities in China. C.A.J.A. 6671. The subject inventions are scientific discoveries made by Hu in collaboration with Wu while studying brain functions and nature of quantum entanglement. App. 147a.

The Petitioners had published a spin-mediated consciousness theory in which quantum spins carried by nuclei and/or electrons inside the brain play important roles. App. 147a. Hu thought that this theory might be experimentally tested by first attempting to quantum-entangle nuclear/electronic spins inside the brain with those of an external substance through interactions with the photons of magnetic pulse and then observing the resulting brain effects such attempt might produce. Hu further thought that the said experiment would work if quantum entanglement means genuine inter-connectedness and inseparableness of once interacting

quantum entities and is able to influence biological and/or chemical processes. Hu then carried out various experiments in collaboration with Wu. App. 147a.

At the time of Petitioners' experiments, many experiments by other scientists had already shown that quantum entanglement is physically real; indeed, it is ubiquitous in the microscopic world and manifests itself macroscopically under some circumstances. App. 145a-146a. However, the essence and implications of quantum entanglement were hotly debated and largely unknown. App. 146a.

The subject discoveries and inventions were based on Hu's realizations that (App 147a-148a):

(1) quantum entanglement means genuine interconnectedness and inseparableness of once interacting quantum entities and can be directly sensed and utilized by the entangled quantum entities;

(2) it can persist in biological, chemical and other systems at room and higher temperatures despite of quantum decoherence; and

(3) it can influence chemical and biochemical reactions, other physical processes and micro- and macroscopic properties of all forms of matters.

Therefore, it can be harnessed and developed into useful technologies to serve the mankind in many areas such as health, medicine and even recreation

besides the already emerging fields of quantum computation. App. 148a.

Hu's discoveries and inventions in collaboration with Wu were disclosed in five patent applications. Four of them are involved in this case:

11/670,996 ("the '996 application"), filed 02/04/2007, App 145a-188a;

11/944,631 ("the '631 application"), filed 11/25/2007, App 220a-277a;

13/449,739 ("the '739 application"), filed 04/18/2012, C.A.J.A. 2001-2048, which is a divisional application of the '996 application; and

13/492,830 ("the '830 application") with Petitioner, Wu, filed 06/09/2012, App. 189a-219a, which is a continuation-in-part application of the '996 application.

These discoveries were published in five peer-reviewed scientific articles, C.A.J.A. 4603-4654. The first pages of these five articles are available at App. 352a-366a .

(A) The '996 Application

The claimed invention in the '996 application relates to method of producing quantum entanglement, non-local effects of substances through quantum entanglement on responsive targets such as biological and chemical systems, to apparatus for such productions, and to method of

using the non-local effects for beneficial purposes. App. 145a.

Petitioners have two published scientific articles (App. 352a-357a, C.A.J.A. 6674-6695) and one Chinese patent by Hu on the subject invention/discovery (C.A.J.A. 6876).

The specification (App. a145-182a) describes the invention in details. Drawings (App. 182a-188a) are included with the application which provide schematic views of the method and apparatus for producing quantum entanglement and non-local effects of substances. For example, Paragraphs 42-45 of the specification (App. 156a-157a) describe in details of how to setup and use one particular embodiment shown in Fig. 1A (App. 182a) and how quantum entanglement is generated and non-local effects of substances are produced.

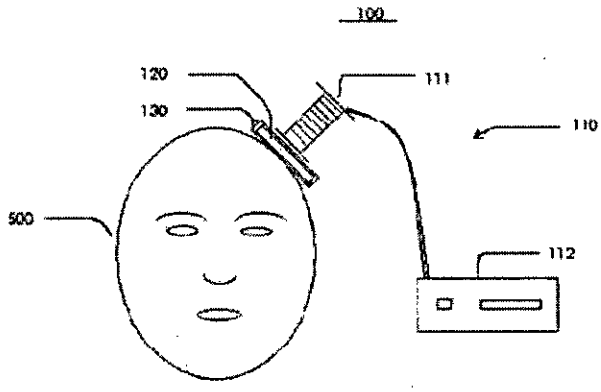

FIG. 1A

The specification further goes on to describe in Paragraphs 72-108 of the specification (App. 1165a-182a) various experimental studies and results obtained with the apparatus and methods disclosed.

To verify that the biological and/or chemical effects experienced by the test subjects were due to quantum entanglement between the quantum entities inside the test subjects and those in the substances under study, four sets of experiments were described and carried out to obtain verification. Paragraphs 78-82 (App. 168a-169a), 90-94 (App. 174a-177a).

Representative Claim 1 in the '996 application is listed below (App. 132a-133a):

> A method of producing a plurality of quantum entanglements between a first plurality of quantum entities in a first target and a second plurality of quantum entities in a second target, a first non-local effect of said second target on said first target through said plurality of quantum entanglements and/or a second non-local effect of said first target on said second target through said plurality of quantum entanglements which comprises the steps of:
>
> selecting said first target which comprises a first chemical substance, water-based medium, human or animal;
>
> selecting said second target which comprises a second chemical substance, water-based medium, human or animal;

providing a photon or magnetic pulse generating source which emits a plurality of photons or magnetic pulses as quantum entanglement generating members when said source operates;

disposing said first target between said source and said second target or said second target between said source and said first target; and

driving said source to emit said photons or magnetic pulses which interact with said first plurality of quantum entities in said first target and said second plurality of quantum entities in said second target;

whereby said plurality of quantum entanglements ... is generated through said interactions of said photons or magnetic pulses ... with said first plurality of quantum entities ... and said second plurality of quantum entities ...; and said first non-local effect ..., comprising a first non-local effect of said second target on a first physical, chemical or biological property or process of said first target, and/or said second non-local effect ..., comprising a second non-local effect of said first target on a second physical, chemical or biological property or process of said second target, are generated through said plurality of quantum entanglements.

