

Federal Circuit Bar *Journal*



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The Three Types of Abstract Ideas

Joseph Matal*

Introduction

No field of patent jurisprudence is more vigorously criticized by a more distinguished group of authorities than is the current law of subject matter eligibility. A former Chief Judge of the Federal Circuit has described the state of the law as “unending chaos”¹ and “a menagerie of inconsistency,”² in which judicial decisions are “unclear, inconsistent with one another and confusing,” and in which he himself cannot “predict outcomes in individual cases with any confidence.”³ Another former Chief Judge of the Federal Circuit has noted the “exist[ence] [of] widespread uncertainty and confusion regarding” standards for patent eligibility, which “is especially pronounced with respect to the exception for abstract ideas”⁴—and “is allowing patent challengers to . . . wield the exception[s] [to eligibility] like a sledgehammer.”⁵ In a similar vein, recent former Directors of the Patent Office have stated that “[o]ur current patent eligibility law truly is a mess,” producing “decisions that are irreconcilable, incoherent, and against our national interest;”⁶ that the law is “ambiguous and difficult to apply consistently;” and that “hope has faded”

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¹ *The State of Patent Eligibility in America Part I: Hearing Before the Subcomm. on Intellectual Prop. of the S. Comm. on the Judiciary*, 116th Cong. (2019) [hereinafter “*Senate Hearing I*”] (statement of the Hon. Paul R. Michel (ret.), Fed. Cir.).

² Brief of the Hon. Paul R. Michel (ret.) as Amicus Curiae in Support of Petitioners at 14, *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 915 F.3d 743 (Fed. Cir. 2019), cert denied, 140 S. Ct. 855 (2020) (No. 19–430); see also *id.* at 14 (“[under the] § 101 caselaw . . . the outcome [is] never certain, even after knowing which Federal Circuit judges are deciding the appeal.”); *Id.* at 4 (“[o]ne cannot distinguish eligible subject matter from ineligible, with any reasonable certainty.”).

³ *Senate Hearing I* (statement of the Hon. Paul R. Michel).

⁴ Brief of the Hon. Randall R. Rader & ChargePoint, Inc. as Amici Curiae in Support of Petitioner at 21, 12 (ret.), *Chamberlain Grp., Inc. v. Techtronic Indus. Co.*, 953 F.3d 1341 (Fed. Cir. 2019), cert. denied, (No. 19–1299), 2020 WL 5882260.

⁵ *Id.* at 21.

⁶ *Senate Hearing I* (statement of David J. Kappos, Partner, Cravath, Swaine & Moore).

that courts and the Patent Office will be able to “interpret and clarify” the exceptions to eligibility.⁷ Academics and leading professional associations are just as pessimistic, describing the case law as “creat[ing] a tremendous amount of uncertainty for innovators”⁸ and “inject[ing] ambiguity and unpredictability into the eligibility determination.”⁹

This article takes a contrary view. The Federal Circuit has now issued over 100 precedential opinions applying the *Alice/Mayo* patent eligibility test. Many cases address the same issues, and a close analysis of them reveals emerging standards and an evolving taxonomy of what is and is not eligible for patenting. While common law, case-by-case adjudication inevitably produces a few outlying decisions, especially in the early years after a change in the law, the volume of Federal Circuit case law is now large enough that it is becoming apparent where the eligibility lines fall.

To the extent that the labels employed by the current jurisprudence create some confusion, this is a result of the Supreme Court’s insistence that all eligibility limits are simply a question of exceptions for “laws of nature, natural phenomena, and abstract ideas.”¹⁰ The high Court’s adoption of this unified field theorem of patent eligibility has forced the Federal Circuit to take several very different eligibility tests and place them all under the rubric of “abstract ideas.” The principal thesis of this article is that the term “abstract ideas,” as currently used by the courts, encompasses three different tests for eligibility. The body of the article describes how the recent Federal Circuit decisions fall into each of these categories.

The first category of “abstract ideas” encapsulates how the term was used during the two centuries leading up to *Bilski v. Kappos*.¹¹ In this form, “abstract idea” does not refer to a specific type of subject matter. Instead, the term means any discovery in any field of knowledge—physics, mathematics, chemistry, or biology—that is claimed in the abstract, without regard to a practical application that creates utility for humans.

The second category of abstract ideas, finally acknowledged by the Supreme Court in *Bilski* and *Alice*, does refer to a specific type of subject matter: economic practices and other human activities. This type of subject matter is

⁷ *Senate Hearing I* (statement of Q. Todd Dickinson, Senior Partner, Polsinelli, PC).

⁸ *Senate Hearing I* (statement of Adam Mossoff, Professor, Antonin Scalia Law School).

⁹ *The State of Patent Eligibility in America, Part II: Hearing Before the Subcomm. on Intellectual Prop. of the S. Comm. on the Judiciary*, 116th Cong. (2019) [hereinafter “*Senate Hearing II*”] (statement of Scott Partridge, Immediate Past Chair, Am. Bar Ass’n Section of Intellectual Prop. Law).

¹⁰ *Mayo Collaborative Servs. v. Prometheus Lab’ys., Inc.*, 566 U.S. 66, 70 (2012) (quotations omitted).

¹¹ 561 U.S. 593 (2010).

treated as *inherently* ineligible. Even if it is claimed for a specific, practical application, and in a novel and nonobvious form, it cannot be the basis for a patent. The many recent cases applying this second, human-activities category fall into several emerging subcategories: business transactions and practices; the selection of media content and the display of information; detecting and preventing fraud or human error; and games and methods of human conditioning. What unites these types of subject matter is that the knowledge that they seek to apply belongs to the social sciences or liberal arts. Inventions in this category seek to influence the operation of the human mind, rather than to exploit and apply the laws of nature.

The third category of abstract ideas, applied in cases such as *Electric Power Group, LLC v. Alstom S.A.*¹² and *ChargePoint, Inc. v. SemaConnect, Inc.*,¹³ has been described as encompassing subject matter that includes data collection and processing or different forms of electronic communication.¹⁴ Unlike the second category, however, the Federal Circuit has made clear that the subject matter that falls into this category is *not* inherently ineligible. Instead, patent claims in this category are “abstract” because they claim only a result without describing *how* to achieve that result, or because they claim only the routine functions of a prior-art device in a particular field of use. These eligibility rules have been applied robustly in the last few years to invalidate patents that claim only the idea of solving a problem with computers or that are directed to the normal and intended operation of a preexisting communications device. This third category of abstract ideas has been the most controversial—it is a frequent target of the critics of the current case law. And yet it is also an eligibility test that is deeply rooted in American jurisprudence. These cases’ prohibition on claiming mere functions or characteristic uses is a direct descendant of the “function of a machine” test, which was first articulated in *Corning v. Burden*¹⁵ and *O’Reilly v. Morse*¹⁶ and was regularly applied by the Supreme Court and the courts of appeals for over a century.¹⁷

The last sections of the article describe how modern Supreme Court decisions have effectively assigned (or reassigned) particular subject matter, such as mathematical equations, to these three categories and notes the high Court’s strange treatment of medical-diagnostic methods. The article also describes the uncertain status and scope of the mental steps doctrine, and concludes by

¹² 830 F.3d 1350 (Fed. Cir. 2016).

¹³ 920 F.3d 759 (Fed. Cir. 2019).

¹⁴ See *Elec. Power Grp., LLC*, 830 F.3d at 1355–56; *ChargePoint, Inc.*, 920 F.3d at 766, 768–69.

¹⁵ 56 U.S. 252 (1853).

¹⁶ 56 U.S. 62 (1853).

¹⁷ See *Corning*, 56 U.S. at 268–69; *O’Reilly*, 56 U.S. at 199.

speculating that major legislative changes to 35 U.S.C. § 101 are unlikely. If the latter conclusion is correct, in particular, it is high time that patent practitioners set aside their complaints about lingering uncertainty and instead learn to live with the modern eligibility doctrine—and work to synthesize it into a coherent and practical set of rules.

I. Laws of Nature “As Such”—The *Original Abstract Idea*

This first category of abstract ideas—the rule that a law of nature or natural phenomenon cannot be claimed in the abstract or as such, but only in a practical application of the principle—is the oldest and the least controversial of the three categories.¹⁸ It is also the one from which the term “abstract idea” originated.¹⁹ The Supreme Court alluded to this concept as early as its decision in *Pennock v. Dialogue*,²⁰ which held that a patent is voided by the prior public use or sale of an invention that embodies the claims, even if the principle behind the invention’s operation was not disclosed. After quoting an English case’s statement that “the invention must be new to the world,” and that its “public sale . . . makes the patent void,”²¹ *Pennock* noted that “[b]y ‘invention,’” the court meant “not the abstract discovery, but the *thing* invented, not the new secret principle.”²²

The doctrine received full expression in the Supreme Court’s decisions in *Le Roy v. Tatham*,²³ which announced 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.”²⁴ Thus things such as “steam power,” “electricity, and any other power in nature” must remain “open to all”—“no one can appropriate [these] power[s] exclusively to himself, under the patent laws.”²⁵ “[T]he invention is not in discovering” these powers—instead, it is “in applying them to useful objects.”²⁶ Thus “[a] new

¹⁸ See, e.g., *Senate Hearing II* (statement of Scott Partridge, Immediate Past Chair, Am. Bar Ass’n Section of Intellectual Prop. Law) (“[A]t one time the U.S. Supreme Court had established a patent eligibility test that, while imperfect, generally struck a proper balance: preventing the patenting of pure laws of nature, natural phenomena, or abstract ideas themselves, while authorizing the patenting of their practical application in particular fields.”).

¹⁹ See *infra* Sections II–III (the term “abstract idea” was not used to describe other patent eligibility rules until well into this century).

²⁰ 27 U.S. 1 (1829).

²¹ *Id.* at 20.

²² *Id.*

²³ 55 U.S. 156 (1852).

²⁴ *Id.* at 175.

²⁵ *Id.*

²⁶ *Id.*

property discovered in matter, when practically applied, in the construction of a useful article of commerce or manufacture, is patentable.”²⁷ *Le Roy* concluded its discussion by quoting the English case of *Househill Coal & Iron Co. v. Neilson*:

A patent will be good, though the subject of the patent consists in the discovery of a great, general, and most comprehensive principle in science or law of nature, if that principle is by the specification applied to any special purpose, so as thereby to effectuate a practical result and benefit not previously attained.²⁸

The Supreme Court thereafter repeatedly articulated this principle without substantial variation. It noted that “[a]n idea of itself is not patentable, but a new device by which it may be made practically useful is;”²⁹ and that “[w]hile a scientific truth, or the mathematical expression of it, is not patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.”³⁰ Its most recent expression is *Diamond v. Diehr*’s familiar pronouncements that “[i]t is now commonplace that an *application* of a law of nature or mathematical formula to a known structure of process may well be deserving of patent protection”³¹ but that “laws of nature, natural phenomena, and abstract ideas” are “[e]xcluded from . . . patent protection.”³²

The high Court’s only important elaborations on this rule over the years are its explanations that the famous English case of *Neilson v. Harford* is consistent with rather than a departure from the rule, and the Court’s emphasis that once a new discovery is made, its *application* need not involve additional “skill or invention.”

