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Max Oppenheimer

University of Baltimore School of Law, moppenheimer@ubalt.edu

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DEFENDING BREAKTHROUGH INNOVATION: THE HISTORY AND FUTURE OF STATE

PATENT LAW

Max Stul Oppenheimer †

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† Princeton University, BS cum laude; Harvard Law School, JD. Professor, University of Baltimore School of Law. I would like to thank my research assistant, Joseph McCully, for his extraordinary diligence and helpful comments.

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Defending Breakthrough Innovation: The History and Future of State Patent Law

Max Stul Oppenheimer

I. Introduction

Congress, while enacting at least six major revisions to patent law since 1793, has left the definition of patentable subject matter essentially unchanged. The Supreme Court, on the other hand, has been uncomfortable with the concept for more than a century. Despite this long-standing discomfort, it has struggled to advance a theoretical basis for its concern. In a series of recent cases, it has finally developed a theory as to why certain types of inventions, although embraced by the statutory definition, are nonetheless unpatentable. The theory, in effect, abandons the federal government's role in protecting those inventions. This article explores the consequences of the resulting vacuum and challenges the conventional wisdom that patents are purely federal and purely statutory.

Part II of this article traces the history of the statutory concept of patentable subject matter and the judicial efforts to narrow this definition. Part III of this article reviews the current Supreme Court theory. Part IV analyzes the consequences of that theory from a federalism perspective and argues that, by creating a federal vacuum, the Court has opened the door for state patent laws. Part V outlines how certain states can take advantage of this opening and deals with some anticipated objections to this proposal.

II. Patent Theory and History

A. The Economic Role of Patents

Patents are, in essence, government-sanctioned monopolies.¹ They existed in 18th century

¹ The Supreme Court has held that

A patent is not, accurately speaking, a monopoly The term 'monopoly' connotes the giving of an exclusive privilege for . . . a thing which the public freely enjoyed prior to the grant. Thus a monopoly takes something from the people. An inventor deprives the public of nothing which it enjoyed before his discovery, but gives something of value to the community by adding to the sum of human knowledge.

United States v. Dubilier Condenser, 289 U.S. 178, 186 (1933). However, a U.S. patent gives its owner the right to stop others from making, using, selling, or importing the patented invention. 35 U.S.C. § 154(a)(1) (2012). Violation of this right gives rise to damages and (subject to equitable considerations) injunctions. 35 U.S.C. § 283 (2012); eBay, Inc., v. MercExchange, L.L.C., 547 U.S. 388 (2006). It is therefore a challenge to competition, even if not

England,² and were granted by both colonial state governments and states under the Articles of Confederation.³ In Thomas Jefferson's words, they were intended to provide an incentive for "things which are worth to the public the embarrassment of an exclusive patent."⁴

Inventors have two options for profiting from their work: they can keep the work confidential and rely on trade secret protection, or they can commercialize the work publicly. Confidential commercialization is often an attractive option for innovators. As long as the requirements for trade secrecy are met,⁵ a trade secret may be maintained indefinitely and competitors may be prevented from using the trade secret information to compete.⁶

"accurately speaking" a monopoly, and the Court has certainly noted the tension between patent rights and antitrust concerns. *Diamond v. Chakrabarty*, 447 U.S. 303, 319 (1980) (Brennan, J., dissenting); *see also* *Graham v. John Deere Co.*, 383 U.S. 1, 7–10 (1966).

² Early English patents were monopolies on existing articles, granted as royal favors. *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 17–18 (1829); Edward C. Walterscheid, *To Promote the Progress of Science and Useful Arts: The Background and Origin of the Intellectual Property Clause of the United States Constitution*, 2 J. INTELL. PROP. L. 1, 12 (1994). By the time of the American Revolution the system had been changed by the decision in *Darcy v. Allein*, (1602) 77 Eng. Rep. 1260 (K.B.), 11 Co. Rep. 84 b., (invalidating a patent granted by Queen Elizabeth I on playing cards) and by the Statute of Monopolies, 1623, 21 Jac. 1, c. 3, § 6 (Eng.), both of which invalidated "royal favor" patents but allowed patents awarded to an inventor.

³ South Carolina had a general patent statute which provided: "The Inventors of useful machines shall have a like exclusive privilege of making or vending their machines for the like term of fourteen years, under the same privileges and restrictions hereby granted to, and imposed on, the authors of books." An Act for the Encouragement of Arts and Sciences, 1784 S.C. Pub. L. 343–44 (1784). Georgia, Act of February 3, 1786, for the Encouragement of Literature and Genius, and New Hampshire, Act of November 7, 1783, for the Encouragement of Literature and Genius, had intellectual property statutes broad enough to cover both copyrights and patents. Article II of the Articles of Confederation reserved to the states all rights not expressly granted to the national government and there are records confirming that several states made use of that right: a 1780 Pennsylvania patent for a process for tanning, *Statutes at Large of Pennsylvania from 1682 to 1801*, Vol. 10, p. 132 (James T. Mitchell & Henry Flanders eds., 1904); a 1786 South Carolina patent for waterworks useful in producing rice, *Statutes at Large of South Carolina*, Vol. 4, 755 (Thomas Cooper ed., 1838); *Statutes at Large of South Carolina*, Vol. 5, 69 (Thomas Cooper ed., 1839); a 1787 Maryland patent for a cotton and wool carding machine, *Laws of Maryland*, Vol. 2, Session of Nov. 6, 1786–Jan. 20, 1787, 23 (William Kilty ed., 1800); and a 1787 Pennsylvania patent for a flour mill device, *Statutes at Large of Pennsylvania from 1682 to 1801*, Vol. 12, 483–84 (James T. Mitchell & Henry Flanders eds.). The right to grant patents was not among the rights granted to the national government, leaving the power with the states.

⁴ Letter from Thomas Jefferson, Former U.S. President, to Isaac McPherson (Aug. 13, 1813), <http://hdl.loc.gov/loc.mss/mjtj.mtjbib020976>.

⁵ The requirements for trade secrecy are that the information sought to be protected derives value from not being generally known to, or readily ascertainable by proper means by, others who can obtain economic value from its disclosure or use, and that the owner take reasonable steps to maintain its secrecy. UNIF. TRADE SECRETS ACT § 1(4). A public disclosure, such as occurs when a patent is published, would therefore destroy it by making it "readily ascertainable".

⁶ *Id.* Thomas Duston & Thomas Ross, *Intellectual Property for Trade Secrets and Know-How*, IPO ASS'N, http://www.ipo.org/wp-content/uploads/2013/04/IP_Protection_for_Trade_Secrets_and_Know-how1076598753.pdf (last visited Nov. 12, 2016). The requirements for maintaining a trade secret are solely that valuable confidential information is not publicly known and the owner is taking reasonable steps are taken to maintain its confidentiality – there is no time limit.

Most states recognize reverse engineering of a publicly sold product as beyond the protection of trade secret law.⁷ Thus, products that inherently reveal such secrets are difficult to commercialize while maintaining trade secrecy. However, there are technologies of extreme value that can be commercialized without providing a product that can be reverse-engineered. For example, if an inventor devises a process or machine that makes it cheaper to produce an existing product, it is possible to keep the means of production as a trade secret while profiting through the sale of the end product. Aided by provisions of the Digital Millennium Copyright Act, computer software can be sold without disclosing its secrets by selling only executable code or by providing services, like cloud computing or smartphone applications, which utilize the software. In this way, many valuable inventions lend themselves to commercialization without surrendering trade secrecy.

Public commercialization, on the other hand, is of greater benefit to society because it allows others to learn from the invention and build upon it.⁸ Public disclosure, however, irrevocably surrenders the invention's trade secrets.⁹ Thus, without some other form of protection, competitors who learn the invention's secrets through disclosure could make use of them without expending the time and money that the innovator spent to develop them. In economic terms, this would give the competitor a pricing advantage, because the competitor would not need to recover research and development costs. This reduces the incentive to innovate.¹⁰

The Intellectual Property Clause of the Constitution recognizes this tension between private and public interests and authorizes Congress to provide a substitute for trade secret protection. By authorizing the right to exclude competitors from the use of an innovation for a limited time in exchange for disclosing how to make and use the innovation in a patent application,¹¹ the Intellectual Property Clause offers compensation for the loss of trade secret rights,¹² thus

⁷ See, e.g., *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 476 (1974). The Uniform Trade Secrets Act prohibits acquisition of trade secrets by improper means. Misappropriation may be enjoined or give rise to damages. UNIF. TRADE SECRETS ACT §§ 2(a) and 3(a). Misappropriation is defined as “acquisition of a trade secret of another by a person who knows or has reason to know that the trade secret was acquired by improper means.” *Id.* § 1(2)(i).

⁸ *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 427 (2007) (“[T]he primary purpose of our patent laws is not the creation of private fortunes for the owners of patents, but is ‘to promote the progress of science and useful arts’”); *Graham v. John Deere Co.*, 383 U.S. 1, 5 (1966); *Motion Picture Patents Co. v. Universal Film Mfg. Co.*, 243 U.S. 502, 511 (1917).

⁹ UNIF. TRADE SECRETS ACT § 1 cmt.

¹⁰ *Kewanee Oil Co.*, 416 U.S. at 486.

¹¹ 35 U.S.C. §§ 111, 112 (2012).

¹² The Uniform Trade Secrets Act defines a “trade secret” as:

[I]nformation . . . that: (i) derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and (ii) is the subject of *efforts that are reasonable under the circumstances to maintain its secrecy.*

UNIF. TRADE SECRETS ACT § 1(4) (emphasis added) and provides remedies, including damages, for misappropriation of trade secrets. *Id.* § 3. Issued patents, and some unissued patent applications, are published, thereby destroying the associated trade secrets by making them generally known and as a failure to make reasonable efforts to maintain their secrecy. In return for the destruction of the trade secrets contained in the patent, the federal

increasing the incentive to not only innovate, but also to share that innovation and thereby assist other innovators.

Disclosure is thought to benefit society more than maintaining a trade secret, because disclosure permits more people to use the information as a starting point for further innovation.¹³

An inventor:

may keep his invention secret and reap its fruits indefinitely. In consideration of its disclosure and the consequent benefit to the community, the patent is granted. . . . [U]pon the expiration of [the patent], the knowledge of the invention inures to the people, who are thus enabled without restriction to practice it and profit by its use.¹⁴

The compensation offered by the Intellectual Property Clause and the resultant incentives apply to only those categories of innovation that Congress decides to protect pursuant to constitutional authorization. Other categories of innovation will not be incentivized. As a result, these unprotected categories are less likely to be disclosed; those technologies that cannot be commercialized without disclosure may even fail to get the funding necessary for their development.¹⁵

Thus, a U.S. patent may be thought of as a bargain—an exchange of a federally granted monopoly with a limited term in return for the surrender of trade secret rights in confidential information beneficial to the promotion of progress in the useful arts and sciences.

B. Pre-Constitutional History

Patents existed both in 18th century England and in the colonies.

The earliest English patents bore little resemblance to today's patents, other than granting exclusive rights. These patents were a way to reward friends of the crown (at no cost to the

patent statute grants a limited monopoly by creating a right to prevent infringement of the patent, 35 U.S.C. § 271 and the right to obtain monetary damages for infringement. 35 U.S.C. § 284.

¹³ *Kewanee Oil Co.*, 416 U.S. at 494 (Marshall, J., concurring).

¹⁴ *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 186–87 (1933).