(B) The '631 Application

The claimed invention in the '631 application relates to method of producing non-local physical, chemical and biological effects on physical, chemical and/or biological systems through quantum entanglement mediated processes, to apparatus for such productions, and to method of using the non-local effects for beneficial purposes. App. 220a.

Petitioners have two published scientific articles (App. 358a-363a, C.A.J.A. 1378-1401) and one U.K. patent by Hu on the subject invention and discovery (C.A.J.A. 1402-1459).

The specification (App. 220a-268a) describes the invention in details. Drawings (App 269a-277a) are included with the application which provide schematic views of the method and apparatus for producing non-local physical, chemical and biological effects. Paragraph 46 (App. 232a) described how target substance and originating substance can be quantum-entangled through one of several quantum-entanglement processes discovered and published in Petitioners' two scientific articles after peer review (C.A.J.A. 6674-6695). Paragraphs 47-50 (App. 232a-234a) describe in details of how to setup and use one particular embodiment shown in FIG. 1 and FIG. 2 (App. 269a) and how non-local physical, chemical and biological effects are produced.

The specification further goes on to describe in Paragraphs 48-109 (App. 233a-268a) various experimental studies and results obtained with the apparatus and methods disclosed.

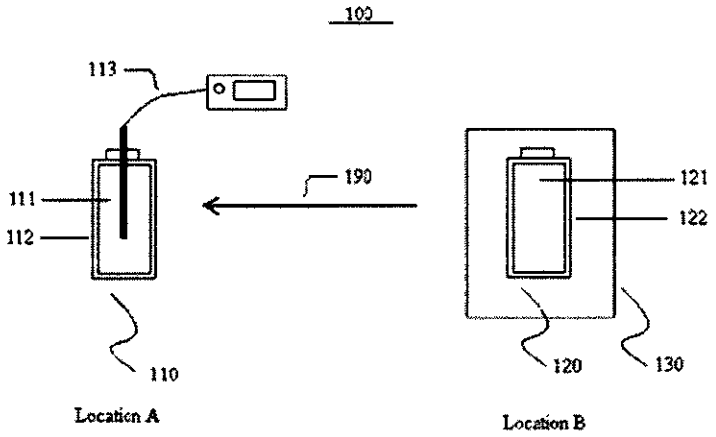

FIG.1

Representative Claim 1 in the '631 application is listed below (App. 115a-116a):

> A method of producing a non-local effect in a target substance through manipulating an originating substance and detecting said non-local effect which comprises the steps of:
>
> selecting a substance which comprises said target substance and said originating substance;
>
> generating a plurality of quantum entanglements within a plurality of quantum entities in said substance by irradiating said substance with magnetic pulse, laser light or microwave, or letting said substance sit for at least thirty days;
>
> separating said substance into said target substance and said originating substance;

positioning said target substance at a first location in a first stable environment and said originating substance at a second location in a second stable environment;

cooling, heating or adding a third substance to said originating substance; and detecting with a high-precision instrument a change in weight, temperature and/or pH value of said target substance;

whereby said non-local effect is produced through a non-local process mediated by said quantum entanglements and said non-local effect is said change in weight, temperature and/or pH value of said target substance.

(C) The '830 Application

The '830 application is a continuation-in-part application of the '966 application. App. 189a. The claimed invention is further related to method of objectively and quantitatively detecting and measuring non-local effect in biological systems, and to apparatus for such detection and measurement. App. 189a.

The Petitioners has one published scientific article on the subject invention. App 364-366a, C.A.J.A. 4649-4654.

The specification describes the invention in details. The new parts not in the '996 application are Paragraphs 8, 16, 43-48, 84-87, 90, 116-125 and 128 of the specification (App. 189a-208a, C.A.J.A. 3538-

3619). Drawings were included with the application which provide schematic views of the method and apparatus for producing quantum entanglement and producing and detecting non-local effects of substances. New drawings not in the '996 application are FIG.7-FIG.10B (App. 209a-219a). For example, Paragraphs 84-85 (App. 192a) describe how to setup and use one particular embodiment shown in FIG.7 and FIG.8A and how quantum entanglement is generated and non-local effects of substances are produced and detected.

The new experimental results are describe in Paragraphs 116-125 (App. 193a-208a) and FIG.9A-FIG.10B (App. 209a-219a).