A. *Neilson v. Harford* Comes to America

The Supreme Court addressed *Neilson* in *O’Reilly v. Morse*,³³ which rejected Samuel Morse’s attempt to claim “the use of . . . electro-magnetism, however

²⁷ *Id.*

²⁸ *Id.* (quoting *Househill Coal & Iron Co. v. Neilson*, Web. Pat. Cas. 673 (1843)).

²⁹ *Rubber-Tip Pencil Co. v. Howard*, 87 U.S. 498, 507 (1874); *see also* *Le Roy v. Tatham*, 63 U.S. 132, 137 (1859) (“It is quite true that a patent may not be taken out solely for an abstract philosophical principle—for instance, for any law of nature or any property of matter, apart from any mode of turning it to account However brilliant the discovery of the new principle may be, to make it useful it must be applied to some practical purpose.”) (quoting *Webster’s Patent Cases*, 673, 342).

³⁰ *Mackay Radio & Telegraph Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939); *see also* *De Forest Radio Co. v. General Elec. Co.*, 283 U.S. 664, 684–85 (1931) (“It is method and device which may be patented and not the scientific explanation of their operation.”) (citing *Le Roy*, 55 U.S. at 174–76).

³¹ 450 U.S. 175, 187 (1981).

³² *Id.* at 185.

³³ 56 U.S. 62 (1853).

developed for marking or printing intelligible characters . . . at any distances.”³⁴ The Court ultimately concluded that Morse’s eighth claim was invalid for claiming a result rather than a means—that it “claims an exclusive right to use a manner and process which he has not described and indeed had not invented.”³⁵ In the course of the proceedings, Morse’s counsel had pressed the argument that Morse’s claim could be sustained on the basis of *Neilson*. The *O’Reilly* Court stated that it “commented on [*Neilson*] . . . more fully, because it has attracted much attention in the courts of this country . . . [a]nd perhaps a mistaken construction of that decision has led to the broad claim in the patent now under consideration.”³⁶

James Neilson’s discovery was that the efficiency of the iron smelting process could be greatly increased by injecting hot air into the smelting furnace (the so-called “hot blast”).³⁷ Like other patents of its era, Neilson’s did not include claims,³⁸ and its specification was brief,³⁹ leading to different interpretations over the years of what it claimed.⁴⁰ Morse’s counsel apparently argued to the Supreme Court in *O’Reilly* that the English court had allowed Neilson to claim the principle that injecting hot air would aid the smelting process—and that *Neilson v. Harford* thus supported Morse’s claim to the principle of using electromagnetism to convey printed letters.

The *O’Reilly* Court rejected this interpretation of *Neilson*. It concluded that *if* Neilson’s patent had not been “for any thing more than the discovery that hot air would promote the ignition of fuel better than cold,” the English court would have rejected it, “because the discovery of a principle in natural philosophy or physical science, is not patentable.”⁴¹ But Neilson’s patent could be sustained, *O’Reilly* concluded, because Neilson had also claimed “interposing a heated receptacle, between the blower and the furnace, and by this means heating the air after it left the blower, and before it was thrown into the fire.”⁴² Thus although the patented invention “embodied . . . the principle that hot air will promote the ignition of fuel better than cold,” Neilson’s

³⁴ *Id.* at 112.

³⁵ *Id.* at 113.

³⁶ *Id.* at 117.

³⁷ See Jeffrey A. Lefstin, *Inventive Application: A History*, 67 FLA. L. REV. 565, 579 (2015).

³⁸ See *Risdon Iron & Locomotive Works v. Medart*, 158 U.S. 68, 72 (1895).

³⁹ See *Inventive Application*, *supra* note 37, at 579.

⁴⁰ See *O’Reilly*, 56 U.S. at 117.

⁴¹ *Id.* at 116 (“If the Court of Exchequer had said that Neilson’s patent was for the discovery, that hot air would promote ignition better than cold, and that he had an exclusive right to use it for that purpose, there might, perhaps, have been some reason [for Morse] to rely upon it. But the court emphatically denied this right to such a patent.”).

⁴² *Id.*

patent could be upheld because it claimed “a mechanical apparatus, by which a current of hot air, instead of cold, could be thrown in.”⁴³

Half a century later, *Risdon Iron & Locomotive Works v. Medart*⁴⁴ confirmed this interpretation of *Neilson*, noting that although Neilson’s patent had been attacked on the basis that “the patent was for a principle, and was, therefore, void,” the patent was ultimately sustained because “the patent did not merely claim a principle, but a machine embodying a principle.”⁴⁵

B. A Practical Application Need Not Be Inventive

While *O’Reilly* and *Risdon* confirmed that some effective means must be disclosed and claimed when practically applying a discovery or principle, other cases have noted that such a practical application need not itself be inventive. *Burr v. Duryee*⁴⁶ commented on the class of “inventions which consist in a new application of certain natural forces to produce a certain result to which they had never before been applied”—but which, “when once pointed out, required no invention to construct devices for its application.”⁴⁷

Burr cited the patent in *McClurg v. Kingsland*,⁴⁸ which claimed an improved method of injecting molten metal into a mold to make iron rolls. The invention applied a principle of fluid dynamics—that liquid introduced into a round container at an angle will rotate in the container, thereby pushing lighter material towards the center—that was gleaned by the inventor from observing water swirling in a bucket.⁴⁹ The Court described how “[t]he thought all at once” struck the inventor that “the application of this principle or law of nature might be beneficially made to the casting of rolls by merely

⁴³ *Id.* Morse also argued that *Neilson v. Harford* supported allowing claims as broad as his eighth claim because Neilson had claimed his heated receptacle “in any form.” *Id.* The *O’Reilly* Court disagreed, emphasizing the distinction that in the case of Neilson’s invention, “the effect” of promoting ignition “was always produced, whatever might be the form of the receptacle, or the mechanical contrivances for heating it,” whereas “Professor Morse has not discovered that the electric or galvanic current will always print at a distance, no matter what may be the form of the machine or mechanical contrivance through which it passes.” *Id.* at 117.

⁴⁴ 158 U.S. 68 (1895).

⁴⁵ *Id.* at 72–73.

⁴⁶ 68 U.S. 531 (1864).

⁴⁷ *Id.* at 568.

⁴⁸ 42 U.S. 202 (1843). *McClurg* is better known today for its pronouncements on Congress’s power to apply new intellectual property laws retroactively. See Dennis Crouch, *McClurg v. Kingsland*, 42 U.S. 202 (1843) – *Shop Rights and Retroactive Patent Statutes*, PATENTLY-O (Oct. 23, 2019), <https://patentlyo.com/patent/2019/10/kingsland-retroactive-statutes.html> [https://perma.cc/J5KT-YHME].

⁴⁹ See *id.* at 204; *Burr*, 68 U.S. at 568–69.

introducing the metal at the bottom of the mould at a tangent.”⁵⁰ Figure 1 from the patent,⁵¹ reproduced below, shows the “gates” at the bottom of the cylinder injecting the metal into the cylinder at just such a tangent, ensuring that it will rotate inside the cylinder:

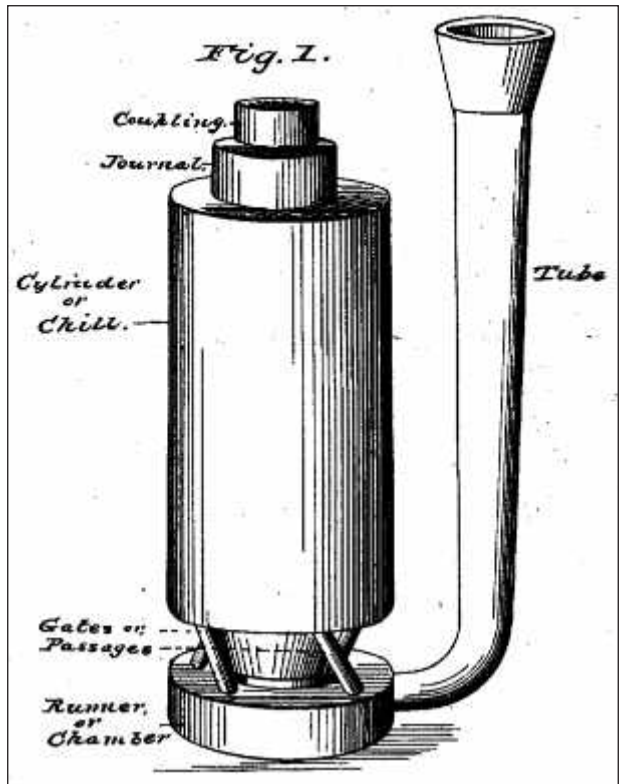


Figure 1: Cylinder or Chill with Gates or Passages at Tangent.⁵²

Burr emphasized that the claimed invention in *McClurg* “required no skill or invention to devise a plan for the application of the principle,” and that “[e]very part of the machinery [used in the invention] is old”⁵³— “[a]nd yet it was a patentable invention or discovery.”⁵⁴

The same principle is illustrated by *Eibel Process Co. v. Minnesota & Ontario Paper Co.*,⁵⁵ an early 20th century decision that *Diamond v. Diehr* cited for the proposition that “application of a law of nature” to a “known structure or

⁵⁰ *Burr*, 68 U.S. at 569.

⁵¹ U.S. Patent No. 8668X (issued Mar. 3, 1835).

⁵² ‘68X, fig. 1.

⁵³ *Burr*, 68 U.S. at 569.