¹⁵ One important industry that exists only because of the availability of patent protection is the pharmaceutical industry. A widely-cited estimate of the cost of developing a new drug is \$2.6 billion. Rick Mullin, *Tufts Study Finds Big Rise in Cost of Drug Development*, CHEMICAL & ENGINEERING NEWS (Nov. 20, 2014), <http://cen.acs.org/articles/92/web/2014/11/Tufts-Study-Finds-Big-Rise.html>. An industry aphorism states that it costs \$999,999,999 to produce the first tablet and \$1 to produce the second. Drug pricing must spread the development cost over subsequent sales, leading to prices well above the incremental cost of production. If a competitor could await an innovator's development of a new drug and simply copy it without incurring development costs, the competitor would not need to build those costs into its pricing and it is doubtful that any company would ever develop a new drug.

monarch)¹⁶ by granting the exclusive right to manufacture a particular article or carry on a specific trade, thereby guaranteeing the grantee monopoly prices by eliminating competition. They were usually not related to any role that the grantee had played in inventing the article or establishing the trade.¹⁷ A classic example was Queen Elizabeth I's grant of the exclusive right to manufacture playing cards, which was challenged and invalidated in *Darcy v. Allein*.¹⁸ The 1623 Statute of Monopolies¹⁹ put an end to such patents. Both the *Darcy* case and the Statute of Monopolies were careful to distinguish, however, between "royal favor" patents, which were invalidated, and patents granted for inventing (or being the first to import) a new technology, which remained valid.

It was the post-Statute of Monopolies concept of patents that applied in the colonies. However, patents do not appear to have been common during the colonial period. Several colonial patents are identified in *Goldstein v. California*,²⁰ but it is difficult to find any record of patent litigation preceding the Constitution.²¹

The Articles of Confederation reserved to the states all rights not expressly granted to the national government.²² The right to grant patents was not among the rights granted to the national government, leaving the power with the states.²³ This resulted in differing levels of protection. For example, South Carolina enacted a general patent statute which stated, "The Inventors of useful machines shall have a like exclusive privilege of making or vending their machines for the like term of fourteen years, under the same privileges and restrictions hereby granted to, and imposed on, the authors of books,"²⁴ while both Georgia²⁵ and New Hampshire²⁶ enacted general intellectual property statutes broad enough to cover patents. In contrast, Maryland²⁷ and North Carolina²⁸ had constitutional provisions dating to 1776 that appear to

¹⁶ It is interesting that the United States patent system adopted a similar approach to incentivizing innovation. Rather than pay for rewards out of government funds, both systems shift the expense to the marketplace by foreclosing competition, thereby allowing the holder of a patent to obtain a reward by charging monopoly prices.

¹⁷ *Pennock v. Dialogue*, 27 U.S. (2 Pet.) 1, 17–18 (1829); Walterscheid, *supra* note 2, at 12.

¹⁸ *Darcy v. Allein*, (1602) 77 Eng. Rep. 1260 (K.B.), 11 Co. Rep. 84 b.

¹⁹ Statute of Monopolies, 1623, 21 Jac. 1, c. 3, § 6 (Eng.).

²⁰ *Goldstein v. California*, 412 U.S. 546, 557 n.13 (1973).

²¹ Walterscheid, *supra* note 2, at 16. Even under the first patent statute under the Constitution, few patents were granted. In the three years of operation under the 1790 statute, fifty-five patents were issued. In contrast, in 2015, the most recent year for which statistics are available, 578,802 utility patents were issued. U.S. Patent Statistics Chart, Calendar Years 1963 - 2014, http://www.uspto.gov/web/offices/ac/ido/oeip/taf/us_stat.htm

²² ARTICLES OF CONFEDERATION of 1781 art. II.

²³ *Id.*

²⁴ An Act for the Encouragement of Arts and Sciences, 1784 S.C. Pub. Laws 343–44 (1784).

²⁵ Act of February 3, 1786, for the Encouragement of Literature and Genius, *reprinted in* ROBERT ATKIN ET AL., A DIGEST OF THE STATE OF GEORGIA 323 (1800).

²⁶ Act of November 7, 1783, for the Encouragement of Literature and Genius (repealed 1842).

²⁷ The Maryland Declaration of Rights declared that "monopolies are odious, contrary to the spirit of a free government, and the principles of commerce; and ought not to be suffered." MD. CONST. of 1776, art. XXXIX.

²⁸ The North Carolina Constitution provided that "perpetuities and monopolies are contrary to the genius of a free State, and ought not to be allowed." N.C. CONST. of 1776, art. XXIII.

prohibit the grant of patents.

C. The Constitution

The problems facing an inventor under the Articles of Confederation would have tracked the general problems facing the country under the Articles. Competition between almost-sovereign states and a lack of uniform laws would have hampered enforcement of patent rights just as they hampered development of a strong national economy. State-by-state patent rights meant enforcement was limited to comparatively small markets.²⁹ As James Madison noted, “The States cannot separately make effectual provision for either [patents or copyrights].”³⁰

The Intellectual Property Clause³¹ emerged from the Constitutional Convention, but little is known about how the clause was drafted or what the drafters intended.³² James Madison did comment in *The Federalist* that the “utility of this power will scarcely be questioned. The copyright of authors has been solemnly adjudged in Great Britain, to be a right at common law. The right to useful inventions seems with equal reason to belong to the inventors.”³³

The first indication that the Convention was concerned about protection of intellectual property appears in the records of August 18, 1787, when it was proposed that the federal government have the power “[t]o encourage . . . the advancement of useful knowledge and discoveries . . . [and] [t]o grant patents for useful inventions.”³⁴ The proposal was referred to the Grand Committee of Eleven in that form on August 31, 1787.³⁵ The patent language, in particular,

²⁹ This is perhaps the reason why Walterscheid, *supra* note 2, at 1–2, was unable to find any record of patent litigation before the adoption of the Constitution.

³⁰ THE FEDERALIST NO. 43 at 222 (James Madison) (George W. Carey and James McClellan ed., 2001).

³¹ Article I, Section 8, Clause 2, gives Congress the 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.” U.S. CONST. art. I, § 8, cl. 8.

³² No delegate to the Constitutional Convention has left any record concerning the interpretation or meaning placed on the intellectual property clause by the delegates themselves.” Edward C. Walterscheid, *Inherent or Created Rights: Early Views on the Intellectual Property Clause*, 19 HAMLINE L. REV. 81, 92 (1995). See generally Walterscheid, *supra* note 2, at 31–34; see also Paul J. Heald & Suzanna Sherry, *Implied Limits on the Legislative Power: the Intellectual Property Clause as an Absolute Constraint on Congress*, 2000 U. ILL. L. REV. 1119, 1141 (2000) and cases collected in Max Stul Oppenheimer, *Harmonization Through Condemnation: Is New London the Key to World Patent Harmony?*, 40 VAND. J. TRANSNAT’L L. 445, 472–79 (2007) [hereinafter Oppenheimer I]. A compelling argument for this lack of interest is offered by Edward C. Walterscheid: “the delegates were tired [and] wanted to go home” Walterscheid, *supra* note 2, at 26.

³³ THE FEDERALIST NO. 43, *supra* note 30, at 222.

³⁴ James Madison, Journal Saturday August 18, 1787, in 2 THE RECORDS OF THE FEDERAL CONVENTION OF 1787 321, 321–22 (Max Farrand ed., rev. ed. 1937); see also Kevin D. Galbraith, Note, *Forever on the Installment Plan? An Examination of the Constitutional History of the Copyright Clause and Whether the Copyright Term Extension Act of 1998 Squares with the Founders’ Intent*, 12 FORDHAM INTELL. PROP. MEDIA & ENT. L. J. 1119, 1140 (2002).

³⁵ The Grand Committee of Eleven comprised one member from each state except Rhode Island and New York, which did not have delegates present at the time. See Galbraith, *supra* note 34, at 1136.

appears to have been added in committee with no record of who made the addition or why.³⁶ On September 5, 1787, the Committee of Eleven presented the Intellectual Property Clause to the Convention in its final form,³⁷ and on September 12, the Committee of Style and Arrangement presented the Constitution, including the clause, to the Convention. On September 17, the clause was approved unanimously without debate or any other record of why the interim language changes were made.³⁸

D. The Legislative Creation of the Statutory Subject Matter Requirement

Whatever the reason for the inclusion of the Intellectual Property Clause or the particular language chosen at the Constitutional Convention, Congress exercised the power promptly. The Patent Act of 1790 was passed in the second term of Congress' first session,³⁹ and it created a committee,⁴⁰ which had the power to grant patents to anyone who “hath . . . invented or discovered any useful art, manufacture, . . . or device, or any improvement therein not before known or used . . . if [any two members] shall deem the invention or discovery sufficiently useful and important.”⁴¹ Statutory subject matter⁴² thus originally consisted of art,⁴³ manufactures, and devices.

The meaning of statutory subject matter lies at the heart of the patent system. Although there is no statutory basis for elevating any requirement over others, some courts have viewed statutory

³⁶ Morgan Sherwood, *The Origins and Development of the American Patent System*, 71 AM. SCI. 500, 500 (1983) (“The absence of debate over the patent provision . . . has been taken as proof of their firm belief in patents as the best way to encourage socially beneficial innovation. However, it is more likely that the authors of the Constitution simply followed the English precedent without paying much attention to the subject, since they were also faced with the larger problems of how to structure the government, solve its fiscal difficulties, and defend the new nation.”).

³⁷ See Galbraith, *supra* note 34, at 1140.

³⁸ *Id.* at 1140–41. On September 12, the Committee of Style and Arrangement reported to the full Convention the entire Constitution, which contained the clause with the language unchanged from the September 5 version. *Id.* On September 17, the Constitution was adopted and signed by the delegates, and there was no recorded debate of the Copyright Clause. *Id.* See also Walterscheid, *supra* note 2, at 26.

³⁹ Patent Act of 1790, ch. 7, 1 Stat. 109 (1790) (repealed 1793).

⁴⁰ The committee was composed of the Secretary of State, the Secretary of the Department of War, and the Attorney General. See *id.* at 109–10. The composition of the committee, and the other demands on the time of cabinet members, may in part explain why only 47 patents were issued in the three years the statute was in effect. U.S. PATENT & TRADEMARK OFFICE, U.S. PATENT ACTIVITY CALENDAR YEARS 1790 TO PRESENT (2016), http://www.uspto.gov/web/offices/ac/ido/oeip/taf/h_counts.pdf.

⁴¹ § 1, 1 Stat. at 110.

⁴² Statutory subject matter refers to the types of inventions which may be patented. *Diamond v. Diehr*, 450 U.S. 175, 182 (1981). Additional requirements limit which of these types of inventions may in fact be granted a patent, but no invention may be patented which is not within the definition of statutory subject matter. *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470, 483 (1974) (“[N]o patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. § 101 . . .”).

⁴³ At the time of enactment of the 1790 statute, “art” meant “process” (the term used in the current statute). *Diehr*, 450 U.S. at 182–84 (holding that the 1952 statutory change from “art” to “process” was simply a modernization of the eighteenth century terminology).

subject matter as a “gatekeeper.”⁴⁴ It is, if nothing more, a reflection of Congress’s policy decision as to what types of inventions may be patented and thereby incentivized. Other countries have created technology-specific exclusions from patentability, with the most common being computer software and biotechnology, industries in which U.S. companies hold dominant positions and which are major contributors to the U.S. economy.⁴⁵ Congress has likewise shown itself capable of providing technology-specific exceptions when it chooses to do so, but it has limited these exceptions to the relatively economically unimportant markets of nuclear weaponry, tax strategies, and medical procedures.⁴⁶

The current definition of statutory subject matter is set forth in 35 U.S.C. § 101, which lists four categories of statutory subject matter that may be patented: machines, manufactures, compositions of matter, and processes.⁴⁷

While the 1790 statute did not include “compositions of matter,” contemporary English precedent would have included it within the term “manufacture.”⁴⁸ Likewise, the 1790 statute did not use the word “process,” but contemporary precedent would have included it in the term “art.”⁴⁹

⁴⁴ See *In re Comiskey*, 499 F.3d 1365, 1371 (Fed. Cir. 2007), *withdrawn and superseded on rehearing en banc* by No. 2006-1286, 2009 WL 68845 (Fed. Cir. 2009), *and opinion revised and superseded* by 554 F.3d 967 (Fed. Cir. 2009); *State Street Bank & Trust Co. v. Signature Fin. Grp., Inc.*, 149 F.3d 1368, 1372 n.2 (Fed. Cir. 1998) (§ 101 is a threshold issue that must be addressed before other questions of patentability), *abrogated sub nom.* *In re Bilski*, 545 F.3d 943 (Fed. Cir. 2008); *Application of Bergy*, 596 F.2d 952, 960 (C.C.P.A. 1979) (“The first door which must be opened on the difficult path to patentability is § 101.”), *vacated in part sub nom.* *Diamond v. Chakrabarty*, 444 U.S. 1028 (1980).