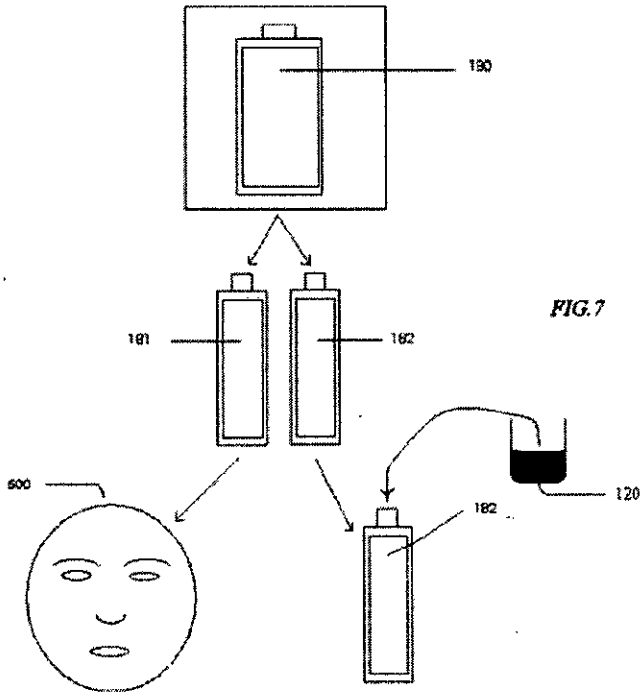

FIG.7

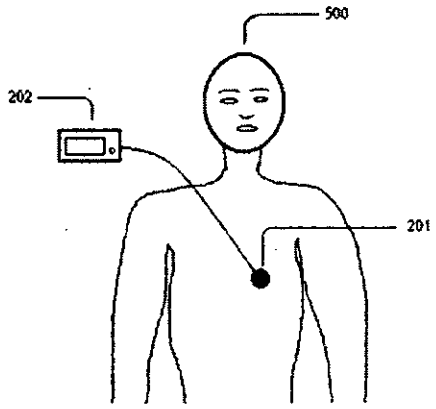

FIG. 5A

Representative Claim 5 is available at App. 128a-130a.

(D) The '739 Application

The '739 application is a divisional application of the '996 application. C.A.J.A. 2001-2048.

Representative Claim 1 in the '739 application is listed below (App. 124a-125a):

> An apparatus for producing a plurality of quantum entanglements between a first plurality of quantum entities in a chemical substance and a second plurality of quantum entities in a human or animal, a non-local chemical effect of said human or animal on said chemical substance through said

plurality of quantum entanglements and/or a non-local biological effect of said chemical substance on said human or animal through said plurality of quantum entanglements which comprises:

a quantum-entanglement generating source which emits a plurality of quantum-entangling photons or magnetic pulses when said source operates;

a first container for holding said chemical substance disposed next to said source; and

said chemical substance in said container;

such that when said first container is filled with ... is disposed next to said human or animal, and said source operates, said photons or magnetic pulses interact with said first plurality of quantum entities ... and said second plurality of quantum entities ... generating said plurality of quantum entanglements, said non-local chemical effect ... which comprises an effect of said human or animal on a chemical property or process of said chemical substance and/or said biological non-local effect ... which comprises an effect of said chemical substance on a biological property or process of said human or animal.

II. The PTO Examinations

All four applications were examined under the pre-AIA first to invent provisions. App. 285a.

The '996 and '830 Applications

In the '996 application, all claims (App. 132a-144a) were rejected because the claimed invention allegedly lacks patentable utility (inoperable) under § 101 and fails under § 112. C.A.J.A. 6535-6553.

In the '830 application, all claims (App. 128a-131a) were rejected for the same alleged reasons above. C.A.J.A. 4473-4490.

The examiner acknowledged that "the concept of quantum entanglement *per se* is not being disputed," but asserted that "rather the method claimed by applicant as being capable of generating quantum entanglements between first and second targets including humans and animals" is disputed. C.A.J.A. 6549, 4489.

The rationales behind the examiner's rejections under § 101 in both applications were that: (1) "[I]f substance is not physically administered to the body, the chemical and physical reactions and interactions required would not take place"; and (2) Even if Hu' experimental data were true, they were not necessary the results of quantum entanglement" because of the alleged quantum decoherence or other possible interpretation. C.A.J.A. 6540-6543, 4479-4482.

To overcome the examiner's repeated rejections based on her common sense and common knowledge (not the specialized knowledge and expertise of a PHOSITA), Hu produced Petitioners' five scientific publications after peer-reviews (App. 352-366) and two foreign patents on the claimed discoveries, and twenty-five scientific articles of other scientists (App. 367-388). C.A.J.A. 6667-7224, 4597-5106.

Hu argued repeatedly why Hu's claimed inventions based on his realizations are clearly supported by the disclosures in the specifications including the experimental data and the evidence produced, thus they are credible and operative, and why the examiner's rationales were wrong from the standpoint of a PHOSITA. C.A.J.A. 6480-6531, 4422-4469.

Hu's rebuttals on examiner's rationales above included the article "Living in a Quantum World" by a renowned expert in quantum entanglement in which he reported that "quantum mechanics is not just about teeny particles[; i]t applies to things of all sizes: birds, plants, maybe even people." C.A.J.A. 6771, 4726. Hu pointed out that "it is well established scientific principle that quantum mechanics is the foundation of chemistry, biochemistry, biology and classical physics.... [t]hus, in principle quantum entanglement should play a role in chemistry and the rest is to do experiments as the [Petitioners] did and disclosed...." C.A.J.A. 6506, 4447.

Hu's rebuttals further included experimental designs and data in the specifications verifying that

the observed effect were due to quantum entanglement (C.A.J.A. 6515, 4458) and experimental results of other scientists in the cited articles demonstrating that EEG, pH value and photo emission rates could be changed non-locally through processes associated with quantum-entanglement (App. 367-388, C.A.J.A. 6787-6790, 6955-6963, 6946-6954, 7042-7052).

Hu's rebuttals on examiner's rationales also included experimental results of other scientists in the cited articles (App. 367-388) clearly demonstrating that decoherence-free space exists and quantum entanglement of nuclear spins can last up to hours in room or higher temperatures. C.A.J.A. 6480-6531, 4422-4469.

Hu submitted that the Petitioners provided much more than sufficient evidence such that, when "considered as a whole, it leads a [PHOSITA] to conclude that the asserted utility is more likely than not true" (citing the standard of proof in MPEP §2107). C.A.J.A. 6482, 4423.

The '631 Application

In the '631 application, all claims (App. 115a-123a) were rejected because the claimed invention was allegedly inoperable under § 101 and not enabling under § 112. C.A.J.A. 1201-1211.