⁵⁴ *Id.*

⁵⁵ 261 U.S. 45 (1923).

process”⁵⁶ may be patentable. *Eibel Process* upheld a patent that applied the law of gravity to make a liquid move more quickly down an inclined surface. The case involved Foudrinier paper-making machines, which are operated by pouring liquid pulp onto a fine wire mesh that moves over a series of rollers, drying and felting the pulp as it goes and ultimately pressing it into paper.⁵⁷ These machines, being large and expensive, were run continually, thus making the speed at which they could be operated “of the highest importance.”⁵⁸ The limitation on their speed in the prior art was that when the machine was run in excess of certain speeds, the pulp stock tended to wave or ripple, interfering with its felting and resulting in defective paper.⁵⁹ William Eibel discovered the physical phenomenon that was the source of the problem: the rippling and waving was caused when the pulp stock flowed at a slower rate than the rate at which the mesh ran, which resulted in the pulp’s being pulled by the wire mesh—it was this pulling of the pulp stock that made it wave and ripple.⁶⁰

Eibel’s solution to this problem was to elevate the beginning of the machine by 12 inches—by “putting shimming blocks under the machine,”⁶¹ for example—thereby causing the pulp stock “to travel by gravity . . . substantially as fast as the wire moves.”⁶² As illustrated in Eibel’s figure 1, the wire is elevated at the breast-roll (item b) “by means of screw b’, or any other suitable means.”⁶³

⁵⁶ *Diamond v. Diehr*, 450 U.S. 187, 187; *see also In re Bergy*, 596 F.2d 952, 993 (C.C.P.A. 1979) (Baldwin, J., concurring) (noting that *Eibel* “is often cited approvingly as an example of the proper use of a natural phenomenon to produce a new and useful result”).

⁵⁷ *Eibel Process Co.*, 261 U.S. at 46–47.

⁵⁸ *Id.* at 48; *see also id.* (noting that such a machine cost about \$250,000 at the time—equivalent to \$3.7 million in today’s currency).

⁵⁹ *See id.* at 52–53.

⁶⁰ *See id.* at 52, 56–57, 62, 67–68; *see also* U.S. Patent No. 845,224, col. 1 ll. 88–92 & 98–101 (filed Aug. 22, 1906) (issued Feb. 26, 1907) (noting that in the prior art, “the making-wire has always had to perform the work of drawing along the [pulp] stock, and as the wire moved much faster than the stock the stock waved or rippled badly near the breast-roll end of the wire The machine has been run necessarily at a slow rate of speed to give ample time for the water to escape and for the fibers to lay down so as to make a uniform sheet.”).

⁶¹ *Eibel Process Co.*, 261 U.S. at 50, 58.

⁶² *Id.* at 49.

⁶³ ’224 Patent, col. 1 l.62 & col. 2 ll. 36–37.

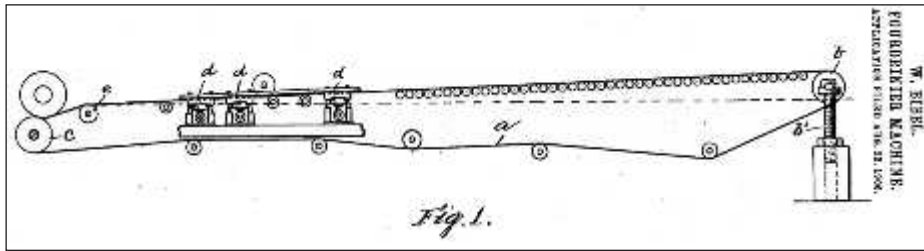


Figure 2: Side View of Elevated Foudrinier Machine.⁶⁴

Eibel’s discovery of the natural phenomenon that caused the waving and rippling,⁶⁵ combined with the public’s initial skepticism of his invention followed by its quick and widespread adoption,⁶⁶ persuaded the Supreme Court that his invention was “new and useful.”⁶⁷ And the fact that the patent made only a non-inventive application of a law of nature—the “obvious application of the principle that water will run downhill”⁶⁸—neither caused the *Eibel* Court to deem the patent ineligible, nor deterred *Diamond v. Diehr* from citing the case as a textbook example of how a law of nature may be practically applied to obtain a patent.

C. A Rule Grounded in the Utility Requirement

Although the recent Supreme Court cases justify all of eligibility jurisprudence based on a concern about preemption,⁶⁹ the Court has also noted, with respect to the rule against claiming principles in the abstract, that preemption does *not* restrict an inventor’s ability to claim the practical applications of the law of nature that he or she has discovered. *The Telephone Cases*,⁷⁰ which involved Alexander Graham Bell’s claim to the telephone, conceded that “[i]t may be that electricity cannot be used at all for the transmission of speech, except in the way Bell has discovered, and that therefore, practically, his patent gives him its exclusive use for that purpose.” The Court nevertheless concluded that that this “does not make his claim one for the use of electricity distinct from the particular process with which it is connected in his patent.”

The rule against patenting scientific principles “in the abstract” also has been rationalized as being based on the narrower preemption concern that allowing such patents would “tie up” the “basic tools of scientific and technological

⁶⁴ *Id.* col. 1 ll. 58–60.

⁶⁵ See *Eibel Process Co.*, 261 U.S. at 67–68.

⁶⁶ See *id.* at 55.

⁶⁷ *Id.* at 56.

⁶⁸ *Id.* at 52.

⁶⁹ See *Mayo Collaborative Servs. v. Prometheus Lab’s Inc.*, 566 U.S. 66, 72 (3012); *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2013).

⁷⁰ 126 U.S. 1, 535 (1888).

work,”⁷¹ because they would make infringers of even those conducting scientific research. The experimentation exception to infringement liability that protects such researchers, however—the right to understand and explore the principles behind the claimed invention’s operation, and to find ways to improve it or design around it⁷²—should not depend on the scope of the patent’s claims. Indeed, even claims that are limited to the practical application of a scientific principle would not always preclude an experimenter’s activities from literally infringing. It is the experimentation exception itself, not eligibility doctrine, that protects researchers.

The rule against patenting scientific principles in the abstract is best justified by § 101’s utility requirement. As Judge Dyk noted in his opinion in *Athena Diagnostics, Inc. v. Mayo Collaborative Services, LLC*,⁷³ “[f]or there to be a patent eligible application of a natural law . . . the claims must recite a specific application of that ‘discovery’ with established utility.”⁷⁴ The laws of nature themselves—the properties of lead and tin at issue in *Le Roy v. Tatham*, the force of gravity in *Eibel Process*, or the Arrhenius equation’s gauging of thermally-induced reactions in *Diehr*—benefit no one in the abstract. It is only when these principles are applied to make a stronger pipe, to produce paper at a faster rate, or to properly cure rubber that they are useful to humans.

The only other thing to be said about the prohibition against patenting scientific principles in the abstract is that it rarely arises in practice. Inventors overwhelmingly are eager to show how their discoveries can be made useful. The only recent case that falls squarely into this category is *In re Gitlin*,⁷⁵ which affirmed the rejection of claims to the mathematical concept of interpolation.⁷⁶

⁷¹ *Ass’n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013).

⁷² *See* *CLS Bank Int’l v. Alice Corp. Pty. Ltd.*, 717 F.3d 1269, 1322–25 (Fed. Cir. 2013) (Newman, J., dissenting); *Senate Hearing I* (statement of Robert A. Armitage, at 26–28).

⁷³ 927 F.3d 1333 (Fed. Cir. 2019).

⁷⁴ *Id.* at 1341 (Dyk, J., concurring in denial of rehearing en banc); *see also* *Brenner v. Manson*, 383 U.S. 519, 534 & 536 (1966) (“The basic quid pro quo contemplated by the Constitution and the Congress for granting a patent monopoly is the benefit derived by the public from an invention with substantial utility ‘A patent system must be related to the world of commerce rather than to the realm of philosophy.’”) (quoting *In re Ruschig*, 343 F.2d 965, 970 (C.C.P.A. 1965)).

⁷⁵ 775 F.App’x. 689 (Fed. Cir. 2019).

⁷⁶ *See id.* at 691 (citing *Diamond v. Diehr*, 450 U.S. 175, 182 n.7 (1981)). As discussed *infra* at notes 285–293 and accompanying text, this article contends that the recent decision in *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC* is best characterized as falling into the third category of abstract ideas, for inventions that claim a result without describing how to achieve it. *See* *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC*, 939 F.3d 1355 (Fed. Cir. 2019).

II. Economic Practices and Other Human Activities: The *New Abstract Idea*

Others have exhaustively explained how § 101 confines the patent system to the technological arts and thus bars patents that are based on sociological concepts or that claim aesthetic creations.⁷⁷ The Constitution's phrase "useful arts" was understood at the founding to mean what we would today call "technology;"⁷⁸ the 1952 Act did not intend to change that meaning when it updated § 101 by replacing the term "art" with "process;"⁷⁹ and the word "process," in any event, must be understood in the industrial context of the words that surround it: machines, manufactures, and compositions of matter.⁸⁰ The resulting rule that patents are restricted to advances in the technological arts was long and widely accepted: the patenting of business methods was all but unheard of during the first two centuries of the nation's history.⁸¹

It is thus surprising that no Supreme Court decision articulated this limit on subject matter eligibility before *Bilski* and *Alice* did so just a decade ago. Before *Bilski*, the leading judicial authority for the proposition that business methods are ineligible was a series of Second Circuit decisions from the very early 20th century,⁸² some of which were equivocal about their reasons for

⁷⁷ See *Bilski v. Kappos*, 561 U.S. 593, 613–644 (2010) (Stevens, J., concurring in judgment); *In re Bilski*, 545 F.3d 943, 966–976 (Fed. Cir. 2008) (Dyk, J., concurring); *id.* at 998–1011 (Mayer, J., dissenting); Brief for Respondent at 15–29, *Bilski v. Kappos*, 561 U.S. 593 (No. 08–964), 2009 WL 3070864; Peter S. Menell, *Forty Years of Wondering in the Wilderness and No Closer to the Promised Land: Bilski's Superficial Textualism and the Missed Opportunity to Return Patent Law to its Technological Mooring*, 63 STAN. L. REV. 1289 (2011); John R. Thomas, *The Patenting of the Liberal Professions*, 40 B.C. L. REV. 1139 (1999).

⁷⁸ See *Bilski*, 561 U.S. at 634 (Stevens, J., concurring in judgment); *Bilski*, 545 F.3d at 1001 (Mayer, J., dissenting); Menell, *supra* note 77, at 1292–94; Thomas, *supra* note 77, at 1164.

⁷⁹ See *Bilski*, 545 F.3d at 975–76 (Dyk, J., concurring); Menell, *supra* note 77, at 1296–97, 1302.

⁸⁰ See *Bilski*, 545 F.3d at 968–70 (Dyk, J., concurring); Brief for Respondent at 26–27, *Bilski v. Kappos*, 561 U.S. 593 (No. 08–964), 2009 WL 3070864, at 26–27.

⁸¹ See *Bilski*, 561 U.S. at 638 n.35 (Stevens, J., concurring in judgment); *Bilski*, 545 F.3d at 974 (Dyk, J., concurring); *id.* at 1001 n.4 (Mayer, J., dissenting).