⁴⁵ See Kimberly Amadeo, *Components of GDP: Explanation, Formula and Chart*, BALANCE, <https://www.thebalance.com/components-of-gdp-explanation-formula-and-chart-3306015> (last updated Oct. 28, 2016); Robert Carlson, *Estimating the Biotech Sector’s Contribution to the US Economy*, 34 NATURE BIOTECHNOLOGY 247-55 fig. 4 (2016); *The Bloomberg Innovation Index*, BLOOMBERG, <http://www.bloomberg.com/graphics/2015-innovative-countries/> (last visited Nov. 14, 2016). For examples of exclusions from patentability in other countries, see Oppenheimer I, *supra* note 32, at 454 nn.36–37.

⁴⁶ See Max Stul Oppenheimer, *Patents, Taxes, and the Nuclear Option: Do We Need a “Tax Strategy Patent” Ban Treaty?*, 1 J.L. TECH. & POL’Y 1, 28 (2008); James R. Newman and Byron S. Miller, *The Control of Atomic Energy: A Study of Its Social, Economic, and Political Implications* (New York: McGraw-Hill, 1948); John Raidt, *Patents and Biotechnology*, U.S. CHAMBER COM. FOUND., <https://www.uschamberfoundation.org/patents-and-biotechnology> (last visited Nov. 14, 2016) (discussing the “narrowly tailored” exemption provided to medical procedures and its application). Tax strategy patents and claims “directed to or encompassing a human organism” are specifically excluded from patentability. Leahy-Smith America Invents Act, Pub. L. No. 112-29, §§ 14, 33, 125 Stat. 284, 327–28 (2011) (amending 35 U.S.C. § 101 (2006)). Nuclear weapons technology is likewise excluded from patentability. 42 U.S.C. § 2181 (2012). In addition, Congress has denied remedies for infringement of medical procedure patents. 35 U.S.C. § 287(c)(1) (2012).

⁴⁷ “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” 35 U.S.C. § 101 (2012). The list is exhaustive. “[N]o patent is available for a discovery, however useful, novel, and nonobvious, unless it falls within one of the express categories of patentable subject matter of 35 U.S.C. § 101” *Kewanee Oil Co.*, 416 U.S. at 483.

⁴⁸ *In re Bilski*, 545 F.3d 943, 969 (Fed. Cir. 2008) (Dyk, J., concurring).

⁴⁹ *Corning v. Burden*, 56 U.S. 252, 267 (1853) (“[A] process, *eo nomine*, is not made the subject of a patent in our act of Congress. It is included under the general term ‘useful art.’”); *Cochrane v. Deener*, 94 U.S. 780, 787–88

The second patent statute, enacted in 1793,⁵⁰ explicitly added the term “composition of matter” to the list of statutory subject matter.⁵¹ It also established a registration system under which an applicant needed only to allege having “invented any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter, not known or used before the application”⁵² and “present a petition to the Secretary of State.”⁵³ The Secretary of State was authorized to issue a patent without any examination of the validity of the applicant’s allegations,⁵⁴ leaving issues of validity to the court system and subsequent litigation.⁵⁵

Thus, the 1793 definition of statutory subject matter remained unchanged until 1952⁵⁶ when Congress replaced the word “art” with “process” and defined the term “process,”⁵⁷ changes that were not meant to change the definition substantively.⁵⁸

(1876) (“A process is a mode of treatment of certain materials to produce a given result. . . . If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art.”); *Tilghman v. Proctor*, 102 U.S. 707, 722–23 (1880) (“A manufacturing process is clearly an art”); *Diamond v. Diehr*, 450 U.S. 175, 184 (1981) (“Analysis of the eligibility of a claim of patent protection for a ‘process’ did not change with the addition of that term to § 101.”).

⁵⁰ Patent Act of Feb. 21, 1793, ch. 11, 1 Stat. 318, 318–19 (repealed 1836).

⁵¹ The 1793 statute provided:

That when any person . . . being a citizen . . . of the United States, shall allege that he . . . [has] invented any new and useful art, machine, manufacture or composition of matter, or any new and useful improvement on any art, machine, manufacture or composition of matter, not known or used before the application, and shall present a petition to the Secretary of State, . . . it shall and may be lawful for the said Secretary of State, to cause letters patent to be made out

Id. at 318–20.

⁵² *Id.* The language limits patents to invention not known or used before filing of the application. This must have been intended to mean “not known or used by others” since clearly the inventor knew of the invention before filing the application.

⁵³ *Id.*

⁵⁴ *Id.*

⁵⁵ As a result of the lack of examination before issuing patents, “a great number of lawsuits arise, which are daily increasing in an alarming degree, onerous to the courts, ruinous to the parties, and injurious to society.” Sen. John Ruggles, Senate Report Accompanying S. 239, 24th Cong. at 3–4 (1st Sess. 1836), *reprinted in* DONALD CHISUM, CHISUM ON PATENTS app. 12 (Matthew Bender & Co., 2000). The patent statute was amended in 1836 to address these problems by creating a Patent Office to evaluate patent applications. Patent Act of 1836, ch. 357, 5 Stat. 117, 119–20.

⁵⁶ Patent Act of 1952, ch. 950, 66 Stat. 792. Congress also amended the patent statute in 1836 and 1848, but neither amendment affected the definition of statutory subject matter. The 1836 amendments were largely directed to eliminating abuses by establishing a Patent Office to review applications and determine patentability. Patent Act of 1836, ch. 357 5 Stat. 117. The 1848 Act provided for publication of patents. Patent Act of May 27th, 1848, 6 Stat. 231.

⁵⁷ 35 U.S.C. § 100(b) (2015).

⁵⁸ *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (“[A] process has historically enjoyed patent protection because it was considered a form of ‘art’ as that term was used in the 1793 Act.”); *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

In the most recent major review of the patent statute in 2011, Congress left the definition of statutory subject matter unchanged.⁵⁹

Although there have been at least four major overhauls of the patent statute (instances in which Congress certainly would have reviewed the definition of statutory subject matter), the current statutory language differs from the original language in only two respects: the addition of the category “composition of matter” in 1793 and the change from “art” to “process” in 1952, both of which have been held to be non-substantive.⁶⁰

Certainly nothing in the statutory development suggests Congressional intent to exclude laws of nature, physical phenomena, or abstract ideas from the definition per se.⁶¹ In fact, the legislative history suggests a broad reading of the four categories of statutory subject matter now

⁵⁹ Leahy-Smith America Invents Act, Pub. L. No. 112-29, § 14, 125 Stat. 284, 327–28 (2011) (amending 35 U.S.C. § 101). The Act created an explicit exception excluding tax strategy inventions from eligibility by amending the rules for evaluating prior art under 35 U.S.C. §§ 102 and 103, and established a process for reviewing patentability of business methods, but did not change the fundamental definition of statutory subject matter under 35 U.S.C. § 101. *Id.*

⁶⁰ While the 1790 statute did not explicitly include “compositions of matter,” this category was, under English precedent, considered to be within the term “manufacture.” *In re Bilski*, 545 F.3d 943, 969 (Fed. Cir. 2008) (Dyk, J., concurring). Processes, though not mentioned in the 1793 statute, were considered patentable subject matter. In *Corning v. Burden*, 56 U.S. 252, 267 (1854), the Court held “[a] process, *eo nomine*, is not made the subject of a patent in our act of Congress. It is included under the general term ‘useful art.’” In *Cochrane v. Deener*, the Court held:

That a process may be patentable, irrespective of the particular form of the instrumentalities used, cannot be disputed. . . . A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. If new and useful, it is just as patentable as is a piece of machinery. In the language of the patent law, it is an art.

94 U.S. 780, 787–88 (1876). In *Tilghman v. Proctor*, 102 U.S. 707, 723 (1880), the Court held, “That a patent can be granted for a process, there can be no doubt. The patent law is not confined to new machines and new compositions of matter, but extends to any new and useful art or manufacture. A manufacturing process is clearly an art” Finally, in *Diamond v. Diehr*, the 1952 statutory change from “art” to “process” was held as simply modernizing the eighteenth century term “art” which, in contemporary terminology would have included processes. *Diehr*, 450 U.S. 175 (1981). “Analysis of the eligibility of a claim of patent protection for a ‘process’ did not change with the addition of that term to § 101.” *Id.* at 184.

⁶¹ Other sections of the patent statute place limits on patentability. Under 35 U.S.C. § 111, patent applications must be submitted in writing, and under 35 U.S.C. § 112, the application must be detailed enough to demonstrate that the applicant has possession of the invention and can describe how to make and use it. Under 35 U.S.C. § 102, the application must demonstrate novelty, while 35 U.S.C. § 103 requires that the claimed invention be non-obvious. These limits, however, are technology-neutral; they do not preclude patentability of specific types of inventions. *See generally* Dan L. Burk & Mark A. Lemley, *Is Patent Law Technology-Specific?*, 17 BERKELEY TECH. L.J. 1155 (2002) (discussing the technology-neutral theory of patent law in comparison to the technology-specific application of patent law). Congress has imposed technology-specific statutory exclusions, showing that they are quite capable of excluding things from patentability when they choose to do so. *See id.* at 1190–96. These exclusions share no common theoretical basis—they are simply examples of case-by-case lobbying power. *See N. Telecom, Inc. v. Datapoint Corp.*, 908 F.2d 931, 941 (Fed. Cir. 1990) (discussing an approach whereby courts would look to the level of skill in each case to reach a decision).

enumerated in 35 U.S.C. § 101. Yet, the Supreme Court has announced these three exceptions to the broad language of the statute.⁶² These exceptions emerged in an ad hoc fashion, leaving researchers uncertain as to what categories of technology can be protected (and therefore what research might be justified economically).⁶³

E. The Ad Hoc Development of the Judicial Exceptions to Statutory Subject Matter

Judge Rader of the Federal Circuit has reasonably asked, “why should some categories of invention deserve no protection?”⁶⁴ A sufficient, although simplistic, answer is, “because Congress decided to impose it, and the Constitution gave Congress that power.”

Determining why some categories of invention should be excluded from protection by judicial exception is a more complicated issue. There are two possible justifications for judicial introduction of exceptions to the congressional definition of statutory subject matter: (1) the statute is ambiguous and requires interpretation; or (2) the statute, although clear, must be limited as a matter of constitutional law.⁶⁵ The justification matters. If it is merely a matter of ambiguity, then Congress (and Congress alone) can direct a contrary conclusion; however, if it is constitutionally mandated, then Congress is without power to overcome the exceptions—and the power resides with the states.

The development of judicial exceptions has been ad hoc. Each of the three categories of exceptions developed mostly independently for 150 years before the Court finally offered an overarching theory as to why these particular exceptions should exist.