The examiner did not deny that quantum entanglement is real (and even cited the article "Living in a Quantum World" in the initial Office Action) but doubted, based on his common sense and common knowledge, the claimed inventions being

capable of generating nonlocal physical effect mediated by quantum entanglement. C.A.J.A. 1201-1207.

The rationales behind the examiner's rejections under § 101 were that: (1) "[The physical properties] of an isolated target substance (water) can be changed ('whereby said non-local effect is produced through a non-local process mediated by said quantum entanglements and said non-local effect is said change in [said physical properties]') by manipulating a separate removed originating substance (water) violate[conservation laws or is contrary to common knowledge of chemistry]" (quoting Hu in ' '); and (2) Quantum entanglement was observed only momentarily in highly controlled experiment but Hu's experiments were not highly controlled. C.A.J.A. 1201-1211.

As in the '996 and '830 Applications, to overcome the examiner's repeated rejections based on his common sense and common knowledge (not the specialized knowledge and expertise of a PHOSITA), Hu produced, as supporting evidence, Petitioners' scientific publications and foreign patent on the claimed discoveries, and scientific articles written by other scientists. C.A.J.A. 1108-1147.

Hu pointed out that the examiner's rationales were wrong because quantum-entangled entities in the target substance and originating substance at two different locations **are not separate or isolated** quantum-mechanically. Thus, the observed nonlocal effect does not violate conservation laws or chemistry from the standpoint of a PHOSITA. C.A.J.A. 1114-1148.

As in the '996 and '830 Applications, Hu argued why the claimed invention based on his realizations are clearly supported by the disclosures in the specifications and the evidence produced, thus they are credible and operative, and why the examiner's rationales were wrong from the standpoint of a PHOSITA. C.A.J.A. 1108-1147.

Hu submitted that he provided much more than sufficient evidence such that, when "considered as a whole, it leads a [PHOSITA] to conclude that the asserted utility is more likely than not true" (citing the standard of proof in MPEP §2107). C.A.J.A. 1113.

The '739 Application

In the '739 application, all claims (App. 124a-127a) were rejected because the claimed invention allegedly "[did] not include additional elements that are sufficient to amount to significantly more than the judicial exception" to § 101 (C.A.J.A. 2613) and fails for other alleged reasons.

Hu argued at length (C.A.J.A. 2832-2850) to the examiner that he has provided much more than sufficient evidence such that "the record as a whole suggests that it is more likely than not that the claimed invention would be considered significantly more than...natural phenomenon" (C.A.J.A. 2850).

III. The Board Proceedings

Three of the Board's four Decisions acknowledged that "[w]e have no doubt that if [Petitioner']'s invention is able to use quantum entanglement to...it would be groundbreaking and revolutionary." App. 34a, 72a, 92a.

However, the Board stated that: "due to the absence of any known scientific principles explaining how Appellant's invention could possibly operate in this matter...", "we are not apprised of error in the Examiner's position concerning lack of utility under §101...." App. 34a, 72a, 92a.

The Board's above statement (along with others) was its non-expert view not that of a PHOSITA. It is erroneous, unsupported by the evidence of record, and, indeed, contrary to the evidence of record.

The '996, '830 and '631 applications

In the Appeal Briefs to the Board (C.A.J.A. 6586-6655, 4523-4590, 1268-1364), Petitioners expressly directed the Board to the facts, evidence and arguments made to the two examiners during the lengthy prosecutions.

The examiners' Answers (C.A.J.A. 7228-7237, 5110-5121, 1906-1945) maintained the same alleged reasons and arguments for rejections of the claimed inventions as those in the Final Office Actions (C.A.J.A. 6535-6553, 4473-4490, 1201-1211).

The examiner in the '996 and '830 applications admitted in her Answers that "the principle of quantum mechanics is not disputed nor whether macroscopic systems may be entangled" and "quantum mechanics and interactions, even within macroscopic objects, is not being disputed." C.A.J.A. 7229-7230, 5115. The examiner in the '630 application did not deny that quantum entanglement is physically real.

Therefore, Hu pointed out again in his Reply Briefs (C.A.J.A. 7238-7257, 5122-4143, 1949-1951) that "whether ...nonlocal effect through ... quantum entanglements can be produced within macroscopic systems is a mainly matter of insights and experimentation ...." C.A.J.A. 7251, 5136, 1949.

Despite all of the facts, evidence and arguments presented by the Petitioners, the Board affirmed the examiners' rejections under §101 and §112. App. 97a, 83a, 38a.

The Board stated that "the fundamental issue is not whether Appellant has explained how the claimed invention works[,] [r]ather, the requirements of utility and enablement consider whether Appellant's invention works as claimed." App. 92a fn3, 72a-73a fn6, 34a-35a fn2.

However, Petitioners did disclose in the experimental section of the specifications (*e.g.*, App. 168a-169a, 174a-177a) that the invention does work as claimed and, further, Petitioners' five scientific publications (App. 352-366) after peer-reviews and two foreign patents on the claimed discoveries, and twenty-five scientific articles of other scientists (App.

367-388) strongly support Petitioners' inventions and discoveries do work as claimed.

The Board stated that "[i]f the principles governing the operation...were so readily amenable to understanding we see no reason to omit an explanation of them ..." App. 92a fn3, 72a fn6, 34-35 fn2. This statement was the Board's non-expert view.

A PHOSITA would know and understand that: (1) How to generate quantum entanglement was known in the prior arts (App. 145a-146a, 220a-221a); and (2) How to utilize quantum entanglement to produce nonlocal effects was discovered/invented by Hu based on his realizations (App. 147a-148a, 222a-223a) and was amply and cogently explained in the specifications (See, *e.g.*, App. 168a-169a) and verified by test data in the experimental section of the specifications (See *e.g.*, App. App. 174a-177a).