⁸² See, e.g., *Guthrie v. Curlett*, 10 F.2nd 725, 726 (2d Cir. 1926); *Berardini v. Tocci*, 190 F. 329, 332 (2nd Cir. 1911); *Hotel Security Checking Co. v. Lorraine Co.*, 160 F. 467, 469 (2nd Cir. 1908); *Hocke v. New York Cent. & H.R.R. Co.*, 122 F. 467, 469 (2nd Cir. 1903). Other scattered judicial and Patent Office decisions so holding are noted in Professor Thomas's article, see *The Patenting of the Liberal Professions*, *supra* n.77, at 1145–47, and Judge Mayer's *Bilski* dissent, see *Bilski*, 545 F.3d at 998–1000, 1001–02.

invalidating the patents at issue.⁸³ *Bilski* and *Alice* are thus landmark decisions, finally providing controlling legal authority for the principle that only advances in the technological arts can be made the subject of a patent.

A. How Business Methods Became an “Abstract Idea”

Bilski is also the first judicial decision to announce that economic practices, however claimed, constitute an abstract idea. Bernard Bilski sought to claim a system of hedging (*i.e.*, entering into contracts to protect against price fluctuations) in purchases of home energy.⁸⁴ No previous decision of any court had ever held that economic practices are inherently “abstract” or that the term “abstract idea” designates a type of subject matter (rather than a way of claiming the subject matter). The Federal Circuit held that Bilski’s claims, because they did not require implementation on a computer, did not satisfy the machine-or-transformation test;⁸⁵ in the Supreme Court, Bilski and the Patent Office largely confined themselves to arguing about the applicability of the machine-or-transformation test and what it means.⁸⁶

But in his solo dissent from the Federal Circuit’s en banc decision, Judge Rader, in an effort to avert a sweeping ruling on patent eligibility, suggested that Bilski’s patent application could be rejected on the alternative basis that it “claims merely an abstract idea.”⁸⁷ Judge Rader articulated the correct “abstract idea” test—that “[a]n abstract idea must be applied to (transformed into) a practical use before it qualifies for protection”⁸⁸—but he stretched the meaning of the term by applying it to Bilski’s patent. The claims at issue recited a specific formula, with specific inputs, for hedging purchases of home energy.⁸⁹ Bilski’s invention was certainly ineligible for patenting, but

⁸³ See *Hotel Sec. Checking Co.*, 160 F. at 469–70 (“The fundamental principle of the system” is “the art of bookkeeping,” which is “as old as the laws of trade,” and although the “patentee has modified and adapted it to fit the ephemeral character of the business in hand, . . . [it] required no exercise of the inventive faculties to do this”); *Hocke*, 112 F. at 469 (noting that it was “difficult to classify the subject of the patent” at issue, and suggesting that methods of avoiding mistakes in business transactions (the subject of the patent) “generally suggest themselves as their necessity becomes apparent”); see also *In re Wait*, 73 F.2d 982 (C.C.P.A. 1934) (avoiding the question of whether “methods of doing business” are patentable).

⁸⁴ See *Bilski*, 561 U.S. at 599.

⁸⁵ See *Bilski*, 545 F.3d at 962, 963–64.

⁸⁶ See Brief for Respondents, *Bilski v. Kappos*, 561 U.S. 593 (No. 08–964), 2009 WL 3070864; Brief for Petitioner, *Bilski v. Kappos*, 561 U.S. 593 (No. 08–964), 2009 WL 2372921.

⁸⁷ *Bilski*, 545 F.3d at 1011 (Rader, J., dissenting).

⁸⁸ *Id.* at 1013.

⁸⁹ See Brief for Petitioner at 57–59, *Bilski v. Kappos*, 561 U.S. 593 (No. 08–964), 2009 WL 2372921. The United States effectively conceded this point four years later in its *Alice*

his claims were not “abstract” in the sense in which that term had been used in American patent law for nearly two centuries. The U.S. Government, however, adopted Judge Rader’s argument. In a single paragraph at the very end of its brief, it contended that Bilski’s hedging method “is also unpatentable on the independent ground that it would preempt the abstract idea of hedging consumption risk.”⁹⁰

The *Bilski* Justices all agreed that the claims before them were ineligible, but they struggled mightily over whether § 101 categorically excludes business methods. A bare majority, uncomfortable with “atextual approaches,”⁹¹ rejected an exception for business methods as well as reliance on the machine-or-transformation test⁹²—but still needed some basis for affirming the rejection of Bilski’s claims. Almost as an afterthought, the Court held that “fundamental economic practice[s]” constitute an abstract idea, and thus are ineligible for patenting for that reason.⁹³

However insubstantial the basis for *Bilski*’s conclusion that economic practices constitute an “abstract idea,” *Bilski* immediately became its own source of authority for that proposition. When *Alice* was before the Supreme Court, counsel for CLS Bank could gleefully note that in the *Bilski* decision, the “common-sense proposition” that economic practices are an abstract idea “did not require extensive discussion or debate.”⁹⁴ And in response to the Alice Corporation’s argument that the abstract-ideas category is limited to “pre-existing fundamental truths that exist in principle apart from human action,”⁹⁵ the Court simply noted that “*Bilski* belies petitioner’s assertion.”⁹⁶ All

brief, noting that Bilski’s claim 4 recited a specific formula for hedging risk in energy markets, and thus could not have been rejected on the basis that it was a “highly general claim.” Brief for the United States as Amicus Curiae Supporting Respondents at 28, *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208 (2014) (No. 13–298).

⁹⁰ Brief for Respondent, at 53–54, *Bilski v. Kappos*, 561 U.S. 593 (2010) (No. 08–964), 2009 WL 3070864.

⁹¹ *Bilski*, 561 U.S. at 609.

⁹² *Id.* at 603–10. Justice Scalia, who provided the fifth vote for most of Justice Kennedy’s opinion, did not join the section that suggested that “the Patent Act leaves open the possibility that there are at least some . . . business methods . . . that are within patentable subject matter.” *Id.* at 609. He also joined Justice Breyer’s separate concurrence, which criticized recent eligibility jurisprudence as allowing “the granting of patents that ‘ranged from the somewhat ridiculous to the truly absurd.’” *Id.* at 659–60 (Breyer, J., concurring in judgment) (quoting *In re Bilski*, 545 F.3d at 1004 (Mayer, J., dissenting)).

⁹³ *Bilski*, 561 U.S. at 611–12.

⁹⁴ Brief for Respondents at 17, *Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208 (No. 13–298).

⁹⁵ *Alice*, 572 U.S. at 220 (internal quotations omitted) (brackets in original).

⁹⁶ *Id.*

nine Justices in *Alice* agreed that economic practices and other methods of organizing human activity “are squarely within the realm of ‘abstract ideas’ as we have used that term.”⁹⁷

Thus, finally, American law had clarity that business methods and other methods of organizing human activity are ineligible for patenting—but at the cost of the doctrinal disruption of forcing this rule into the concept of “abstract ideas.”

B. Inherently Ineligible Subject Matter

The distinctive feature of this category of abstract ideas is that the type of subject matter that it covers—economic practices and other human activities—is *inherently* ineligible. It does not matter that the subject matter is practically applied for human benefit; that it is disclosed in a detailed and specific way that would allow a skilled artisan to readily practice the invention; or that the claimed subject matter is novel and nonobvious. Inventions in this field are per se ineligible.

It was not always clear that *Bilski* would have this effect. An early post-*Bilski* Federal Circuit decision, *Ultramercial, LLC v. Hulu*,⁹⁸ upheld a business-method patent that claimed a scheme for allowing a viewer to watch copyrighted content over the internet in exchange for first watching an advertisement. Identifying a “statutory reluctance to list any new, non-obvious, and fully disclosed subject matter as beyond the reach of title 35,”⁹⁹ the Court concluded that “[t]he application of an abstract idea to a ‘new and useful end’ is . . . deserving of patent protection.”¹⁰⁰ The Supreme Court vacated this decision and remanded it for reconsideration in view of *Mayo*,¹⁰¹ but on remand the Federal Circuit doubled down on its previous analysis.¹⁰² Citing *Diehr*’s statement that a court should not “ignore the presence of the old elements in the [§ 101] analysis,”¹⁰³ the second Federal Circuit decision held that “a claim may be premised on an abstract idea and, indeed, the abstract idea may be of central importance to the invention.”¹⁰⁴

⁹⁷ *Id.* at 221.

⁹⁸ 657 F.3d 1323 (Fed. Cir. 2011).

⁹⁹ *Id.* at 1327.

¹⁰⁰ *Id.*; see also *id.* at 1328 (emphasizing the claimed invention’s “specific application to the Internet and a cyber-market environment”).

¹⁰¹ See *WildTangent, Inc. v. Ultramercial, LLC*, 566 U.S. 1007 (2012).

¹⁰² *Ultramercial, Inc. v. Hulu, LLC*, 722 F.3d 1335 (Fed. Cir. 2013).

¹⁰³ *Id.* at 1344 (quoting *Diamond v. Diehr*, 450 U.S. 175, 188 (1981)).

¹⁰⁴ *Ultramercial, Inc.*, 722 F.3d at 1344.

When this decision was also vacated and remanded (this time in view of *Alice*),¹⁰⁵ the Federal Circuit finally adopted the approach that has been the governing standard ever since. Patent owner Ultramercial argued on this second remand that its claims were eligible because they were “directed to a specific method of advertising and content distribution that was previously unknown and never employed on the Internet before”—and that such “abstract ideas remain patent-eligible under § 101 as long as they are new ideas, not previously well known, and not routine activity.”¹⁰⁶ The third *Ultramercial* decision rejected this argument, holding that the fact that some steps in an abstract idea “were not previously employed in this art is not enough—standing alone—to confer patent eligibility.”¹⁰⁷

Subsequent decisions have all followed this approach. The Federal Circuit has emphasized, for example, that “[n]o matter how much of an advance in the finance field . . . claims recite, the advance lies entirely in the realm of abstract ideas”—and “[a]n advance of that nature is ineligible for patenting.”¹⁰⁸ In other words, “claims . . . are ineligible . . . [when] their innovation is an innovation in ineligible subject matter,”¹⁰⁹ because “a claim for a *new* abstract idea is still an abstract idea.”¹¹⁰ Also, “a claimed invention’s use of the ineligible concept to which it is directed cannot supply the inventive concept that renders the invention ‘significantly more’ than that ineligible concept.”¹¹¹

¹⁰⁵ See *WildTangent, Inc. v. Ultramercial, LLC*, 573 U.S. 942, 942 (2014).

¹⁰⁶ *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 714 (Fed. Cir. 2014).

¹⁰⁷ *Id.* at 716.

¹⁰⁸ *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1163 (Fed. Cir. 2018).

¹⁰⁹ *Id.*

¹¹⁰ *Synopsys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1151 (Fed. Cir. 2016).