Notwithstanding repeated admonitions to the lower courts not to read words into the patent statute,⁶⁶ the Court itself has created three exceptions to the clearly established categories of statutory subject matter in § 101: laws of nature, physical phenomena, and abstract ideas.⁶⁷ The difficulties in defining the scope of statutory subject matter stem from these three exceptions, and these exceptions have arguably delayed the development of the software, biotech, and

⁶² *Diehr*, 450 U.S. at 187–88; *Parker v. Flook*, 437 U.S. 584, 598 (1978) (Stewart, J., dissenting); *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972).

⁶³ See Max Stul Oppenheimer, *Patents 101: Patentable Subject Matter and Separation of Powers*, 15 VAND. J. ENT. & TECH. L. 1 (2012) [hereinafter Oppenheimer II].

⁶⁴ *In re Bilski*, 545 F.3d 943, 1012 (Fed. Cir. 2008) (Rader, J., dissenting).

⁶⁵ *Marbury v. Madison*, 5 U.S. (1 Cranch) 137 (1803). “Congress has performed its constitutional role in defining patentable subject matter in § 101; we perform ours in construing the language Congress has employed. In so doing, our obligation is to take statutes as we find them, guided, if ambiguity appears, by the legislative history and statutory purpose.” *Diamond v. Chakrabarty*, 447 U.S. 303, 315 (1980).

⁶⁶ The Supreme Court has “more than once cautioned that ‘courts “should not read into the patent laws limitations and conditions which the legislature has not expressed.”” *Diehr*, 450 U.S. at 182 (citations omitted).

⁶⁷ *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972). Laws of nature “are part of the storehouse of knowledge . . . free to all men and reserved exclusively to none.” *Funk Bros. Seed v. Kalo*, 333 U.S. 127, 130 (1948). See also *Diehr*, 450 U.S. at 187–88; *Parker v. Flook*, 437 U.S. 584, 598 (1978) (Stewart, J., dissenting).

nanotechnology industries.⁶⁸ The Court’s particular intervention disincentivizes innovation and runs counter to the constitutional mandate to promote progress because withdrawing patent protection withdraws the incentive to disclose.

The Court had addressed the issue of statutory subject matter directly⁶⁹ and tangentially⁷⁰ more than a dozen times.

1) Scientific Principles and Ideas

The Court’s exploration of the meaning of “statutory subject matter” began with a series of decisions in the 1850s.⁷¹ The Court opined that “[a] principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right”⁷² and that “[i]t is for the discovery or invention of some practical method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself.”⁷³

The Court explained the distinction between understanding a scientific principle and finding a use for the principle in *O’Reilly v. Morse*,⁷⁴ the 1853 case determining the scope of patentability of Samuel Morse’s telegraph. Morse had claimed his invention in several ways: (1) as “a process of using electromagnetism to produce distinguishable signs for telegraphy;”⁷⁵ (2) as a “system of signs, consisting of dots, spaces, and horizontal lines, for numerals, letters, words, or sentences, substantially as herein set forth and illustrated, for telegraphic purposes;”⁷⁶ and (3) as “the use of the motive power of the electro or galvanic current, which [he] call[ed] electro-magnetism, however developed, for making or printing intelligible characters, signs or letters at any distances.”⁷⁷ The Court found the first two formulations of the invention patentable and the third unpatentable, distinguishing between patentable specific uses of electromagnetism and

⁶⁸ See Joshua D. Sarnoff, *Patent-Eligible Inventions after Bilski: History and Theory*, 63 HASTINGS L.J. 53, 59–60 (2011).

⁶⁹ See *Le Roy v. Tatham*, 55 U.S. (14 How.) 156 (1852); see also *Bilski v. Kappos*, 561 U.S. 593 (2010); *Lab. Corp. of Am. Holdings v. Metabolite Labs.*, 548 U.S. 124 (2006); *Diamond v. Diehr*, 450 U.S. 175 (1981); *Diamond v. Chakrabarty*, 447 U.S. 303 (1980); *Parker v. Flook*, 437 U.S. 584 (1978); *Gottschalk v. Benson*, 409 U.S. 63 (1972); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948); *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86 (1939); *McClain v. Ortmyer*, 141 U.S. 419 (1891); *Tilghman v. Proctor*, 102 U.S. 707 (1880); *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498 (1874); *Corning v. Burden*, 56 U.S. 252 (1853); *O’Reilly v. Morse*, 56 U.S. 62 (1853).

⁷⁰ See, e.g., *Dann v. Johnston*, 425 U.S. 219 (1976); *United States v. Dubilier Condenser Corp.*, 289 U.S. 178 (1933).

⁷¹ In 1853, as now, the patent statute required that the invention for which a patent was sought must be “useful.” Section 1(a), Patent Act of 1836, Ch. 357, 5 Stat. 117 (July 4, 1836)

⁷² *Le Roy*, 55 U.S. at 175. Of course, the court’s holding is a tautology.

⁷³ *Corning*, 56 U.S. at 268.

⁷⁴ *O’Reilly*, 56 U.S. at 113.

⁷⁵ *Gottschalk v. Benson*, 409 U.S. 63, 68 (1972) (citing *O’Reilly*, 56 U.S. at 111).

⁷⁶ *In re Bilski*, 545 F.3d 943, 984 (Fed. Cir. 2008) (internal quotation marks omitted).

⁷⁷ *O’Reilly*, 56 U.S. at 62.

unpatentable claims to the use of magnetism as a motive power without specifying how it was used.⁷⁸ The Court rejected the third formulation, because it attempted to claim something that Morse had not invented and could not describe.⁷⁹ As the Court observed, “[f]or aught that we now know some future inventor, in the onward march of science, may discover a mode of writing or printing at a distance by means of the electric or galvanic current, without using any part of the process or combination set forth in the plaintiff’s specification.”⁸⁰ Under today’s statute, this same concern raises a possible written description deficiency under 35 U.S.C. § 112.

In 1874, the Court declared that “an idea of itself is not patentable, but a new device by which it may be made practically useful is.”⁸¹ The idea at issue was the creation of a small hole in a rubber eraser meant to allow the eraser to fit on the end of a pencil.⁸² The Court viewed this as an unpatentable “idea that if a pencil is inserted into a cavity in a piece of rubber smaller than itself the rubber will attach itself to the pencil, and when so attached become convenient for use as an eraser”⁸³ – in other words, no more than a recognition of the scientific principle that rubber can be stretched around an object and, when released, will contract and grip the object.

In *Mackay Radio & Telegraph Co. v. Radio Corp. of America*, the Court was tasked with determining the patentability of a claim for a radio antenna produced according to a previously known formula.⁸⁴ The Court assumed that the patent claim covered an invention and was valid,⁸⁵ but it nonetheless stated in *dictum* that “[w]hile a scientific truth, or the mathematical expression of it, is not patentable, a novel and useful structure created with the aid of knowledge of scientific truth may be.”⁸⁶

While irrelevant to the resolution of the case before the Court, and supported by no citation of authority, this dictum laid the foundation for the Court’s first general exclusion from patentable

⁷⁸ *Id.* at 112–13.

⁷⁹ “In fine he claims an exclusive right to use a manner and process which he has not described and indeed had not invented, and therefore could not describe when he obtained his patent. The court is of opinion that the claim is too broad, and not warranted by law.” *Id.* at 113.

⁸⁰ *Id.*

⁸¹ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874).

⁸² *Id.*

⁸³ *Id.*

⁸⁴ *Mackay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 98–99 (1939).

Carter [the applicant] did not invent the formula. It had been . . . published in a scientific journal thirty years before. . . . [and] expressed the scientific truth that when radio activity is projected from a charged wire of finite length, i.e., one having standing waves, and having a length of a multiple of half wave lengths, the angle between the direction of the principal radio activity and the wire is dependent on wave length and wire length, which is a multiple of half wave lengths. . . . It is plain, therefore, that the Carter invention, *if it was invention*, consisted in taking the angle of the Abraham formula as the angle between each wire of the V antenna and its bisector.

Id. at 93–94 (emphasis added).

⁸⁵ *Id.* at 94 (“We assume, without deciding the point, that this advance was invention even though it was achieved by the logical application of a known scientific law to a familiar type of antenna.”).

⁸⁶ *Mackay*, 306 U.S. at 94

statutory subject matter: scientific principles.⁸⁷

2) Laws of Nature

The second exclusion from patentable statutory subject matter—laws of nature—was announced in 1948 in *Funk Bros. Seed Co. v. Kalo Inoculant*.⁸⁸ The technology at issue in that case involved a bacterial inoculant. Farmers had previously used several different inoculants depending on the type of crop they were growing, because they believed they needed to apply each inoculant separately because of mutual inhibition.⁸⁹ The patent applicant had found that several inoculants could coexist and therefore be applied in a one-step mixture and claimed the mixture.⁹⁰ In holding the invention unpatentable, the Court chose an expansive rationale—that a combination of naturally occurring inoculants was a product of nature and therefore unpatentable, even though a narrower ground of decision was available.⁹¹ The Court cited no evidence that the claimed combination occurred naturally.⁹² The Court held that “[h]e who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly. . . . If there is to be invention from such a discovery, it must come from the application of the law of nature to a new and useful end.”⁹³ The Court did not find that the “invention” constituted advancement over what already existed in nature:

The combination of species produces no new bacteria, no change in the six species of bacteria, and no enlargement of the range of their utility. . . . They serve the ends nature originally provided and act quite independently of any effort of the patentee.⁹⁴ . . . The qualities of these bacteria, like the heat of the sun, electricity, or the qualities of metals, are part of the storehouse of knowledge of all men. They are manifestations of laws of nature, free to all men and reserved exclusively to none.⁹⁵

⁸⁷ Compare *id.*, with *Tilghman v. Proctor*, 102 U.S. 707, 724–25 (1880).

⁸⁸ *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948).

⁸⁹ *Id.* at 129–30.

⁹⁰ *Id.* at 130.

⁹¹ Concurring in the result, Justice Frankfurter preferred to reach it on enablement grounds rather than limiting the definition of statutory subject matter. In his view,

[i]t only confuses the issue...to introduce such terms as ‘the work of nature’ and the ‘laws of nature.’ For these are vague and malleable terms infected with too much ambiguity and equivocation. Everything that happens may be deemed ‘the work of nature,’ and any patentable composite exemplifies in its properties ‘the laws of nature.’

Id. at 134–35 (Frankfurter, J., concurring). Instead, he would have found the claim unpatentable because “the strains that Bond put together in the product which he patented can be specified only by the properties of the mixture” and therefore failed the enablement requirement. *Id.*

⁹² *Id.* at 130.

⁹³ *Id.*

⁹⁴ *Id.* at 131.

⁹⁵ *Id.* at 130.