The Board asserted that "..heart rate changes ... even if present...do not necessarily demonstrate a ... pharmaceutical interaction....the various articles cited by Appellant are either generic...[or] from sources regarded as having no scientific value...." App. 93a, 73a.

However, the standard proof of patentable utility is "more likely than not" in MPEP §2017, not "necessarily". Articles by other scientists do provide direct support. See, *e.g.*, Articles 12, 13, 17 and 20 in C.A.J.A. 6946-6954, 6955-6963, 7003-7021, 7042-7052 respectively. The Board's statement that "sources [are] regarded as having no scientific value" is not that of a PHOSITA but its own opinion.

The '739 application

The Board concluded that "Examiner's analysis ... is consistent with PTO guidance [in MPEP § 2106] ...[;] [a]ccordingly, we adopt the Examiner's position and sustain the § 101 rejection on the basis" of the judicial exception of a natural phenomenon. App. a55-a58. The Board cited *Alice Corp. v. CLS Bank International,* 573 U.S. 208, 216 (2014) ("Laws of nature, natural phenomena, and abstract ideas" are not patentable.) App. a55.

IV. The Federal Circuit's Opinion

In their Appeal Brief (App. 278a-351a), Petitioners showed that it was not possible for the examiners and the Board to conduct a valid patentable utility analysis (and other analyses) of the claimed inventions in the '996, '830 and '631 applications unless they first determined the four foundational questions stated in the Appeal Brief (App 331a-332a).

Unfortunately, none of that happened. neither the examiners nor the Board acknowledge the necessity to look at the Hu's realizations the way a PHOSITA would. Similarly, at no time did the PTO acknowledge that it even had any evidence at all of why Hu's realizations were wrong, who a PHOSITA was, what were the qualifications of a PHOSITA. Instead, the PTO's entire analyses and bases for rejections of all claims appear to be only from the common sense and common knowledge of the PTO employees, reading the specifications, the claims, the

prior arts and the voluminous evidence independently from the context of a PHOSITA.

Petitioners further showed that the substantial evidence standard of review dictates the opposite result and listed six reasons on the Board's decisions lacking substantial evidence. App. 333a-339a.

However, the Federal Circuit affirmed the Board's decisions rejecting all claims on the ground of operability by applying a "heightened standard" not found in the statutes nor any case decided by this Court (App. 23a).

The Federal Circuit stated that "[t]he Board did not err in requiring Hu to establish the operability of his asserted discoveries, in view of the conflict with ordinary experience as well as with established scientific principles", citing *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1359 (Fed. Cir. 1999); *Newman v. Quigg*, 877 F.2d 1575 (Fed. Cir. 1989); *In re Swartz*, 50 F. Appx 422, 424–25 (Fed. Cir. 2002). App. 23a.

Citing Hamlet in a footnote that "[t]here are more things in heaven and earth, Horatio, Than are dreamt of in your philosophy" (App. 23a-24a), the Federal Circuit held that:

> The PTO, as the nation's guardian of technologic invention, must be receptive to unusual concepts, for the core of invention is unobviousness[;] [h]owever, concepts that strain scientific principles are properly held to a heightened standard, typically measured

> by reproducibility of results[;] [h]ere the Board was presented with an apparent departure from conventional scientific understanding, and the Board appropriately sustained the examiners' requirements for experimental verification... [s]hould further investigation bring peer recognition and verifiable results, the PTO and the scientific community would surely be interested.

The Federal Circuit also affirmed without discussion that the apparatus claims in the '739 application is directed to the judicial exception of a natural phenomenon. App. a24.

REASONS FOR GRANTING THE PETITION

I. The varied standards of the PTO, buttressed by the decisional laws of the lower reviewing courts, for determining operability under § 101 are biased against groundbreaking inventions or discoveries, thus hindering the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause

In *Bilski v. Kappos*, this Court explained that the IP Clause empowered Congress "to pass a series of patent laws..., as a means of encouraging innovation". 130 S. Ct. 3218, 3236 (2010). In *Eldred v. Ashcroft*, this Court observed that "in the patent context,...the ultimate purpose of promoting the 'Progress of Science and useful Arts' should be served by the patent law. 537 U.S. 186, 223 (2003). In *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, this Court noted that "the primary purpose of

our patent laws ... is 'to promote the progress of science and useful arts' ". 243 U.S. 502, 511 (1917).

Therefore, the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause is the overarching goal of the patent system. See, Sean B. Seymore, Patently Impossible, 64 *Vanderbilt Law Review* 1489, 1540 (2011).

Prior to the mid-20th century, a de minimis utility standard applied to almost all inventions. Sean B. Seymore, The Research Patent, 74 *Vanderbilt Law Review* 143, 150 (2021). However, since that time, the utility threshold is technology-specific—de minimis for some inventions but more stringent for others. *Id.* at 145. "For example, mechanical and electrical inventions almost never face utility hurdles, [b]ut the opposite is true for chemical inventions..." (citations omitted). *Id.*

The varied standards of the PTO for determining operability under § 101, buttressed by the decisional law of the lower reviewing courts, are embodied in MPEP § 2107 (App. 100a-114a):

> 2107.01 General Principles Governing Utility Rejections
>
> ...
>
> An invention that is "inoperative" (*i.e.*, it does not operate to produce the results claimed by the patent applicant) is not a "useful" invention in the meaning of the patent law.
>
> ...

2107.02 Procedural Considerations Related to Rejections for Lack of Utility

...

In most cases, an applicant's assertion of utility creates a presumption of utility that will be sufficient...

...