¹¹¹ *BSG Tech LLC v. BuySeasons, Inc.*, 899 F.3d 1281, 1290 (Fed. Cir. 2018); see also *Solutran, Inc. v. Elavon, Inc.*, 931 F.3d 1161, 1169 (Fed. Cir. 2019) (“[M]erely reciting an abstract idea in a claim—even if the idea is novel and non-obvious—is not enough to save it from ineligibility.”); *Trading Techs. Int’l, Inc. v. IBG LLC*, 921 F.3d 1084, 1093 (Fed. Cir. 2019) (“The abstract idea itself cannot supply the inventive concept, no matter how groundbreaking the advance.”) (internal quotation marks omitted); *Intellectual Ventures I LLC v. Symantec Corp.*, 838 F.3d 1307, 1315 (Fed. Cir. 2016) (“While the claims may not have been anticipated or obvious [from] the prior art . . . that does not suggest that the idea . . . is not abstract.”); *Affinity Labs of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1263 (Fed. Cir. 2016) (“Even assuming [the claimed invention is novel], it does not avoid the problem of abstractness.”); *buySAFE, Inc. v. Google, Inc.*, 765 F.3d 1350, 1355 (Fed. Cir. 2014) (“[N]arrowing of [an abstract idea] does not make the idea non-abstract for § 101 purposes.”); *In re Morsa*, 809 F.App’x. 913, 918 (Fed. Cir. 2020) (“Novelty of an invention . . . does not avoid the problem of abstractness.”) (quotation marks omitted); *In re Greenstein*, 774 F.App’x. 661, 665 (Fed. Cir. 2019) (“[T]he alleged novelty of Greenstein’s investment strategy—an abstract idea—is immaterial to the claims’ eligibility for patenting

It is now clear that *any* subject matter that falls within *Bilski* and *Alice*'s "fundamental economic practices" and "methods of organizing human activity," no matter how novel and nonobvious, is ineligible for patenting. The next section describes the types of subject matter that are encompassed within this category of "hard" ineligibility under the Federal Circuit's decisions.

C. The Subcategories of "Human Activities"

Bilski tells us that "fundamental economic practices"¹¹² are an abstract idea, and *Alice* elaborates that this category also includes other "method[s] of organizing human activity"¹¹³—and conversely that improvements in "computer technology" or "any other technology or technical field"¹¹⁴ are eligible for patenting. These guideposts have now been applied in over 60 Federal Circuit cases that illustrate the scope of this category of abstract ideas. This number, of course, does not include all § 101 cases decided since *Bilski*—many of them fall into the other categories of abstract ideas described in this article. And while some non-precedential decisions are included in this number, most are excluded because they are too summary in their description of the subject matter or their reasoning to illuminate the Federal Circuit's approach to this issue.

The Federal Circuit decisions in the inherently-ineligible category of abstract ideas fall into four subcategories: (1) economic transactions, pricing, and business plans and practices; (2) selecting media content and displaying information for human consumption; (3) detecting and preventing fraud and human error; and (4) games and human conditioning.

The following decisions illustrate how the Federal Circuit has applied these four subcategories of ineligible subject matter.

1. Economic Transactions, Pricing, and Business Plans and Practices

Given that *Bilski* (hedging in energy markets) and *Alice* (using escrow to secure financial agreements) each involved economic transactions, it is unsurprising that the economics-and-business subcategory is the largest within the human-activities category of abstract ideas, accounting for just over half of the Federal Circuit decisions.

under § 101."); *Bridge and Post, Inc. v. Verizon Commc'ns, Inc.*, 778 F.App'x. 882, 889 (Fed. Cir. 2019) ("[E]ven a highly specific method for implementing an abstract is . . . still directed to that abstract idea."); *In re Morinville*, 767 F.App'x. 964, 969–70 (Fed. Cir. 2019).

¹¹² See *Bilski v. Kappos*, 561 U.S. 593, 611–12 (2010) (quoting *In re Bilski*, 545 F.3d 943, 1013 (Fed. Cir. 2008) (Rader, J., dissenting)).

¹¹³ *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208,, 220 (2014).

¹¹⁴ *Id.* at 225.

a. Structuring Economic Transactions

Ways and means of organizing the steps or conditions of an economic transaction are ineligible subject matter. Perhaps no § 101 case was easier for the Federal Circuit to decide than *buySAFE, Inc. v. Google, Inc.*,¹¹⁵ which invalidated a patent for using a third-party guarantee that a transaction will be performed.¹¹⁶ The unmistakable similarity to the *Alice* claims allowed the Federal Circuit to note that “[t]he claims in this case do not push or even test the boundaries of the Supreme Court precedents under section 101.”¹¹⁷ Other patents for structuring financial transactions have also been found to be directed to an abstract idea. The Federal Circuit held ineligible claims to a system of preregistering bank cards in a transit system to allow them to be used to pay fare more efficiently and reliably in *Smart Systems Innovations, LLC v. Chicago Transit Authority*;¹¹⁸ a system of paying for remote purchases at a local store (so as to avoid having to give credit card information over the unsecure internet) in *Inventor Holdings, LLC v. Bed Bath & Beyond, Inc.*;¹¹⁹ and a system for crediting a merchant’s account more quickly (before the check is even scanned) when electronically processing a check in *Solutran, Inc. v. Elavon, Inc.*¹²⁰

Investment vehicles and strategies form a related subcategory. The Federal Circuit invalidated claims for a real estate investment vehicle that allowed tax-free exchanges of property in *Fort Properties, Inc. v. American Master Lease LLC*,¹²¹ and has rejected Mark Greenstein’s attempts to patent investment vehicles that adjust returns by age¹²² and that entitle an investor to receive future taxes that are paid when funds are withdrawn from tax-deferred savings accounts.¹²³

b. Pricing and Valuation

Determining the value or best price for investments, products, services, or markets also is ineligible subject matter. Thus the Federal Circuit invalidated claims to a system for using statistical sampling to predict the behavior

¹¹⁵ 765 F.3d 1350, 1355 (Fed. Cir. 2014).

¹¹⁶ *See id.* at 1351–52.

¹¹⁷ *Id.* at 1354–55.

¹¹⁸ 873 F.3d 1364, 1371–72 (Fed. Cir. 2017).

¹¹⁹ 876 F.3d 1372, 1375 (Fed. Cir. 2017).

¹²⁰ 931 F.3d 1161, 1166–67 (Fed. Cir. 2019); *see also* *Western Express Bancshares, LLC v. Green Dot Corp.*, 816 F.App’x 485, 488 (Fed. Cir. 2020) (invalidating patent for system of prepaid payment cards that allows the customer to change the function of the card).

¹²¹ 671 F.3d 1317, 1322 (Fed. Cir. 2012).

¹²² *See In re Greenstein*, 774 F.App’x. 661, 662 (Fed. Cir. 2019).

¹²³ *See In re Greenstein*, 792 F.App’x. 941, 942–43 (Fed. Cir. 2019). The author of this article was the principal counsel for the Director in each of the four *Greenstein* appeals.

of financial markets in *SAP America, Inc. v. InvestPic, LLC*.¹²⁴ The court also voided claims to methods for setting a price for goods based on consumer demand in *OIP Technologies, Inc. v. Amazon.com, Inc.*,¹²⁵ and for setting prices based on a combination of the class of products sold and the class of potential purchasers in *Versata Development Group, Inc. v. SAP America, Inc.*¹²⁶ And a claimed formula for setting appropriate fees for managing a stable-value life insurance policy was deemed ineligible in *Bancorp Services, L.L.C. v. Sun Life Assurance Co. of Canada*.¹²⁷

c. Business Plans and Structures

Entrepreneurial ideas for selling goods and services are ineligible subject matter, as are business organizational systems and structures. A number of these cases have involved loan origination and financing: claims to an automated system for processing car loans through a clearinghouse were invalidated in *Dealertrack, Inc. v. Huber*,¹²⁸ claims to a computer-implemented system for allowing customers to anonymously purchase loan packages based on their credit rating were axed in *Mortgage Grader, Inc. v. First Choice Loan Services Inc.*,¹²⁹ and claims to an automated system for financing purchases of items in a dealer's inventory were found ineligible in *Credit Acceptance Corp. v. Westlake Services*.¹³⁰ Other cases have involved business ideas for monetizing media content: a plan for allowing viewers to watch copyrighted content over the internet in exchange for first viewing an advertisement was invalidated

¹²⁴ 898 F.3d 1161, 1163–65 (Fed. Cir. 2018); see also *In re Chorna*, 656 F.App'x 1016, 1018–19, 1020 (Fed. Cir. 2016) (per curiam) (affirming the Patent Trial and Appeals Board's rejection of a patent application for a system for predicting the future value of financial instruments).

¹²⁵ 788 F.3d 1359, 1361–62 (Fed. Cir. 2015).

¹²⁶ 793 F.3d 1306, 1312, 1333 (Fed. Cir. 2015); see also *In re Morsa*, 809 F.App'x 913, 915, 916–17 (Fed. Cir. 2020) (per curiam) (voiding claims to use of a bidding system to sell advertising placement).

¹²⁷ 687 F.3d 1266, 1278 (Fed. Cir. 2012); see also *In re Villena*, 745 F.App'x 374, 375–76 (Fed. Cir. 2018) (affirming the Patent Trial and Appeals Board's rejection of a patent application for determining a price for residential property); *Audatex N. Am., Inc. v. Mitchell Int'l, Inc.*, 703 F.App'x 986, 989 (Fed. Cir. 2017) (affirming the Patent and Trial Appeals Board's finding that claims directed to determining the value of a damaged vehicle for insurance purposes are patent ineligible).

¹²⁸ 674 F.3d 1315, 1331–33 (Fed. Cir. 2012).

¹²⁹ 811 F.3d 1314, 1318 (Fed. Cir. 2016).