The conclusion that “manifestations of laws of nature” were “free to all men” established the second judicial exemption from the legislative definition of statutory subject matter.⁹⁶

3) Mathematical Algorithms and Abstract Ideas

In 1972, the Court established the “abstract ideas” exception to patentable statutory subject matter when it faced a patent application that claimed a process for converting numbers from binary coded decimal format to the binary format used by digital computers.⁹⁷ The Court in *Gottschalk v. Benson* held that a claim to a computer-implemented method of converting numbers was not a patentable invention under § 101.⁹⁸ Because the method had “no substantial practical application except in connection with a digital computer,” it was not limited to a specific use and therefore amounted to nothing more than an unpatentable mathematical algorithm.⁹⁹ The Court stated that such a mathematical formula was simply an abstract idea, akin to unpatentable phenomena of nature and abstract concepts.¹⁰⁰ The court then summarized, “[p]henomena of nature, though just discovered, mental processes, and abstract intellectual concepts are not patentable, as they are the basic tools of scientific and technological work.”¹⁰¹ Under this theory, the problem with allowing a patent on the invention was that it “wholly pre-empt[s]” the use of a mathematical formula and therefore was not patentable subject matter.¹⁰² The Court recognized pre-emption as a new justification for invalidating the patent (without engaging in statutory interpretation), describing the claimed mathematical process as “so abstract and sweeping as to cover both known and unknown uses of the BCD to pure binary conversion.”¹⁰³

In *Parker v. Flook*, the Court clarified that a “process is not unpatentable simply because it contains a law of nature.”¹⁰⁴ The patent at issue included claims to a catalytic conversion process that involved the use of a formula, which the Court assumed to be novel and useful, to calculate and update “alarm limits.”¹⁰⁵ Drawing on the formulation of *Benson*, the Court explained that determining whether a claim containing a mathematical algorithm is statutory subject matter is not simply a matter of whether the claim “wholly pre-empts” the mathematical algorithm, but whether “once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention.”¹⁰⁶ Noting that the line between an abstract principle and the application of that principle is “not always clear,”¹⁰⁷ the Court concluded that the process

⁹⁶ The statutory section at issue in *Funk Bros.* was § 31, comparable to § 101 of the statute as revised in 1952.

⁹⁷ *Gottschalk v. Benson*, 409 U.S. 63, 64, 67 (1972) (holding “abstract intellectual concepts” unpatentable).

⁹⁸ *Id.* at 71–72.

⁹⁹ *Id.*

¹⁰⁰ *Id.* at 67–68.

¹⁰¹ *Id.*

¹⁰² *See id.* at 71–72.

¹⁰³ *Id.* at 68.

¹⁰⁴ 437 U.S. 584, 590 (1978).

¹⁰⁵ *Id.* at 586–87.

¹⁰⁶ *Id.* at 594.

¹⁰⁷ *Id.* at 589.

was not statutory subject matter under § 101 since it was merely a mathematical formula, which was “not the kind of ‘discover[y]’ that the statute was enacted to protect.”¹⁰⁸

In *Diamond v. Chakrabarty*,¹⁰⁹ the Court noted that Congress plainly contemplated that the patent laws would be given wide scope:¹¹⁰

This is not to suggest that § 101 has no limits or that it embraces every discovery. The laws of nature, physical phenomena, and abstract ideas have been held not patentable. Thus, a new mineral discovered in the earth or a new plant found in the wild is not patentable subject matter. Likewise, Einstein could not patent his celebrated law that $E=mc^2$; nor could Newton have patented the law of gravity. Such discoveries are “manifestations of . . . nature, free to all men and reserved exclusively to none”.¹¹¹ . . .

In *Diamond v. Diehr*, the applicant claimed a process for making molded rubber products, which involved monitoring the temperature inside the mold and using a well-known equation to calculate the required cure time based on the measured temperature.¹¹² While reiterating that an algorithm or mathematical formula is like a law of nature, which cannot be the subject of a patent, the Supreme Court held that the claim was valid as “a process of curing synthetic rubber. Their process admittedly employs a well-known mathematical equation, but they do not seek to pre-empt the use of that equation.”¹¹³

In 2010, the Court attempted to clarify its interpretation of § 101 in *Bilski v. Kappos*.¹¹⁴ The applicant claimed a computer-implemented system for hedging risk.¹¹⁵ The patent office and lower courts had all held the claims were not statutory subject matter under the abstract ideas exception.¹¹⁶ In affirming, the Court summarized:

Section 101 specifies four independent categories of inventions or discoveries that are patent eligible . . . “Congress plainly contemplated that the patent laws would be given wide scope” The Court’s precedents provide three specific exceptions to § 101’s broad principles: “laws of nature, physical phenomena and

¹⁰⁸ *Id.* at 592–93.

¹⁰⁹ *Diamond v. Chakrabarty*, 447 U.S. 303, 305 (1980).

¹¹⁰ The Committee Report accompanying the 1952 Act included a statement that “a person may have ‘invented’ a machine or a manufacture, which may include anything under the sun that is made by man, but it is not necessarily patentable under section 101 unless the conditions of the title are fulfilled.” S. REP. NO. 82-1979, at 5 (1952); H.R. REP. NO. 82-1923, at 6 (1952). The Court interpreted the language as “inform[ing] us that Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’” (first quoting S. REP. NO. 82-1979, at 5 (1952); and then quoting H.R. REP. NO. 82-1923, at 6 (1952)). *Chakrabarty*, 447 U.S. at 308–09.

¹¹¹ *Chakrabarty*, 447 U.S. at 309 (citations omitted).

¹¹² See *Diamond v. Diehr*, 450 U.S. 175 (1981).

¹¹³ *Id.* at 187.

¹¹⁴ See *Bilski v. Kappos*, 561 U.S. 593, 593–94 (2010).

¹¹⁵ *Id.* at 593.

¹¹⁶ *Id.*

abstract ideas.” While not required by the statutory text, these exceptions are consistent with the notion that a patentable process must be “new and useful.” And in any case, the exceptions have defined the statute’s reach as a matter of statutory *stare decisis* going back 150 years.¹¹⁷

The Court has thus created three broad exceptions to the statutory language. It has acknowledged that Congress intended to give patents a wide scope and frequently reminded the lower courts that “our obligation is to take statutes as we find them, guided, if ambiguity appears, by the legislative history and statutory purpose.”¹¹⁸ It further acknowledged that its exceptions are “not required by the statutory text.” Yet the Court has nonetheless proceeded to announce *ad hoc* exemptions from the unambiguous statutes, without advancing an argument for its power to do so.

In *Patents 101* I argued that the judicially imposed limits on the statutory language were not constitutionally required and represented an unwarranted judicial intrusion into Congress’ role as policy maker, in the guise of statutory interpretation.¹¹⁹ The Supreme Court disagreed—repeatedly.¹²⁰ In a recent series of cases, the Court finally offered a basis for its authority to establish these exemptions. In doing so, it opened a new option for protecting breakthrough inventions.

III. A Theory at Last

The courts, of course, have the power to review and interpret statutes.¹²¹ However, the power to intervene and impose a judicial interpretation on a statute, as the Court has done in the creation of exceptions to the congressional definition of statutory subject matter, is limited to two situations.¹²² That power arises when a statute is ambiguous and requires interpretation¹²³ and it arises when a statute, although unambiguous, must be limited as a matter of constitutional constraint.¹²⁴ Unfortunately, despite repeated review of statutory subject matter cases, the Court has never explicitly identified which of these sources of its authority it relies on to override the statutory language regarding patentable subject matter.

¹¹⁷ *Id.* at 593–94 (emphasis added) (citations omitted) (quoting *Diamond v. Chakrabarty*, 447 U.S. 303, 308–09 (1980) (internal quotation marks omitted)).

¹¹⁸ *Chakrabarty* 447 U.S. at 313, 315.

¹¹⁹ See *Oppenheimer II*, *supra* note 63.

¹²⁰ See, e.g., *Alice Corp. Pty. Ltd. v. CLS Bank Intern.*, 134 S. Ct. 2347 (2014); *Mayo Collab. Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289 (2012); *Ass’n for Molecular Pathology v. Myriad Genetics*, 133 S. Ct. 2107 (2012).

¹²¹ See *Marbury v. Madison*, 5 U.S. (1 Cranch) 137 (1803).

¹²² There is a third possibility – the Court is simply wrong and has exceeded its authority to undo a Congressional enactment – which is beyond the scope of this article.

¹²³ See *Chakrabarty*, 447 U.S. at 315 (“Congress has performed its constitutional role in defining patentable subject matter in § 101; we perform ours in construing the language Congress has employed. In so doing, our obligation is to take statutes as we find them, guided, *if ambiguity appears*, by the legislative history and statutory purpose.”) (emphasis added).

¹²⁴ *Marbury*, 5 U.S. (1 Cranch) 137.

The source of judicial authority has important consequences. If the Court is acting pursuant to its power to interpret an ambiguous statute, then Congress (and Congress alone) can determine that the Court has misunderstood Congress' intent and correct the erroneous judicial interpretation by revising the statute. If the Court is acting pursuant to its power to prevent unconstitutional application of statutory language, then Congress cannot override the Court's decision – the only way to change the result is by constitutional amendment.

The next two sections examine the applicability of the two available sources of authority to the decisions establishing exceptions to the statutory language of 35 U.S.C. § 101.

A. Possibility #1: Are the Judicial Exceptions an Exercise in Interpretation of Ambiguity?

The language of 35 U.S.C. § 101 does not appear ambiguous on its face. It lists four categories of statutory subject matter and does not exclude “phenomena of nature, mental processes, or abstract intellectual concepts.”¹²⁵ This does not appear to be an oversight on Congress' part; Congress has apparently had no difficulty excluding specific types of inventions that would otherwise fit within the four broad statutory categories. It has done so most recently in the America Invents Act which explicitly excludes human organisms (which would be compositions of matter under *Chakrabarty*) and tax strategies (which would be processes under *State Street Bank*) from the scope of Section 101.¹²⁶

The Supreme Court cautioned in *Dubilier*,¹²⁷ and repeated in *Chakrabarty*, that courts “should not read into the patent laws limitations and conditions which the legislature has not expressed.”¹²⁸ *Chakrabarty* itself appears to find the statutory language unambiguous.¹²⁹

In *Bilski v. Kappos*, writing for four members of the Court, Justice Kennedy noted that “precedents provide three specific exceptions to §101's broad patent-eligibility principles: ‘laws of nature, physical phenomena, and abstract ideas’” but that “*these exceptions are not required by the statutory text.*”¹³⁰

¹²⁵ 35 U.S.C. § 101.

¹²⁶ Leahy-Smith America Invents Act, Pub. L. No. 112-29, §§ 14, 33, 125 Stat. 284, 327–28 (2011) (amending 35 U.S.C. § 101) (declaring tax strategies within the prior art and thereby excluding them from patentability and declaring human organisms unpatentable).

¹²⁷ *United States v. Dubilier Condenser Corp.*, 289 U.S. 178, 199 (1933).

¹²⁸ *Chakrabarty*, 447 U.S. at 308.

¹²⁹ “Congress has performed its constitutional role in defining patentable subject matter in § 101 . . .” *Id.* at 315. The Court held that the statutory definition was broad enough to cover “anything under the sun that is made by man.” *Id.* at 309 (quoting S. REP. NO. 82-1979; H.R. REP. NO. 82-1923).

¹³⁰ *Bilski v. Kappos*, 561 U.S. 593, 601 (2010) (emphasis added). Justice Kennedy noted that, while not required by the statutory text, they are consistent with the notion that a patentable process must be “new and useful.” This observation appears inconsistent with the provisions of Section 100(b), which defines a process as any “process, art or method, and includes *a new use of a known process*, machine, manufacture, composition of matter, or material.” *Id.* at 602 (emphasis added). Justice Stevens, writing for four Justices in a concurring opinion, questioned Kennedy's

In 150 years of Supreme Court review of patentable subject matter cases, not once has the Court pointed to an ambiguity in the definition of statutory subject matter or stated that the language adopted by Congress is unclear or ambiguous.¹³¹

If the statute is not ambiguous, there is only one other source of judicial power to create exceptions to Congress' definition of patentable subject matter, and language in recent cases points to this second source of power.

B. Possibility #2: Are the Judicial Exceptions an Exercise of the Power to Find a Statute Unconstitutional?

The Court has never explicitly been called upon to rule on the constitutionality of § 101. However, statements in recent cases suggest that that is exactly the basis for imposing exceptions on the statutory language.

The first hint appeared in Justice Breyer's dissent in *Metabolite*, where the Justice argued that the Court should have reviewed a lower court's holding of patentability. Justice Breyer invoked constitutional limits to justify the judiciary's deviation from the literal language of § 101 as follows: "the reason for the exclusion is that sometimes too much patent protection can impede rather than 'promote the Progress of Science and useful Arts . . .'"¹³² The quoted language is, of course, taken directly from the Preamble to Article I §8 of the Constitution.