One situation where an assertion of utility would not be considered credible is where a person of ordinary skill would consider the assertion to be "incredible in view of contemporary knowledge" and where nothing offered by the applicant would counter what contemporary knowledge might otherwise suggest...

...

In appropriate situations the Office may require an applicant to substantiate an asserted utility for a claimed invention.

...

There is no predetermined amount or character of evidence that must be provided by an applicant to support an asserted utility,...the character and amount of evidence needed to support an asserted utility will vary depending on what is claimed...and whether the asserted utility appears to contravene established scientific principles ...[;]...[f]urthermore, the applicant does not have to provide evidence sufficient to establish that an asserted utility is true "beyond a reasonable doubt"[;]...[n]or must an applicant provide evidence such that it establishes an asserted utility as a

> matter of statistical certainty[;]... [i]nstead, evidence will be sufficient if, considered as a whole, it leads a person of ordinary skill in the art to conclude that the asserted utility is more likely than not true.

...

In this case, the Federal Circuit held that "concepts that strain scientific principles are properly held to a heightened standard, typically measured by reproducibility of results[;]...[s]hould further investigation bring peer recognition and verifiable results, the PTO and the scientific community would surely be interested." App. 23a-24a.

By applying the heightened standard of requiring reproducibility of results, through independent verification and peer recognition, in order to have PTO's interests, the Federal Circuit in this case has effectively raised the standard of proof on operability under § 101 from "more likely than not true" in MPEP § 2107 to "beyond a reasonable doubt" or "as a matter of statistical certainty" not required by MPEP § 2107.

In Sean B. Seymore, Patently Impossible, 64 *Vanderbilt Law Review* 1489 (2011), the author summarizes the current jurisprudence on operability under § 101 as follows:

> The quest to achieve the impossible fuels creativity, spawns new fields of inquiry, illuminates old ones, and extends the frontiers of knowledge. It is difficult,

> however, to obtain a patent for an invention which seems impossible, incredible, or conflicts with well-established scientific principles. The principal patentability hurdle is operability, which an inventor cannot overcome if there is reason to doubt that the invention can really achieve the intended result. Despite its laudable gatekeeping role, [the author] identifies two problems with the law of operability. First, though objective in theory, the operability analysis rests on subjective credibility assessments. These credibility assessments can introduce a bias toward unpatentability, with inventions emerging from new, poorly understood, and paradigm-shifting technologies as well as those from fields with a poor track record of success as the most vulnerable. Second, what happens when the impossible becomes possible? History reveals that the Patent Office and the courts will continue to deny patents for a long time thereafter. [The author] argues that the mishandling of seemingly impossible inventions vitiates the presumption of patentability, prevents the patent system from sitting at the cutting edge of technology, and frustrates the patent system's overarching goal to promote scientific and technological progress.

Id. at 1489. The author gives examples of patently impossible inventions later becoming possible, *Id.* at 1514-21.

The author suggests that the gatekeeper function of the PTO should not be accomplished by operability requirement under § 101 but other means which do not hinder the promotion of the "Progress of Science and Useful Arts", the overarching goal of the patent system. *Id.* at 1489. The author proposes the following solutions:

> [A] more robust enforcement of patent law's enablement requirement can and should perform the gatekeeping role because it can resolve whether an invention works by weighing objective, technical factors. This approach would quickly reveal technical merit for inventions that really work or, alternatively, the fatal flaw for inventions that are truly impossible. Its implementation would not only eliminate the need for the operability requirement, but it would also streamline patent examination, improve the disclosure function of the patent system, promote scientific and technological progress, and ultimately foster innovation.

Id..

Surprisingly, this Court had scarcely considered the threshold question of operability under § 101 since the Patent Act of 1790. This situation might have been due to the reason that the patent applicants had not mount a meaningful challenge in this Court. But not being meaningful challenged in or reviewed by this Court does not means that the question of operability under § 101 is unimportant or the actions of the PTO as the gatekeeper and the decisional law of the lower

reviewing courts have been correct, just or constitutional since the Patent Act of 1790, especially, in this age of rapidly advancing sciences and technologies.

Petitioners respectfully submit that the varied standards of the PTO for determining operability under § 101 (App. 110a-114a), from "presumption of utility" (App. 103a) to varied "character and amount of evidence needed to support an asserted utility... depending on what is claimed" (App. 113a), buttressed by the decisional laws of the lower reviewing courts, are biased towards conventional inventions but against groundbreaking inventions or discoveries, thus hindering the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause.

II. The Federal Circuit's application of a "heightened standard" of operability under § 101, "typically measured by reproducibility of results" through independent verification and peer recognitions effectively raises the standard of proof on operability from "more likely than not true" to "beyond a reasonable doubt" or "as a matter of statistical certainty"

In *Herman v. Huddleston*, this Court held that "[i]f they prove that it is more likely than not..., they should recover[;] [w]e therefore decline to depart from the preponderance-of-the-evidence standard generally applicable in civil actions". 459 U.S. 375, 390 (1983).

MPEP § 2107.02 III (App. 105a) states the evidentiary standard as follows:

> The evidentiary standard to be used throughout *ex parte* examination in setting forth a rejection is a preponderance of the totality of the evidence under consideration." *In re Oetiker,* 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992) ("After evidence or argument is submitted by the applicant in response, patentability is determined on the totality of the record, by a preponderance of evidence with due consideration to persuasiveness of argument."); *In re Corkill,* 771 F.2d 1496, 1500, 226 USPQ 1005, 1008 (Fed. Cir. 1985). A preponderance of the evidence exists when it suggests that it is more likely than not that the assertion in question is true. *Herman v. Huddleston,* 459 U.S. 375, 390 (1983).