¹³⁰ 859 F.3d 1044, 1054–55 (Fed. Cir. 2017); see also *LendingTree, LLC v. Zillow, Inc.*, 656 F.App'x 991, 992–93, 996 (Fed. Cir. 2016) (affirming the Patent Trial and Appeals Board's finding that claims directed to operating a loan-application clearinghouse over the internet are ineligible).

in *Ulramercial, Inc. v. Hulu, LLC*;¹³¹ and claims to a system for providing access to multimedia content over a computer in exchange for payment were upheld in *Smartflash LLC v. Apple Inc.*¹³² The Federal Circuit also rejected an attempt to patent a system of providing unbiased product reviews on the internet (by excluding reviewers who profit from the sales),¹³³ as well as claims to the business idea of allowing individuals to purchase products in exchange for the right to perform in a television program.¹³⁴

In addition to particular money-making ideas, the Federal Circuit has also found that claims to general business processes and management structures are directed to abstract ideas. Claims to a plan of tasks to be completed in conducting transactions for an insurance company were held ineligible in *Accenture Global Services, GmbH v. Guidewire Software, Inc.*,¹³⁵ and claims to a system for organizing a business's hierarchical leadership structure based on job functions were rejected in *In re Morinville*.¹³⁶

d. Business Subroutines: Providing Notice, Keeping Records, and Allocating Resources for Business or Personal Priorities

Finally, the Federal Circuit has also identified the component processes of conducting business to be ineligible subject matter—things such as giving notice of events and deadlines, maintaining business records, or determining who has access to resources. Thus a system for providing customers with advance notice of the delivery of goods was held ineligible in *Electronic Communications Technologies, LLC v. ShoppersChoice.com, LLC*,¹³⁷ as was a system for notifying a user that spending has reached budget limits in *Intellectual Ventures I LLC v. Capital One Bank (USA)*.¹³⁸ A method of keeping electronic records of the timing and delivery of audiovisual content

¹³¹ 772 F.3d 709, 714 (Fed. Cir. 2014).

¹³² 680 F.App'x 977, 980, 984 (Fed. Cir. 2017).

¹³³ See *In re Greenstein*, 778 F.App'x 935, 937 (Fed. Cir. 2019).

¹³⁴ See *In re Ebera*, 730 F.App'x 916, 917–18 (Fed. Cir. 2018).

¹³⁵ 728 F.3d 1336, 1337–38 (Fed. Cir. 2013). The Court held that the patent owner was estopped from contesting that the system claims were directed to an abstract idea under *Alice/Mayo*'s step one because it had failed to appeal a district court finding to that effect with respect to related method claims. See *id.* at 1342. The Court's affirmation of the ineligibility finding over a vigorous dissent, however—see *id.* at 1346 (Rader, J., dissenting)—supports an inference that the majority saw no clear error in the district court's conclusion.

¹³⁶ 767 F.App'x 964, 967–68, 969 (Fed. Cir. 2019); see also *In re Jobin*, 811 F.App'x 633, 637–38 (Fed. Cir. 2020) (finding ineligible claims to organizing a system of crowdsourcing).

¹³⁷ 958 F.3d 1178, 1181–83 (Fed. Cir. 2020).

¹³⁸ 792 F.3d 1363, 1367 (Fed. Cir. 2015); see also *WhitServe LLC v. Donuts Inc.*, 809 F.App'x 929, 931, 933 (Fed. Cir. 2020) (affirming denial of claims directed to sending a professional-services client a reminder that a response is needed); *In re Thomas*, 800 F.App'x

over a communications network was held to be ineligible in *Two-Way Media Ltd. v. Comcast Cable Communications, LLC*.¹³⁹ And a system of reserving computer memory on a cable set-top box for advertising was voided in *Customedia Technologies, LLC v. Dish Network Corp.*,¹⁴⁰ as was a system for allowing a smartphone user to choose which application domain software will have access to the native functionality of the phone in *Ericsson Inc. v. TCL Communication Technology Holdings Ltd.*¹⁴¹

In the latter two cases, which involved the technical fields of computers and software, it is important to note that ‘allocating resources’ under the patents did not produce a technical effect, but rather reflected personal or business priorities: the *Customedia* patent prioritized memory space on the set-top box in order to further the business of targeted advertising, and the smartphone user in *Ericsson v. TCL* assigned permissions to different applications based on personal preferences and the applications’ importance to the user.

e. DDR Holdings: A Purported Outlier

The Federal Circuit has been very consistent in its treatment of economic transactions and business practices as ineligible subject matter. Some authorities, however, cite an early case, *DDR Holdings, LLC v. Hotels.com, L.P.*,¹⁴² as an exception to the rule, characterizing it as upholding a business-method patent. The Annotated Patent Digest, for example, places *DDR* under the heading, “Post-*Bilski* cases finding claimed business method was patentable subject matter”¹⁴³—the sole Federal Circuit decision to qualify for such notoriety. And commentators have described *DDR* as “giv[ing] hope to those who pursue patents in the field” of “business method inventions.”¹⁴⁴ A close reading of *DDR* and the subsequent cases applying it, however, does not support such an interpretation.

922 (Fed. Cir. 2020) (affirming denial of claims directed to giving a patent owner notice that his or her patent has been cited in a publication).

¹³⁹ 874 F.3d 1329, 1334, 1341 (Fed. Cir. 2017); *see also* *Shortridge v. Foundation Construction Payroll Serv., LLC*, 655 F.App’x 848, 849, 854 (Fed. Cir. 2016) (affirming invalidation of patent for creating certified payroll records for public-works construction projects simultaneously with core payroll processing).

¹⁴⁰ 951 F.3d 1359, 1362–63 (Fed. Cir. 2020); *see also In re Downing*, 754 F.App’x 988, 993 (Fed. Cir. 2018) (affirming denial of claims directed to system for personal management and resource planning).

¹⁴¹ 955 F.3d 1317, 1325–27 (Fed. Cir. 2020); *see also id.* at 1327 (“[W]e have repeatedly found the concept of controlling access to resources via software to be an abstract idea.”).

¹⁴² 773 F.3d 1245, 1259 (Fed. Cir. 2014).

¹⁴³ ROBERT A. MATTHEWS, JR., 3 ANNOTATED PATENT DIGEST § 20:18.120 (2020).

¹⁴⁴ M. Griff Griffin & Chris Mann, *Alice v. CLS Bank: Where Are We Now?*, 19 No. 5 FINTECH L. REP. NL 2 (2016).

The *DDR* patent addressed the problem that a website that hosts paid advertising for an affiliated merchant will lose visitors to its own website when a viewer clicks on the ad and is sent to the merchant's website to complete the purchase.¹⁴⁵ The patent's claimed solution to this problem was an "outsource provider" that creates a third website that retains the "look and feel" of the initial website, and allows the customer to consummate the purchase at this intermediate website without ever going to the merchant's website, and then automatically returns the customer/visitor to the original website.¹⁴⁶

DDR acknowledged that the claims "address a business challenge (retaining website visitors)."¹⁴⁷ The decision does *not*, however, hold that "business challenges" are eligible subject matter. Instead, the court found that the claims' technical solution—their disclosure of "a specific way to automate the creation of a composite web page"¹⁴⁸—"satisf[ies] *Mayo/Alice* step two."¹⁴⁹ *DDR* is thus one of the rare cases in which a patent, although reciting ineligible subject matter, nevertheless is directed to an "inventive concept" because it claims an improvement in computer technology or other technical field.¹⁵⁰

Any hope that *DDR* may have offered to owners of business-method patents has since been extinguished by other Federal Circuit decisions. The court has made clear that it was the claimed hybrid-website creating tool, not the associated business challenge, that was the focus of the claims in *DDR*.¹⁵¹ And it has emphasized that the claims in that case proposed a technical solution to a technical problem.¹⁵² *DDR* is thus consistent with the general rule that business methods are ineligible subject matter.

¹⁴⁵ See *DDR*, 773 F.3d at 1248.

¹⁴⁶ See *id.* at 1248–49; see also U.S. Patent No. 6,993,572, B2, 24:25–25:2 (filed Jun. 11, 2003) (issued Jan. 31, 2006).

¹⁴⁷ *Id.* at 1257.

¹⁴⁸ *Id.* at 1259.

¹⁴⁹ *Id.* at 1257.

¹⁵⁰ See *Alice Corp. Pty. Ltd. v. CLS Bank Int'l.*, 573 U.S. 208, 221 (2014).

¹⁵¹ See *Smartflash, LLC v. Apple Inc.*, 680 F.App'x 977, 983 (Fed. Cir. 2017) ("[the *DDR* claims] transformed the manner in which a hyperlink typically functions"); see also *Affinity Lab'ys of Tex., LLC v. DIRECTV, LLC*, 838 F.3d 1253, 1262 (Fed. Cir. 2016) (noting that the *DDR* claims "recited a specific way to automate the creation of a composite web page.").

¹⁵² See *BASCOM Glob. Internet Servs. Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1351 (Fed. Cir. 2016) (noting that the *DDR* claims offered "a particular, technical way" of addressing the problem at issue); *Synopsys, Inc v. Mentor Graphics Corp.*, 839 F.3d 1138, 1151 (Fed. Cir. 2016) ("the claims at issue [in *DDR*] involved a technological solution"); *Shortridge v. Found. Constr. Payroll Serv., LLC*, 655 F.App'x 848, 853 (Fed. Cir. 2016) (finding *DDR* inapplicable to claims that do not "solve a uniquely technical problem"); see also *In re Greenstein*, 778 F.App'x 935, 938–39 (Fed. Cir. 2019) (citing *DDR* as an example of a case that "found that software-based claims may include an inventive concept where they

2. Content Selection and Data Display

A method of selecting media content for human consumption, or of displaying information in a way that helps a person to understand or process it, is ineligible subject matter. As the Federal Circuit has noted, “merely selecting information, by content or source, for collection, analysis, and display does nothing significant to differentiate a process from ordinary mental processes, whose implicit exclusion from § 101 undergirds the information-based category of abstract ideas.”¹⁵³ This line of cases also derives from the rule that the underlying data being selected or displayed is itself ineligible for patenting.¹⁵⁴ Such information—“*i.e.*, the story revealed”—can potentially “be copyrighted, but not patented.”¹⁵⁵ Thus because claim limitations that recite “communicat[ing] information to participants”¹⁵⁶ are themselves “directed to [the] information,”¹⁵⁷ they are ineligible subject matter. This category of § 101 cases also complement the printed matter doctrine, which holds that “[c]laim limitations directed to the content of information and lacking a requisite functional relationship are not entitled to patentable weight [under § 103] because such information is not patent eligible subject matter under 35 U.S.C. § 101.”¹⁵⁸ Because the information itself is not patentable, selecting

provide a technological solution to a technological problem”). The Federal Circuit has thus distinguished *DDR* and found claims ineligible when they are not “directed to the solution of a ‘technological problem’” or “an improvement in computer or network functionality.” *Affinity Lab’ys*, 838 F.3d at 1268 (quoting *Alice Corp.*, 573 U.S. at 223); *see also Smart Sys.*, 873 F.3d at 1372 (noting that *DDR* is “inapposite” when claims are not “directed to an improvement in computer technology”).

¹⁵³ *See Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016).