In *Mayo Collaborative Services v. Prometheus Laboratories*, Justice Breyer, now writing for a unanimous court, applied the same reasoning to hold that a method of optimizing a drug dosage by administering a dose of the drug to a patient, then testing the patient's blood and adjusting the dosage depending on the results¹³³ was not patentable because, although it was a process,¹³⁴ it was no more than informing a "relevant audience about certain laws of nature" and therefore not patentable.¹³⁵

The same analysis, and the same result, can also be seen in *Association for Molecular Pathology*,

logic, noting "At points, the opinion suggests that novelty is the clue. . . . But the fact that hedging is 'long prevalent in our system of commerce,' . . . cannot justify the Court's conclusion", as "the proper construction of §101 . . . does not involve . . . novelty." *Id.* at 620 (Stevens, Ginsburg, Breyer & Sotomayor, JJ., concurring). In any event, the theory that the limitations are imposed by another section of the statute, does not appear to have been further developed or pursued in subsequent cases.

¹³¹ See, e.g., *Chakrabarty*, 447 U.S. 303; *Dubilier*, 289 U.S. 178; *Arrhythmia Research Tech., Inc. v. Corazonix Corp.*, 958 F.2d 1053 (1992).

¹³² *Lab. Corp. of Am. Holdings v. Metabolite Labs.*, 548 U.S. 124, 126–27 (Breyer, J., dissenting) (emphasis omitted).

¹³³ *Mayo Collab. Servs. v. Prometheus Labs., Inc.*, 132 S. Ct. 1289, 1295 (2012).

¹³⁴ 35 U.S.C. § 101 (2011).

¹³⁵ *Mayo*, 132 S. Ct. at 1298.

where the Supreme Court held that a DNA sequence, isolated from the hundreds of millions of nucleotide sequences in the human genome and useful in diagnostic testing, was not patentable because, however difficult it was to find and isolate, it had always existed as a product of nature.¹³⁶ Again invoking the Constitutional purpose of Art. I Section 8, Justice Thomas wrote “[a]s the Court has explained, without this exception, there would be considerable danger that the grant of patents would ‘tie up’ the use of such tools and thereby ‘inhibit future innovation premised upon them.’ . . . This would be at odds with the very point of patents, which exist to promote creation”¹³⁷ and “as we have recognized before, patent protection strikes a delicate balance between creating ‘incentives that lead to creation, invention, and discovery.’”¹³⁸ The decision where to strike balances is, of course, committed to Congress. Therefore, although Justice Thomas does not quote the Constitutional language, the Court must be saying that Congress’ language is limited by the Constitutional limitation of using the patent laws to “promote progress” (or, in the Court’s words, “innovation,” “creation,” “invention” or “discovery”).

Most recently, in *Alice v. CLS Bank*, Justice Thomas reiterated the theory developed in the above cases, this time rejecting a patent as claiming “an abstract idea”, and this time citing the constitutional language¹³⁹:

We have described the concern that drives this exclusionary principle as one of pre-emption . . . the patent “would pre-empt use of this approach in all fields, and would effectively grant a monopoly over an abstract idea”. Laws of nature, natural phenomena, and abstract ideas are ‘the basic tools of scientific and technological work.’ “[M]onopolization of those tools through the grant of a patent might tend to impede innovation more than it would tend to promote it,” thereby thwarting the primary object of the patent laws. . . . *See* U.S. CONST., Art. I, § 8, cl. 8 (Congress “shall have Power . . . To promote the Progress of Science and useful Arts”). We have ‘repeatedly emphasized this . . . concern that patent law not inhibit further discovery by improperly tying up the future use of’ these building blocks of human ingenuity.¹⁴⁰

In sum, the current justification supporting exceptions to the statutory language of 35 U.S.C. §101 is based, not on the need to interpret an ambiguous statute, but rather on the theory first advanced in the Breyer dissent in *Metabolite*: “too much patent protection can impede rather than ‘promote the Progress of Science and useful Arts’”¹⁴¹ In other words, the Constitution limits application of the statute. Thus, while the Court has never stated in explicit terms that the statutory language is broader than the Constitution permits, these decisions can only be based on

¹³⁶ *Ass’n for Molecular Pathology v. Myriad Genetics*, 133 S. Ct. 2107 (2013).

¹³⁷ *Id.* at 2116.

¹³⁸ *Id.*

¹³⁹ *Alice Corp. v. CLS Bank*, 134 S. Ct. 2347, 2354 (2014).

¹⁴⁰ *Id.* (citations omitted).

¹⁴¹ *Lab. Corp. of Am. Holdings v. Metabolite Labs.*, 548 U.S. 124, 126-127 (Breyer, J., dissenting) (emphasis omitted); *see also supra* Section III.A (discussing the absence of ambiguity in 35 U.S.C. § 101).

the conclusion that, although the clear statutory language¹⁴² covers such inventions, laws of nature, mathematical algorithms, and abstract principles must be excluded because there is no constitutional power for Congress to authorize such patents.

IV. A Federal Vacuum; a State Opportunity

The patent statute is an exercise of power granted to the federal government by Article I section 8 of the Constitution. Prior to adoption of the Constitution, that power had been held by the states under the Articles of Confederation. The Court's exceptions to the statutory language are, in effect, a determination that the Constitution did not grant Congress the power to protect the excepted categories of inventions. If the power to grant such patents is denied to the federal government because it is not granted by the Constitution, then under the Tenth Amendment it remains with the states, where it resided under the Articles of Confederation.¹⁴³

Thus, by creating a federal vacuum regarding protection of inventions that fall within the categories of laws of nature, mathematical algorithms and abstract principles, the Court has opened the door for states to adopt patent laws¹⁴⁴ protecting such inventions.

The question remains whether any other restraint might stand in the way of state patent protection for the excluded categories of invention. Two legal concerns and one practical concern must be considered. The legal concerns are whether a state patent system would conflict with federal antitrust law and whether such a system would violate the Supremacy Clause of the U.S. Constitution. The practical concern is whether state patent protection could be implemented, or whether potential infringers would easily avoid liability by locating infringing activities outside the state.

A. Coexisting with Antitrust Laws

An initial objection might be that state patent rights would be inconsistent with federal antitrust laws. Even federally granted patent laws must be reconciled with "this Nation's deep-seated antipathy to monopolies."¹⁴⁵

However, even Thomas Jefferson, whose anti-monopoly credentials were unmatched, was willing to concede that monopolies had a role in situations where it was necessary to provide "the embarrassment of an exclusive patent" for things of worth."¹⁴⁶

¹⁴² See *supra* Section III.A.

¹⁴³ See *supra* Section II.B.

¹⁴⁴ A purist might argue that "patents" can only refer to rights granted by the federal government and that state grants might be "patent-like" but would not be patents. For simplicity, this article will refer to the state granted rights as "state patent rights."

¹⁴⁵ *Diamond v. Chakrabarty*, 447 U.S. 303, 319 (1980) (Brennan, J., dissenting); *Graham v. John Deere Co.*, 383 U.S. 1, 7–10 (1966).

¹⁴⁶ Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), <http://hdl.loc.gov/loc.mss/mtj.mtjbib020976>.

The decision to make patent rights exclusive (whether denominated monopolies or not) is consistent with antitrust laws that had already been made. As the Supreme Court has observed,

[a] patent is not, accurately speaking, a monopoly. . . . The term ‘monopoly’ connotes the giving of an exclusive privilege for ... something that the public freely enjoyed prior to the grant. Thus a monopoly takes something from the people. An inventor deprives the public of nothing which it enjoyed before his discovery.¹⁴⁷

Thus, as long as a state system included requirements similar to the federal novelty and obviousness standards, it would not be a monopoly within the definition the Supreme Court has established. The resulting question is not whether patent rights can coexist with antitrust laws - it is whether the federal government has exclusive domain over granting those rights or whether states can also grant such rights.

The answer to that question (and the supremacy objection) turns in part on pre-Constitutional history.

Until the adoption of the Constitution, patents were granted by states.¹⁴⁸ The Tenth Amendment reserves all powers not expressly delegated to the federal government by the Constitution as state powers. Supreme Court decisions indicate that granting patent rights was not designated to the federal government with respect to certain subject matter: laws of nature, natural phenomena, and abstract ideas.

For this reason, the basis for the Supreme Court restrictions on patentable subject matter plays a crucial role. If the Court were simply interpreting the Patent Act, there would be a compelling argument that the Constitution had completely removed the power to grant patents from the states, assigned it to the federal government, and Congress had simply decided not to exercise the power to grant patents with respect to certain categories of invention.¹⁴⁹ However, if “laws of nature, natural phenomena, and ideas” are not patentable because they are “the basic tools of

The patent statute is not the only example of federally granted exclusive rights. For example, the Food and Drug Administration in effect grants exclusive rights to the first applicant to present a successful application for approval of a New Chemical Entities by refusing to approve additional applications for a limited period of time. 21 C. F. R. Section 314.108 - New drug product exclusivity.

¹⁴⁷ *United States v. Dubilier Condenser*, 289 US 178, 186 (1933).

¹⁴⁸ *See supra* Sections II.B–C.

¹⁴⁹ Congress has this discretion. They have excluded tax strategy patents and claims “directed to or encompassing a human organism” from the definition of patentable subject matter under 35 U.S.C. § 101. Leahy-Smith America Invents Act, Pub. L. No. 112-29, §§ 14, 33, 125 Stat. 284, 327–28 (2011) (amending 35 U.S.C. § 101). Nuclear weapons technology is excluded from patentability, although under the Atomic Energy Act rather than the patent statute. 42 U.S.C. § 2181 (2006). Congress has also denied remedies for infringement (although not patentability) of medical procedure patents. 35 U.S.C. § 287(c)(1) (2011).

scientific and technological work”¹⁵⁰ and therefore beyond the patent-granting power bestowed by the Constitution,¹⁵¹ then the power to grant patents as to these inventions was not taken from the states.¹⁵²

The only remaining inquiry is whether granting patents for laws of nature, natural phenomena, and abstract ideas was a power that the states had prior to the Constitution¹⁵³ – and the answer is “yes.”

Patents were issued before the Revolutionary War in England and in the colonies.¹⁵⁴ In post-Revolutionary United States, the Articles of Confederation left the power to grant patents with the states¹⁵⁵ and at least one state clearly exercised that power by enacting a general patent statute.¹⁵⁶ New Hampshire and Georgia enacted intellectual property statutes that were broad enough to include the power to grant patents.¹⁵⁷ Pennsylvania, South Carolina and Maryland issued patents under the Articles of Confederation.¹⁵⁸

The power thus existed as a state right under the Articles of Confederation and was not completely transferred to the federal government by the Constitution.

B. Surviving the Supremacy Clause

The Supremacy Clause raises a related but separate hurdle for a state-granted patent rights system.

¹⁵⁰ *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972).

¹⁵¹ *See supra* Section III.B.

¹⁵² U.S. CONST. amend. X.

¹⁵³ Even if the Constitution did not take a power from the states, the states would not have that power unless it was theirs to begin with.

¹⁵⁴ Five Colonial patents are mentioned in *Goldstein v. California*, 412 U.S. 546, 557 n.13 (1973).

¹⁵⁵ Article II of the Articles of Confederation reserved to the states all rights not expressly granted to the national government. ARTICLES OF CONFEDERATION of 1781, art. IX. The right to grant patents was not among the granted rights.