Further, in *Brooktree Corp. v. Advanced Micro Devices, Inc.*, the Federal Circuit held that "[t]o violate [§] 101 the claimed device must be totally incapable of achieving a useful result." 977 F.2d 1555, 1571 (Fed. Cir. 1992). See also *E.I. du Pont De Nemours and Co. v. Berkley and Co.,* 620 F.2d 1247, 1260 n.17 (8th Cir. 1980) ("A small degree of utility is sufficient . . . The claimed invention must only be capable of performing some beneficial function . . . In short, the defense of non-utility cannot be sustained without proof of total incapacity").

In this case, the Federal Circuit noted the following:

> In three of the four applications no references were cited; in the '739 application the examiner rejected claims ...under § 102(b) as anticipated by a reference of Kiontke.
>
> ...
>
> Hu provided twenty-five scientific publications by physicists concerning quantum entanglement, and five publications authored by [the Petitioners] concerning observations such as those set forth in their patent applications. Hu states that the examiners and the Board "resort[ed] to speculation, unfounded assumptions or hindsight reconstruction" ...[and] physicists knowledgeable in the science of quantum mechanics would understand the principles of quantum entanglement, although the PTO examiners and the Board did not.
>
> ...
>
> An examiner informed the Board that "the concept of quantum entanglement *per se* is not being disputed[;]" '996 Application, ...[t]he examiners' rejections were based on skepticism concerning Hu's application of quantum entanglement to produce the effects Hu described and claimed.

App. 18a, 22a.

The Federal Circuit held that "[t]he PTO, as the nation's guardian of technologic invention, must be receptive to unusual concepts, for the core of invention is unobviousness." App. 23a.

Yet, the same court then held that "concepts that strain scientific principles are properly held to a heightened standard, typically measured by reproducibility of results[;]...[s]hould further investigation bring peer recognition and verifiable results, the PTO and the scientific community would surely be interested." App. 23a-24a.

By applying the "heightened standard" of requiring reproducibility of results, through independent verification and peer recognition, in order to have PTO's interests, the Federal Circuit in this case has effectively raised the standard of proof on operability under § 101 from "more likely than not true" in MPEP § 2107 (App. 114a) to "beyond a reasonable doubt" or "as a matter of statistical certainty" through independent verification and peer recognition not required by MPEP § 2107 (App. 113a).

Further, the application of the "heightened standard" (App. 23a) contradicts with its holding that "[t]he PTO, as the nation's guardian of technologic invention, must be receptive to unusual concepts, for the core of invention is unobviousness" (App. 23a).

Petitioners respectfully submit that the Federal Circuit erred in this case by applying a "heightened standard" of operability under § 101, "typically measured by reproducibility of results",

when claimed inventions or discoveries are considered to contain concepts straining scientific principles (App. 23a).

Petitioners further submit that the Federal Circuit's above "heightened standard" of operability are biased against groundbreaking inventions or discoveries including this case, thus hindering the promotion of the "Progress of Science and Useful Arts" emanating from the IP Clause.

III. The decisional law of the reviewing courts, creating judicial exceptions to patent eligibility under § 101, has no statuary basis and is inapplicable in light of this Court's recent decision in Henry Schein, Inc. v. Archer & White Sales, Inc. 139 S. Ct. 524 (2019)

In *Bilski v. Kappos*, this Court acknowledged that judicial exceptions to patent eligibility are without statuary basis as follows:

> The Court's precedents provide three specific exceptions to § 101's broad patent-eligibility principles: "laws of nature, physical phenomena, and abstract ideas." *Chakrabarty, supra,* at 309, 100 S.Ct. 2204. While these exceptions are not required by the statutory text, they are consistent with the notion that a patentable process must be "new and useful."

561 U.S. 593, 601-02 (2010).

This Court also acknowledged the following:

> Any suggestion in this Court's case law that the Patent Act's terms deviate from their ordinary meaning has only been an explanation for the exceptions for laws of nature, physical phenomena, and abstract ideas. See *Parker v. Flook,* 437 U.S. 584, 588–589, 98 S.Ct. 2522, 57 L.Ed.2d 451 (1978). This Court has not indicated that the existence of these well-established exceptions gives the Judiciary *carte blanche* to impose other limitations that are inconsistent with the text and the statute's purpose and design. Concerns about attempts to call any form of human activity a "process" can be met by making sure the claim meets the requirements of §101.

Bilski at 603.

Further, this Court recently held that there is no statutory authority for judicial exceptions under the Federal Arbitration Act. Henry Schein, Inc. v. Archer & White Sales, Inc. 139 S. Ct. 524, 528 (2019) ("The Act does not contain a 'wholly groundless' exception, and we are not at liberty to rewrite the statute passed by Congress and signed by the President").

In this case, the '739 application is a divisional application of the '996 application and its claimed invention is for an apparatus (App. 124a-127a).

The Board concluded that "Examiner's analysis ... is consistent with PTO guidance [in MPEP § 2106] ...[;] [a]ccordingly, we adopt the Examiner's position and sustain the § 101 rejection on the basis" of the judicial exception of a natural phenomenon. App. a55-a58. The Board cited *Alice Corp. v. CLSBankInt'l*, 573 U.S. 208, 216 (2014) ("Laws of nature, natural phenomena, and abstract ideas" are not patentable.) App. a55.

The Federal Circuit affirmed without discussion that the apparatus claims in the '739 application is directed to the judicial exception of a natural phenomenon. App. 24a.