¹⁵⁴ *See Digitech Image Techs., LLC v. Elec. for Imaging, Inc.*, 758 F.3d 1344, 1349 (Fed. Cir. 2014) (“[A] collection of information”—in this case, data stored in a digital-image reproduction system—“does not fall within any of the categories of eligible subject matter.”); *see also id.* at 1350 (“Data in its ethereal, non-physical form is simply information that does not fall under any of the categories of eligible subject matter under section 101.”) (citing *In re Nuijten*, 500 F.3d 1346, 1351 (Fed. Cir. 2007); *Mentor Graphics Corp. v. EVE-USA, Inc.*, 851 F.3d 1275, 1294 (Fed. Cir. 2017) (“claims [that] cover carrier signals themselves” are not eligible)).

¹⁵⁵ *See Guthrie v. Curlett*, 10 F.2d 725, 727 (2d Cir. 1926).

¹⁵⁶ *See In re Marco Guldenaar Holding B.V.*, 911 F.3d 1157, 1161 (Fed. Cir. 2018).

¹⁵⁷ *Id.*

¹⁵⁸ *Praxair Distrib., Inc. v. Mallinckrodt Hosp. Prod. IP Ltd.*, 890 F.3d 1024, 1032 (Fed. Cir. 2018); *see also Guldenaar*, 911 F.3d at 1161 (noting that “this court has generally found printed matter to fall outside the scope of § 101”); *In re Chatfield*, 545 F.2d 152, 157 (C.C.P.A. 1976) (holding that inventions in “methods of doing business,” “purely mental steps,” and “printed matter,” “however meritorious, do not constitute patentable subject matter”); *In re Taylor*, 771 F.App’x 1005, 1010 (Fed. Cir. 2019) (holding that the claimed

or displaying it for the content that it communicates to humans also is ineligible subject matter.

a. Content Selection

The Federal Circuit has consistently held that selecting media content based on the information that it conveys to a person is ineligible subject matter. This includes selecting content based on assumptions about what consumers want to listen to or see. Claims to streaming regional television broadcasts to mobile devices outside of the region were held ineligible in *Affinity Laboratories of Texas, LLC v. DIRECTV, LLC*.¹⁵⁹ The court emphasized that “[t]he essential advance [of the claims] is . . . only in the content of this particular [downloaded] application, and that is nothing but a functionally described display of information.”¹⁶⁰ Similarly, the dependent claims “recite[d] functions that . . . simply constitute particular choices within the range of existing content or hardware, such as specifying that the regional broadcast is FM radio or video content [or] . . . song information.”¹⁶¹ The court also found that claims to tailoring the web pages that are presented to a user based on the user’s website navigation data and personal characteristics are ineligible in *Intellectual Ventures I LLC v. Capital One Bank (USA)*.¹⁶²

Targeting advertisements with a view to the content that will be most effective with particular users also is ineligible subject matter. Claims to selecting advertisements for delivery to a user based on demographic information about the user were invalidated in *Affinity Laboratories of Texas, LLC v. Amazon.com Inc.*¹⁶³

“use of a barcode [in an advertising mat] is nothing more than another type of printed matter within an advertisement that does not change the function of the claimed advertising mat” and thus is not entitled to patentable weight).

¹⁵⁹ 838 F.3d 1253, 1256 (Fed. Cir. 2016).

¹⁶⁰ *Id.* at 1263.

¹⁶¹ *Id.* at 1264; *see also Affinity Labs of Texas*, 838 F.3d at 1267.

¹⁶² 792 F.3d 1363, 1369 (Fed. Cir. 2015); *see also Affinity Labs of Texas*, 838 F.3d at 1268 (providing user-selected media content to the user on a mobile device); *Bridge & Post, Inc. v. Verizon Commc’ns, Inc.*, 778 F.App’x 882, 889 (Fed. Cir. 2019) (delivering targeted media based on the user’s computer network activity). Conversely, identifying content that people do *not* want also is an abstract idea. *See Intellectual Ventures I LLC v. Erie Indem. Co.*, 711 F.App’x 1012, 1014 (Fed. Cir. 2017) (identifying and removing “undesirable” computer files based on their size, content, and naming convention).

¹⁶³ 838 F.3d at 1267; *see also In re Morsa*, 809 F.App’x 913, 915 (Fed. Cir. 2020) (claims to targeting advertisements based on geographic, demographic, and “psychographic” data about the viewer held ineligible); *id.* at 917 (“Customizing information based on . . . information known about the user is an abstract idea.”) (quotation marks omitted).

b. Data Display

Displaying data in a way that is designed to aid the mental processing of it—to help a person to learn something more quickly, to absorb more information, or to locate a relevant subset of data—is ineligible subject matter. As *Electric Power Group* explains: “Merely requiring the selection and manipulation of information—to provide a human comprehensible amount of information useful for users—by itself does not transform the otherwise abstract processes of information collection and analysis.”¹⁶⁴

Patents in this subcategory, which claim things such as graphical user interfaces, often are difficult to evaluate for eligibility because the claimed inventions involve advanced computer technology and software programming. A close analysis of the patents that are deemed ineligible, however, reveals that the technology that they recite is readily available and off the shelf, and the required programming could be accomplished by a person of ordinary skill. As “computery” as these inventions may at first seem, they demand only the use of pre-existing technology. Their true innovation, if any, resides in finding new ways of making information accessible to the human mind.

The most important of the recent cases are the *Trading Technologies* decisions.¹⁶⁵ *Trading Technologies* makes graphical user interfaces for use in the electronic trading of stocks, commodities, and currency.¹⁶⁶ One of the patents in suit describes the need for an effective computer interface: it notes that “[t]he successful trader [must] anticipate[] the rise or fall of the value of an item and perform[] his or her own transaction before the rest of the market is aware of the item’s potential gain or loss in value.”¹⁶⁷ In order to do this—to predict the direction of the market—the trader must analyze data such as “the volume of offers and bids or the rate at which these volumes are changing.”¹⁶⁸ But it is difficult to “effectively process all of this information in order to make an informed transaction decision.”¹⁶⁹ *Trading Technologies*

¹⁶⁴ See *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016) (internal quotation marks and citations omitted).

¹⁶⁵ See *Trading Techs. Int’l v. IBG LLC*, 921 F.3d 1084, 1092 (Fed. Cir. 2019); *Trading Techs. Int’l v. IBG LLC*, 921 F.3d 1378, 1384 (Fed. Cir. 2019).

¹⁶⁶ See *TT Platform*, *TRADING TECHNOLOGIES*, <https://www.tradingtechnologies.com/trading/tt-platform/> [<https://perma.cc/4983-5KX2>].

¹⁶⁷ U.S. Patent No. 7533056B2 col. 1 ll. 28–31 (filed May 3, 2006) (issued May 12, 2009); see also *id.* at col. 1 ll. 31–33 (“Thus, anticipation of the market and specifically of the future demand for an item of interest is critical to the success of a trader.”).

¹⁶⁸ *Id.* at col. 1 ll. 51–52.

¹⁶⁹ *Id.* at col. 1 ll. 56–60.

solution to this problem is to “present[] this information in an intuitive format, allowing the trader to make informed decisions quickly.”¹⁷⁰

Figure 3 from the patent, reproduced below, shows one of the claimed interfaces. Bids to purchase an item are shown in the columns (300) below the “axis of values” (the dark horizontal line in the middle (336)), and offers for sale of the item are reflected in the columns (304) above that line. The place where the pointed end of each column touches a horizontal line determines the price of the offer or bid; the length of the column shows the volume of offers or bids; and different colored sections of each column indicate that different parties are making the offers or bids.¹⁷¹ This visual representation of bids and offers not only allows “[t]he trader . . . to discern immediately the number and volume of bids and offers outstanding for the item,”¹⁷² but “[w]hen all outstanding offers and bids are displayed, the arrangement of icons naturally forms the edges of a triangle that points to the value differential at the axis of values.”¹⁷³

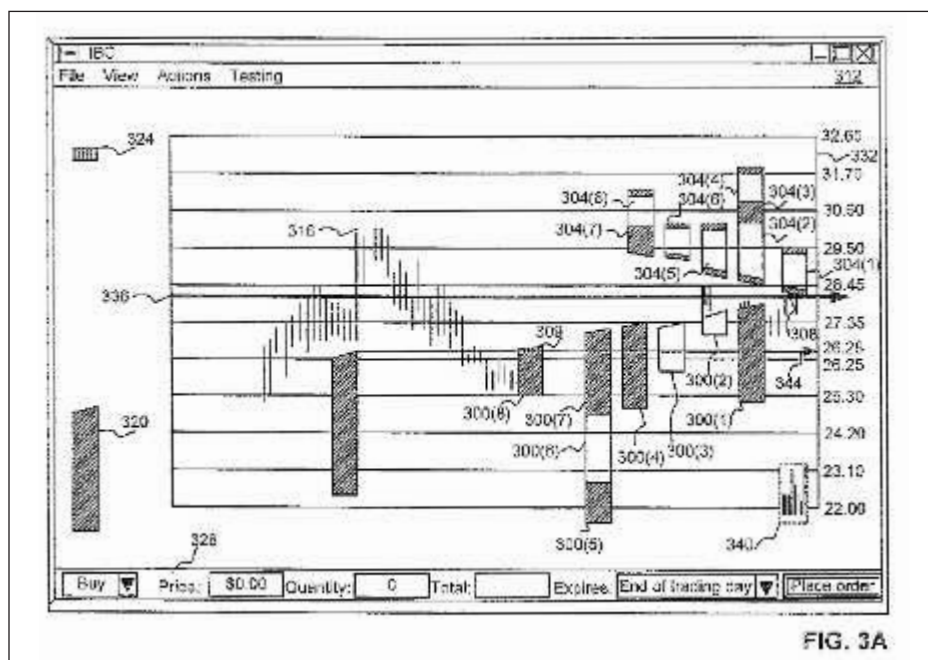


Figure 3: Priority View Electronic Trading Interface.¹⁷⁴

¹⁷⁰ *Id.* at col. 2 ll. 44–46.

¹⁷¹ *See id.* at col. 2 l. 46, col. 3 l. 2.

¹⁷² *Id.* at col. 2 ll. 50–53.

¹⁷³ *Id.* at col. 2 ll. 58–61.

¹⁷⁴ *Id.* at col. 4 ll. 3–4.

As “intuitive” as this display may be, however, it is an invention that is focused on human mental processing rather than an advance in technology. As the Federal Circuit noted, “[the] invention makes the *trader* faster and more efficient, not the computer.”¹⁷⁵ The court concluded that the claimed interface is ineligible because it is “focused on providing information to traders in a way that helps them process information more quickly, [] not on improving computers or technology.”¹⁷⁶

The *Trading Technologies* cases represent a computer-era application of an eligibility principle with an old and distinguished lineage. The same rule was applied in *Guthrie v. Curlett*,¹⁷⁷ an early twentieth century decision involving a patent for a consolidated railroad tariff index. Charles Guthrie’s invention addressed the problem that the nation’s then-1300 railroads each printed its own tariff schedule; his consolidated index, which condensed this information and organized it by different topics, allowed a shipper to more quickly find relevant tariffs and readily compare rates.¹⁷⁸ In figure 4 from his patent, for example, a shipper of agricultural tools and tractors, or of “buggies, carriages, and wagons,” need only look at one page to determine which rail lines are available:¹⁷⁹

¹⁷⁵ *Trading Techs. Int’l v. IBG LLC*, 921 F.3d 1084, 1090 (Fed. Cir. 2019); see also *id.* at 1093 (noting that the claims recite “a purportedly new arrangement of generic information that assists traders in processing information more quickly”).