¹⁵⁶ South Carolina had a statute providing “The Inventors of useful machines shall have a like exclusive privilege of making or vending their machines for the like term of fourteen years, under the same privileges and restrictions hereby granted to, and imposed on, the authors of books.” An Act for the Encouragement of Arts and Sciences, 1784 S.C. Pub. L. No. 1335, 34.

¹⁵⁷ Georgia (Act of February 3, 1786, for the Encouragement of Literature and Genius) *reprinted in* ROBERT ATKIN ET AL., A DIGEST OF THE STATE OF GEORGIA 323 (1800).and New Hampshire (Act of November 7, 1783, for the Encouragement of Literature and Genius).

¹⁵⁸ 10 STATUTES AT LARGE OF PENNSYLVANIA FROM 1682 TO 1801, 132 (James T. Mitchell & Henry Flanders eds.,1904) (1780 patent to Guest for a process for tanning); 4 Statutes at Large of South Carolina, 755 (Thomas Cooper ed. 1838); 5 STATUTES AT LARGE OF SOUTH CAROLINA, 69 (1839) (1786 patent to Belin for waterworks useful in producing rice); 2 Laws of Maryland, Session of Nov. 6, 1786-Jan. 20, 1787, ch. 23 (William Kilty ed., 1800) (1787 patent for cotton and wool carding machine); 12 Statutes at Large of Pennsylvania from 1682 to 1801, 483–84 (James Mitchell & Henry Flanders eds.,1906) (1787 patent for a flour mill device).

Under the Supremacy Clause of the Constitution, federal law “shall be the supreme Law of the Land ... any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.”¹⁵⁹ The “notwithstanding” phrase “is a *non obstante* provision... and instructed courts not to apply the general presumption against implied repeals.... The non obstante provision in the Supremacy Clause therefore suggests that federal law should be understood to impliedly repeal conflicting state law.”¹⁶⁰ Thus, state laws that conflict with federal law are void.¹⁶¹

The Supreme Court has recognized three types of preemption:

First, Congress can define explicitly the extent to which its enactments pre-empt state law. . . . and when Congress has made its intent known through explicit statutory language, the courts' task is an easy one.

Second, in the absence of explicit statutory language, state law is pre-empted where it regulates conduct in a field that Congress intended the Federal Government to occupy exclusively. Such an intent may be inferred from a “scheme of federal regulation . . . so pervasive as to make reasonable the inference that Congress left no room for the States to supplement it,” or where an Act of Congress “touch[es] a field in which the federal interest is so dominant that the federal system will be assumed to preclude enforcement of state laws on the same subject” although “where . . . the field which Congress is said to have pre-empted includes areas that have been traditionally occupied by the States, congressional intent to supersede state laws must be ‘clear and manifest.’”

Finally, state law is pre-empted to the extent that it actually conflicts with federal law. Thus, the Court has found pre-emption where it is impossible for a private party to comply with both state and federal requirements. . . . or where state law “stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.”¹⁶²

A) Explicit Preemption

Nothing in the Intellectual Property Clause¹⁶³ (or any other clause of the Constitution) explicitly forbids states from granting patent rights.

¹⁵⁹ U.S. CONST., art. VI, cl. 2.

¹⁶⁰ *PLIVA, Inc. v. Mensing*, 564 U.S. 604, 621–22 (2011) (holding that federal food and drug law, which required generic drug manufacturers to use FDA-approved labels, pre-empted state duty-to-warn labeling requirements); *see also* *Mutual Pharmaceutical Co., Inc. v. Bartlett*, 133 S.Ct. 2466 (2013)

¹⁶¹ *Maryland v. Louisiana*, 451 U.S. 725, 746 (1981); *Crosby v. National Foreign Trade Council*, 530 U.S. 363, 372 (2000) (“[S]tate law is . . . preempted to the extent of any conflict with a federal statute”). *See generally*, Caleb Nelson, *Preemption*, 86 VA. L. REV. 225 (2000).

¹⁶² *English v. General Elec. Co.*, 496 U.S. 72, 78–80 (1990) (citations omitted).

¹⁶³ U.S. CONST. art. I, § 8, cl. 8.

The Intellectual Property Clause gives Congress the 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.”¹⁶⁴ There has been debate as to whether the preamble (“to promote the Progress...”) is a limitation on Congress’s power or serves some other purpose. The Supreme Court has held that “[t]he clause is both a grant of power and a limitation.”¹⁶⁵ The purpose of the Intellectual Property Clause is twofold:

The monopoly privileges that Congress may authorize are neither unlimited nor primarily designed to provide a special private benefit . . . [They are] intended to motivate the creative activity of authors and inventors . . . and to allow the public access to the products of their genius after the limited period of exclusive control has expired.¹⁶⁶

The Intellectual Property Clause does not explicitly restrict any state action and does not prohibit the federal government from using extra-patent measures to “Promote the Progress.” Indeed, the federal government routinely funds programs also designed to improve science and useful arts. For example, the National Institutes of Health provides grants for medical research; the Advanced Research Project Administration provides grants for emerging technology research; and the National Institute for Standards and Technologies funds technological innovation.

B) Exclusive Occupancy Preemption

“[I]n the absence of explicit statutory language, state law is pre-empted where it regulates conduct in a field that Congress intended the Federal Government to occupy exclusively.”¹⁶⁷

Congress has clearly left areas of intellectual property law to the states. For instance, state trademark law coexists with federal trademark law. State trade secret law functions alongside federal patent law.¹⁶⁸

There are provisions of federal statutes other than the Intellectual Property Clause, which may indicate that Congress meant to regulate patents. For example, a jurisdictional statute appears to confer exclusive federal judicial jurisdiction over patent matters.¹⁶⁹ That statute, however, could be read to confer exclusive federal judicial jurisdiction over cases involving federal patents. Such

¹⁶⁴ U.S. CONST. art. I, § 8, cl. 8.

¹⁶⁵ *Graham v. John Deere Co.*, 383 U.S. 1, 5 (1966).

¹⁶⁶ *Sony Corp. Universal City Studios, Inc.*, 464 U.S. 417, 429 (1984).

¹⁶⁷ *English v. General Elec. Co.*, 496 U.S. 72, 79 (1990).

¹⁶⁸ *See generally* *Kewanee Oil Co. v. Bicron Corp.*, 416 U.S. 470 (1974) (sustaining the application of state trade secret law to the protection of a process that was patentable but not patented); *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 161 (1989) (invalidating a particular state statute, but noting that trade secret protection may “dovetail” with patent incentives). *See also* *Aronson v. Quick Point Pencil Co.*, 440 U.S. 257 (1979).

¹⁶⁹ 28 U.S.C. § 1338 (2011).

an interpretation would leave state judicial jurisdiction over state trademark and trade secret issues and cases involving state patent rights, because “[wh]ere . . . the field which Congress is said to have pre-empted includes areas that have been traditionally occupied by the States, congressional intent to supersede state laws must be ‘clear and manifest.’”¹⁷⁰

States were the source of patents granted prior to the Constitution.¹⁷¹ Unlike the most recent copyright statute, where Congress clearly pre-empted the entire field with respect to newly created works of authorship, Congress has taken no steps to indicate a similar interest in regulating the patentability of “laws of nature, natural phenomena, and ideas,” notwithstanding the Supreme Court’s focus on this area of patentable subject matter.

Finally, if the Constitution did not grant Congress the power to extend federal patent protection to “laws of nature, natural phenomena and ideas” then that power remained with the states, where it had existed under the Articles of Confederation¹⁷² - and there can be no “exclusive occupancy preemption” where Congress has no right to occupancy to begin with.

C) Conflict Preemption

The third category of federal preemption is conflict preemption: a state law is preempted if it “stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress.”¹⁷³

In *Bonito Boats v. Thunder Craft*, the Court noted, “efficient operation of the federal patent system depends upon substantially free trade in publicly known, unpatented design and utilitarian conceptions.”¹⁷⁴ However, the Court also noted an appropriate role for state regulation of unpatented designs if “necessary to promote goals outside the contemplation of the federal patent scheme.”¹⁷⁵ If an area is beyond Congress’ constitutional power (and reserved to the states), then state regulation in that area is by definition “outside the contemplation of the federal patent scheme.”¹⁷⁶

Congress’s objective, as expressed in the Patent Act, is to provide patent protection for four categories of statutory subject matter: processes, machines, manufactures, and compositions of

¹⁷⁰ *English*, 496 U.S. at 79 (quotation marks and citations omitted).

¹⁷¹ *See supra* Sections II.B–C.

¹⁷² *See supra* Section III.B.

¹⁷³ *English*, 496 U.S. at 72.

¹⁷⁴ *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 U.S. 141, 156 (1989).

¹⁷⁵ *Id.* at 166. As examples of state regulation that might be permissible, the Court referred to unfair competition, trademark, trade dress, and trade secrets laws. Perhaps by way of distinguishing *Sears and Compco*, both of which invalidated use of unfair competition laws, the Court suggested that prevention of “consumer confusion is a permissible state goal that can be served in some instances by application of such laws.” *Id.* at 154.

¹⁷⁶ *Id.* at 166.

matter.¹⁷⁷ “[T]he powers of Congress to legislate upon the subject of patents is plenary”¹⁷⁸ and Congress has the “constitutional role in defining patentable subject matter.”¹⁷⁹

It is the Supreme Court—not Congress—that has imposed limitations on the clear statutory language. These are limitations that the Court views as compelled by constitutional limits on Congressional power in the field. State patent rights would therefore be consistent with the Congressional goal of filling a gap created by the Court’s view of the limits of the legislature’s power. As such, the grant of state patent rights would not violate federal preemption.

V. A Model for State Patents

A. The Opportunity for States

The theory underlying the Supreme Court cases appears to be that some ideas (i.e. principles of nature) are so far-reaching that patent law cannot allow inventors to monopolize them.¹⁸⁰ The rationale finds its most coherent expression in Justice Breyer’s dissent to the dismissal of *certiorari* in *Lab Corp.*¹⁸¹ In that dissent, Justice Breyer explains that the problem is not that laws of nature are easy, inexpensive, or obvious to discover, but rather that allowing them to be patented grants too much protection and thereby impedes the exchange of information and discourages research.¹⁸²

Stated differently, breakthrough innovations are too important to patent. Even if the federal government is bound by this conclusion, states might well conclude that breakthrough

¹⁷⁷ 35 U.S.C. § 101 (1952).

¹⁷⁸ *McClurg v. Kingsland*, 42 U.S. 202, 206 (1843).

¹⁷⁹ *Diamond v. Chakrabarty*, 447 U.S. 303, 315 (1980).

¹⁸⁰ *See Gottschalk v. Benson*, 409 U.S. 63, 67–68 (1972); *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948).

¹⁸¹ *Lab. Corp. of Am. Holdings v. Metabolite Labs. Inc.*, 548 U.S. 124, 126 (2006) (Breyer, J., dissenting).

¹⁸² *Id.* at 126–27 (Breyer, J., dissenting) (citation omitted). The dissent explains:

The justification for the principle does not lie in any claim that “laws of nature” are obvious, or that their discovery is easy, or that they are not useful. To the contrary, research into such matters may be costly and time-consuming; monetary incentives may matter; and the fruits of those incentives and that research may prove of great benefit to the human race. Rather, the reason for the exclusion is that sometimes *too much* patent protection can impede rather than “promote the progress of science and useful arts,” the constitutional objective of patent and copyright protection.

The problem arises from the fact that patents do not only encourage research by providing monetary incentives for invention. Sometimes their presence can discourage research by impeding the free exchange of information, for example by forcing researchers to avoid the use of potentially patented ideas, by leading them to conduct costly and time-consuming searches of existing or pending patents, by requiring complex licensing arrangements, and by raising the costs of using the patented information, sometimes prohibitively so.