Two scholars have recently criticized the creations of judicial exceptions as unconstitutional and suggested the following constitutional application of § 101:

> How should the Supreme Court handle patent eligibility issues? Literally apply the statute and legislative history! It works quite well. Review the proposed claimed patent subject matter on the basis of whether it describes anything made by man and whether it is an invention or applied discovery. If so, proceed to the analysis of whether it is new and useful, and described in a manner that allows one of ordinary skill in that field to carry it out. Do not stray into economic analysis or the virtues of, or exceptions to, statutory patent eligibility or how Congress decided to exercise its discretion to promote the progress of science through a limited term monopoly versus

> third party freedom to operate, or the size of the created monopoly—the Court was not given that authority nor is it equipped to address it. If the decision, faithfully applying the statute, causes damage to an industry or subgroup, it is up to Congress to decide whether to fix it.
>
> In law school, we learn that there is no right without a remedy. In the case of *Marbury v. Madison*, the U.S. Supreme Court held that it can review the constitutionality of federal statutes. [Marbury v. Madison, 5 U.S. 137 (1803)] However, who oversees the constitutionality of U.S. Supreme Court decisions? There is no private right of action in the U.S. for this. The sole remedy is to urge Congress to pass a law reversing the Supreme Court position. However, why should Congress have to pass a new law when the current law is clear on its face, just to say, we meant what we said the first time?

Sherry Knowles and Anthony Prosser, *Unconstitutional Application of 35 U.S.C. § 101 by the U.S. Supreme Court*, 18 J. MARSHALL REV. INTELL. PROP. L. 144, 167-8 (2018).

Petitioners respectfully submit that the decisional law of the reviewing courts, creating judicial exceptions to patent eligibility under § 101, has no statuary basis and is inapplicable in light of this Court's recent decision in Henry Schein, Inc. v. Archer & White Sales, Inc. 139 S. Ct. 524 (2019).

IV. The PTO personnel and Federal Circuit should not substitute common sense and common knowledge for the specialized knowledge and expertise of a PHOSITA in determining operability under § 101.

In *Allentown Mack Sales & Service, Inc. v. NLRB*, this Court held that:

> Because reasoned decisionmaking demands it, and because the systemic consequences of any other approach are unacceptable, the Board must be required to apply in fact the clearly understood legal standards that it enunciates in principle, such as ... preponderance of the Evidence[;] reviewing courts are entitled to take those standards to mean what they say, and to conduct substantial-evidence review on that basis[;] even the most consistent and hence predictable Board departure from proper application of those standards will not alter the legal rule by which the agency's factfinding is to be judged.

522 U.S. 359, 376-7 (1998).

The Federal Circuit holds that the question of patentable utility under §101is a question of fact and it reviews the Board's factual findings for substantial evidence. *In re Fisher*, 421 F.3d 1365, 1369 (Fed. Cir. 2005). Further, it is a basic requirement for "substantial evidence" review that the Board must produce a record which serves as the foundation for the agency action. *In re Gartside*, 203 F. 3d 1314 (Fed. Cir. 2000).

The Federal Circuit also held that "[t]he 'common knowledge and common sense' on which the Board relied in rejecting [applicant]'s application are not the specialized knowledge and expertise contemplated by the Administrative Procedure Act." In Re Sang-su Lee, 277 F.3d 1338 (Fed. Cir. 2002).

In this case, the Federal Circuit noted that:

> [i]n three of the four applications no references were cited; in the '739 application the examiner rejected claims ...under § 102(b) as anticipated by a reference of Kiontke[;] Hu provided twenty-five scientific publications by physicists concerning quantum entanglement, and five publications authored by [the Petitioners] concerning observations such as those set forth in their patent applications."

App. 18a, 22a.

Further, the records in this show that the examiners and the Board relied on their own common sense and common knowledge of "the absence of any known scientific principles explaining how [Hu]'s invention could possibly operate in this manner" (App. 34a, 72a, 92a) despite of the well-known scientific principle of quantum entanglement (App. 145a-146a, 220a-221a) and Hu's realizations (App. 147a-148a, 222a-223a) based on this principle as repeatedly pointed out by Hu.

However, the Federal Circuit held that "[t]he Board did not err in requiring Hu to establish the operability of his asserted discoveries, *in view of the*

conflict with ordinary experience as well as with established scientific principles" (App. 23a) (*emphasis added*).

Petitioners respectfully submit that the PTO personnel and Federal Circuit should not substitute common sense and common knowledge for the specialized knowledge and expertise of a PHOSITA in determining operability under § 101.

In rejecting a claim as unpatentable, the PTO is bound by the statutory requirements of 35 U.S.C. §132 and 5 U.S.C. §706(2)(A)-(D). *See In re Kahn*, 441 F. 3d 977, 987-988 (Fed. Cir 2006) (articulated reasoning and rational underpinning "much rooted" in the Administrative Procedure Act, to ensure due process and non-arbitrary decision making). It has long been clear that the PTO "may not, because it may doubt that the invention is patentable, resort to speculation, unfounded assumptions or hindsight reconstruction to supply deficiencies in its factual basis. . . we may not resolve doubts in favor of the [PTO] determination where there are deficiencies in the record as to the necessary factual basis supporting its legal conclusion." *In re Warner*, 379 F. 2d 1011, 1017 (C.C.P.A. 1967). That prohibition should be equally clear for lack of utility rejection as for any other rejection.

It was not possible for the examiners and the Board to conduct a valid operability analysis under § 101 (and other analyses) of the claimed inventions unless they first determined the four foundational questions stated in Petitioners' Appeal Brief to the Federal Circuit (App 331a-332a).

A reasonable fact finder would not have arrived at the PTO's finding of the claimed inventions being inoperable and correct substantial evidence standard of review by the Federal Circuit should have arrived at the opposite result.

CONCLUSION

For these reasons, the petition for a writ of certiorari should be granted.

Respectfully submitted,

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