Id.

innovations present tremendous potential and should be encouraged - and capitalized: arguably, the greater the discovery, the greater the value derived from its disclosure.

In a sense, the same argument advanced by the Supreme Court (that judicial exceptions are necessary to prevent monopolization of emerging technologies) is a stronger argument for the opposite conclusion. For instance, emerging technologies are riskier investments than established technologies. Without guaranteed protection, emerging technologies will have difficulty obtaining financing, potentially stifling innovation in the field. If people still chose to innovate without patent protection, they must rely on trade secret protection instead.¹⁸³ Unfortunately, “rather than promoting information exchange and technological innovation, trade secrecy encourages developers to hoard their inventions; this forces software developers to ‘spend much of their efforts reinventing the wheel’”¹⁸⁴

Since only inventions that are protectable are incentivized,¹⁸⁵ providing state incentives would encourage innovation and disclosure in breakthrough technologies. Justice Burger echoed this sentiment in *Goldstein v. California*.¹⁸⁶ There, Justice Burger noted the historical local character of patents in the colonial period and under the Articles of Confederation, remarking that “the patents granted by the States in the 18th century show . . . a willingness on the part of the States to promote those portions of science and the arts which were of local importance.”¹⁸⁷ He referenced a 1751 Massachusetts patent for a process for the manufacture of candles out of whale oil; a 1780 Pennsylvania patent for the processing of tanning oil and blubber; a 1786 South Carolina patent for waterworks which aided in the production of rice, a staple of South Carolina agriculture; a 1787 Maryland patent for a spinning and carding machine “to encourage useful inventions, as well as promote the manufacture of cotton and wool within this state”; and a 1787 Pennsylvania patent for a flour mill device that would “tend to simplify and render cheap the manufacture of flour which is one of the principal staples of this commonwealth. . . .”¹⁸⁸

Given the effect of state patent rights in the past, creating a new system of state patent rights would be a return to the system under the Articles of Confederation - with the same problems faced under the Articles.

B. Incentives for State Action

The Supreme Court’s statutory subject matter exception has arguably delayed the development

¹⁸³ See Chad King, *Abort, Retry, Fail: Protection for Software-Related Inventions in the Wake of State Street Bank & Trust Co. v. Signature Financial Group, Inc.*, 85 CORNELL L. REV. 1118, 1157–58 (2000).

¹⁸⁴ *Id.* at 1159–60. See also Lee A. Hollaar, *Justice Douglas Was Right: The Need for Congressional Action on Software Patents*, 24 AIPLA Q.J. 283, 286 (1996).

¹⁸⁵ See *supra* Section II.A.

¹⁸⁶ *Goldstein v. California*, 412 U.S. 546 (1973).

¹⁸⁷ *Id.* at 557.

¹⁸⁸ *Id.* at 557 n.13.

of the software, biotech, and nanotechnology industries.¹⁸⁹ Patents, by design, inhibit competition and thereby give the inventor the opportunity to raise prices during the term of the patent. This enhanced revenue opportunity incentivizes investing in unproven technology. Rational investors factor in the possibility of greater revenue when evaluating the desirability of investing in new research. Without the possibility of greater revenue, the attractiveness of the risk/reward ratio is reduced, thus reducing the availability of funding to develop the technology. Therefore, the exemptions, by depriving inventors of protection against competition, remove incentives for inventing in these fields, perhaps even to the point of preventing promising new technologies from ever developing.

The states are in a position to provide this missing incentive by providing protection for this previously unprotected subject matter. However, the state-level solution would not be as desirable as a federal solution. In effect, state-by-state patent rights would represent a return to the Articles of Confederation, with all of the attendant problems.

Since state laws are inherently limited to activity within their state, a system resembling that present under the Articles of Confederation would encourage state competition and fragmentation of the national market. For example, if a state adopted the full federal catalog of patent rights, they would risk discouraging manufacturing within the state.

Indeed, under the Articles, there was no consensus among the states. At least one state had a general patent statute,¹⁹⁰ two others had an intellectual property statute broad enough to cover both copyrights and patents,¹⁹¹ while two others prohibited patents.¹⁹² Ideally, there would be a consortium of states with common statutes and reciprocity. This would provide the advantages that would flow from amending the U.S. patent statute and harmonizing it with international norms of predictability and uniformity of processes.¹⁹³ However, the creation of such a uniform system would face challenges. For example, some states have large biotech industries and might therefore be inclined to favor extending protection for that industry, while other states have small biotech presence but large medical institutions which, as consumers of the innovation, might argue for less protection.

¹⁸⁹ Joshua D. Sarnoff, *Patent-Eligible Inventions after Bilski: History and Theory*, 63 HASTINGS L.J. 53, 59–60 (2011).

¹⁹⁰ South Carolina had a statute providing “The Inventors of useful machines shall have a like exclusive privilege of making or vending their machines for the like term of 14 years, under the same privileges and restrictions hereby granted to, and imposed on, the authors of books.” An Act for the Encouragement of Arts and Sciences, 1784 S.C. Pub. Laws 343–44.

¹⁹¹ The two states were Georgia and New Hampshire. Georgia passed an act for the encouragement of literature and genius, 1786 Ga. Laws 342-43. New Hampshire passed an act for the encouragement of literature and genius, 1783 N.H. Laws 305.

¹⁹² The Maryland Declaration of Rights declared that “[M]onopolies are odious, contrary to the spirit of a free government, and the principles of commerce; and ought not to be suffered.” MD. CONST. of 1776, art. XXXIX. The North Carolina Constitution also provided that “[P]erpetuities and monopolies are contrary to the genius of a free State, and ought not to be allowed.” N.C. CONST. of 1776, art. XXIII.

¹⁹³ For additional detail on the arguments for (and against) harmonization, see Oppenheimer I, *supra* note 32.

States could charge a fee for processing patent applications. The resulting potential revenue would need to be balanced against possible harm to the state economy. Certain states could, however, benefit from granting state patent rights tailored to the specific state's economy by providing, for example, exclusive rights to use an invention in the state, or the right to sell in the state.

At least two categories of states could make a state-by-state patent system work. States with large economies (for example, California, New York, and Texas) would have the economic power, by virtue of the size of their markets, to impose this type of restriction without the risk of manufacturers boycotting the state. States with unique, unmovable resources (for example, Johns Hopkins in Maryland) could also impose these restrictions because of the enormous cost of relocating the resources.

C. Designing a Constitutional State Patent System

States wanting to create their own patent systems would face inherent constraints. The systems could, of course, only apply to activities within the state. They could, however, cover not only manufacture within the state, but also use or sale within the state, much as the federal patent statute covers patented inventions manufactured outside the United States but imported into, used or sold within the United States.¹⁹⁴

State systems could only cover inventions that the Constitution did not commit to federal jurisdiction – those excluded from statutory subject matter by the Supreme Court's exceptions.¹⁹⁵

To avoid preemption issues, the state systems should be compatible with the federal constitutional objectives of motivating innovation and disclosure.¹⁹⁶ A safe course would be to track the federal system by using a limited patent term (although the constitutional restriction to limited terms applies only to Congress, not to the states) and a patent application examination system assuring that state patents are only awarded for truly innovative discoveries.

The federal patent statute creates several patentability hurdles. To be patentable the invention must fall within the categories of patentable subject matter,¹⁹⁷ and the invention must be

¹⁹⁴ 35 U.S.C. § 271 (“[W]hoever without authority . . . uses . . . or sells any patented invention, within the United States . . . infringes the patent.”).

¹⁹⁵ See *supra* Sections II.E.1–3. The state might include in its examination system a process for assuring that the claimed invention fell within one of the federal exemptions. A prudent innovator would file both state and federal applications. If the U.S. Patent Office concluded that the invention was statutory, then by definition the state system could not apply. States might even condition state grant on filing, and being denied, federal protection. A federal summary proceeding, along the lines proposed in Max Stul Oppenheimer, *Rethinking Compact Prosecution*, 25 ALB. L. J. SCI & TECH 257 (2015), would be helpful.

¹⁹⁶ See *supra* Section II.A.

¹⁹⁷ 35 U.S.C. § 101 (2012).

useful,¹⁹⁸ novel,¹⁹⁹ and nonobvious.²⁰⁰ The applicant for a patent must supply a written description of the invention sufficient to teach others how to make and use it.²⁰¹ These requirements should be incorporated in a state system because they are sound policy and desirable (if not necessary) to be consistent with the federal scheme and therefore lawful under the Supremacy Clause.²⁰²

CONCLUSION

It is unfortunate that the framers left virtually no record of deliberations concerning the Intellectual Property Clause of the Constitution.²⁰³ Surely they knew how invention fueled the success of England's industrial revolution, and the framers must have realized the limited resources available to the nation. It would certainly be helpful to know if the framers thought that, given the importance of incentivizing innovation, the power to grant copyrights and patents should be exclusively a federal power; or, given the limited resources available to the federal government (and the far more pressing demands on those resources than providing incentives for innovation), it would be helpful to know if the framers thought that state incentives were a valuable tool to be used alongside federal incentives.

Judging solely by the written record, it is likely that they did not consider the question directly.

Without any evidence, one is left to look for inferential clues. The first clue is the lack of records itself. If protection of intellectual property were thought essential to the success of the federal government, one would expect that there would be more robust record of discussions concerning the Intellectual Property Clause. A second clue is co-existence, because for much of the nation's history, state common law copyrights existed alongside federal copyrights.²⁰⁴ This shows a lack of concern over shared control of copyrights, and since the power to grant copyrights and patents arises under the same clause of the Constitution, it is reasonable to conclude that shared control could apply to patents as well. A third clue is the existence of state patents under the Articles of Confederation (and before), and the Tenth Amendment reservation of state powers not granted to the federal government.²⁰⁵

It is fair to ask why, if the states had the power, none have exercised it to date. One explanation would be that to the extent that the federal statute provides adequate incentive to innovate, there is no need for states to intrude. This would have been a reasonable explanation until the emergence of the "too much protection" theory which developed from the dissent in

¹⁹⁸ 35 U.S.C. § 101.

¹⁹⁹ 35 U.S.C. § 102 (2012).

²⁰⁰ 35 U.S.C. § 103 (2012).

²⁰¹ 35 U.S.C. § 112 (2012).

²⁰² *See supra* Sections IV.A–B.

²⁰³ *See supra* Section II.C.

²⁰⁴ *See supra* Sections V.B.

²⁰⁵ *See supra* Sections II.B–C.

Metabolite.²⁰⁶

It is the emergence, and subsequent adoption, of the *Metabolite* theory, that grants the state power to issue patents and creates the need for the exercise of such power. The theory itself – that “too much protection” interferes with progress – certainly has the ring of truth. It ignores, however, the fundamental observation that “[a]n inventor deprives the public of nothing which it enjoyed before his discovery”²⁰⁷ Thus even a broad discovery that preempts a broad field for a limited period of time does not necessarily inhibit progress, since there is no way to know whether the field would even exist absent the broad discovery, nor can the importance of the field be assessed except in hindsight.

The Supreme Court has ruled that certain categories of invention cannot be patented at the federal level, but has provided no reason to believe that progress in those fields will not suffer for lack of incentive. The states are in a position, by virtue of the exclusions created by the Supreme Court, to supply incentives which the federal government cannot.

To be sure, the states are constrained in the design of such incentive systems,²⁰⁸ but it is possible to design incentive systems within those constraints.²⁰⁹ Not all states have equal ability to participate, but the states nonetheless have an opportunity to contribute to the continued “Progress of Science and useful Arts.”

²⁰⁶ See *supra* Section III.B.

²⁰⁷ *United States v. Dubilier Condenser*, 289 U.S. 178, 186 (1933).

²⁰⁸ See *supra* Section V.C.

²⁰⁹ See *supra* Sections V.B–C.

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