¹⁷⁶ *Trading Techs. Int’l*, 921 F.3d at 1384.

¹⁷⁷ 10 F.2d 725 (2d Cir. 1926).

¹⁷⁸ See U.S. Patent No. 1,041,623, col. 1 ll. 24–27, col. 1 ll. 101– col. 2 l. 7 (filed Mar. 30, 1912) (issued Oct. 15, 1912).

¹⁷⁹ See *id.* at col. 3 ll. 60–65.

C. B. GUTHRIE.
CONSOLIDATED TARIFF INDEX.
 APPLICATION FILED MAR. 30, 1912.

1,041,623.

Patented Oct. 15, 1912.
 2 SHEETS—SHEET 2.

Fig. 4.

AGRICULTURAL IMPLEMENTS AND VEHICLES								
AGRICULTURAL IMPLEMENTS								
NUMBERS		ISSUED BY		FROM		TO		PARTICIPATING CARRIERS (See Item No. 4.)
Index No.	I.C.C. OTHER COMS.	Road or Agent	Issuing No. Effective	FROM	TO			PARTICIPATING CARRIERS (See Item No. 4.)
1581		Cent. of Ga.	65-C 9-19-09	Eaton, Willabro and MacVeach, Ga.	Southwest Miss. Vt-ty, Ohio and Miss River Crossings			A-1, A-2, A-3
14	15	16	17	18	19	20		
BUGIES, CARRIAGES, WAGONS								
A-154		A. C. L.	Wit. Veh. No. 3. 10-1-10	Wilson, N.C.	Southwest Miss. Vt-ty, Va. Cities, Germans, Del, Md.			A-1, A-2, A-3, A-4, A-5, A-6, A-7, A-8, A-9, A-10, A-11, A-12, A-13, A-14, A-15, A-16, A-17, A-18, A-19, A-20, A-21, A-22, A-23, A-24, A-25, A-26, A-27, A-28, A-29, A-30, A-31, A-32, A-33, A-34, A-35, A-36, A-37, A-38, A-39, A-40, A-41, A-42, A-43, A-44, A-45, A-46, A-47, A-48, A-49, A-50, A-51, A-52, A-53, A-54, A-55, A-56, A-57, A-58, A-59, A-60, A-61, A-62, A-63, A-64, A-65, A-66, A-67, A-68, A-69, A-70, A-71, A-72, A-73, A-74, A-75, A-76, A-77, A-78, A-79, A-80, A-81, A-82, A-83, A-84, A-85, A-86, A-87, A-88, A-89, A-90, A-91, A-92, A-93, A-94, A-95, A-96, A-97, A-98, A-99, A-100
CANE CARTS								
E-205		Mo. Pcs.	402 11-24-07	Mauritia, Tenn	Vero Cross, Fla	New		
								R.M.K.S. S.E.O. T-40

Figure 4: Consolidated Railroad Tariff Index.¹⁸⁰

The Second Circuit found that the focus of Guthrie’s claims was “how to compress into a small space a lot of information;” the court compared it to the making of “dictionaries or directories,”¹⁸¹ and ultimately concluded that this “is not the kind of art protected by the patent acts.”¹⁸²

In a similar case, the Federal Circuit recently invalidated claims to a system for allowing more rapid and accurate retrieval of information in a database by using XML tags to index the information according to “domains and categories.”¹⁸³ *Intellectual Ventures I LLC v. Erie Indemnity Co.*¹⁸⁴ found that “the heart of the claimed invention lies in creating and using an index to search for and retrieve data,” which “we conclude . . . [is] an abstract concept.”¹⁸⁵ The court noted that “organizing and accessing records through the creation of an index-searchable database” constitutes “longstanding conduct that existed well

¹⁸⁰ *Id.*

¹⁸¹ *Guthrie*, 10 F.2d at 726.

¹⁸² *Id.*

¹⁸³ U.S. Patent No. 6,510,434 B1, at [57] (filed Dec. 29, 1999) (issued Jan. 21, 2003).

¹⁸⁴ 850 F.3d 1315 (Fed. Cir. 2017).

¹⁸⁵ *Id.* at 1328; see also *id.* at 1327 (“collect[ing], classify[ing], or otherwise filter[ing] data” is an “abstract concept”).

before the advent of computers and the Internet. For example, a . . . library-indexing system . . . employs a similar concept.”¹⁸⁶

Another recent index case, *BSG Tech LLC v. BuySeasons, Inc.*,¹⁸⁷ voided claims to an improved product database that proposed parameters for customers to use when searching for a product that are based on parameters that past purchasers of the product most frequently used.¹⁸⁸ The court held that “[w]hile the presentation of summary comparison usage information to users improves the quality of the information added to the database, an improvement to the information stored by a database is not equivalent to an improvement in the database’s functionality.”¹⁸⁹

Similarly, a visual display that allows a person to absorb *more* information was held to be an ineligible idea in *Interval Licensing LLC v. AOL, Inc.*¹⁹⁰ The claimed invention presented information to a computer user without disrupting the user’s primary activity on the computer by only engaging the user’s peripheral attention—for example, by presenting the information via the computer’s background wallpaper, or through a screen saver during “idle time.”¹⁹¹ The invention thereby “provide[d] information in which a user has expressed an interest [but] . . . might not otherwise expend adequate energy

¹⁸⁶ *Id.* at 1327.

¹⁸⁷ 899 F.3d 1281 (Fed. Cir. 2018).

¹⁸⁸ *See id.* at 1283–84.

¹⁸⁹ *Id.* at 1288; *see also In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 609, 611 (Fed. Cir. 2016) (holding ineligible claims to classifying and storing digital images in an organized manner, such as by the time or date when a photo was taken); *Secured Mail Sols. LLC v. Universal Wilde, Inc.*, 873 F.3d 905, 907–08, 910–11 (Fed. Cir. 2017) (holding ineligible claims to a method of using bar codes to communicate information about a mailed letter or package’s sender, receiver, method of shipping, contents, or warranty); *Dropbox, Inc. v. Synchronoss Techs., Inc.*, 815 F.App’x 529, 534–35 (Fed. Cir. 2020) (invalidating claims to “a user-friendly website interface with a file upload connection so that users who are not tech-savvy can easily upload data to a service provider”); *Reese v. Sprint Nextel Corp.*, 774 F.App’x 656, 660 (Fed. Cir. 2019) (invalidating claims to flagging a telephone call as private); *Uniloc USA, Inc. v. ADP, LLC*, 772 F.App’x 890, 900 (Fed. Cir. 2019) (invalidating claims to a “user desktop interface with display regions”); *Move, Inc. v. Real Est. All. Ltd.*, 721 F.App’x 950, 952 (Fed. Cir. 2018) (voiding claims to a system for searching for real estate on a computerized map of a geographic area, and zooming in on a smaller part of the area); *EasyWeb Innovations, LLC v. Twitter, Inc.*, 689 F.App’x 969, 970 (voiding claims to a system of publishing messages on the internet); *Cyberfone Sys., LLC v. CNN Interactive Grp., Inc.*, 558 F.App’x 988, 991–92 (Fed. Cir. 2014) (invalidating claims to collecting data from a telephone transmission, categorizing it, and storing it).

¹⁹⁰ 896 F.3d 1335, 1338 (Fed. Cir. 2018).

¹⁹¹ *See id.* at 1338–39; U.S. Patent No. 6,788,314, col. 3 ll. 20–40 (filed Mar. 20, 2000) (issued Sept. 7, 2000).

to obtain.”¹⁹² The court found that presenting information in this way for human consumption is an ineligible concept:¹⁹³ “the collection, organization, and display of two sets of information on a generic display device is abstract absent a specific improvement to the way computer or other technologies operate.”¹⁹⁴

Finally, courts have held that systems of conveying information to a person by means of a code, symbols, or signals are ineligible subject matter. Another early twentieth century decision, *Berardini v. Tocci*,¹⁹⁵ invalidated a patent for a system of coded messages. The court held that such a patent is “for an art only in the sense that one speaks of the art of painting, or the art of curving the thrown baseball. Such arts, however ingenious, difficult, or amusing, are not patentable within any statute of the United States.”¹⁹⁶ Similarly, the Federal Circuit has rejected claims to a new phonetic alphabet that uses only combinations of Latin letters,¹⁹⁷ and to a system of using “signaling words” to change the content that is displayed on a mobile device.¹⁹⁸

c. *Outlying Cases*

Given the complexity of the issues in this subcategory of ineligible subject matter and the lack of Supreme Court precedent that is directly on point, it is not surprising that the case law of data display and graphical user interfaces includes the most cases that seem to conflict with the main body of precedent. The *Trading Technologies* decisions themselves, for example, were preceded by a non-precedential decision that upheld a similar *Trading Technologies* patent. *Trading Techs. Int’l, Inc. v. CQG, Inc.*¹⁹⁹ affirmed a district court’s finding that the claims at issue were eligible because “the[ir] graphical user interface system . . . is not an idea that has long existed, the threshold criterion of an abstract idea.”²⁰⁰ This approach to patent eligibility would appear to be at odds with *Ultramercial’s* holding that a *new* abstract idea is still an abstract idea.²⁰¹ When this *Trading Technologies* decision was pressed upon a subsequent panel that

¹⁹² ’314 Patent at col. 5 ll. 21–24.

¹⁹³ See *Interval Licensing, LLC*, 896 F.3d at 1338.

¹⁹⁴ *Id.* at 1345 (quotation marks and brackets omitted).

¹⁹⁵ 190 F. 329 (C.C.S.D.N.Y. 1911).

¹⁹⁶ *Id.* at 333.

¹⁹⁷ See *In re Wang*, 737 F.App’x 534, 536 (Fed. Cir. 2018).

¹⁹⁸ See *Maxon, LLC v. Funai Corp., Inc.*, 726 F.App’x 797, 798–99 (Fed. Cir. 2018).

¹⁹⁹ 675 F.App’x 1001 (Fed. Cir. 2017).

²⁰⁰ *Id.* at 1004; see also *id.* at 1005 (“[T]he threshold level of eligibility is often usefully explored by way of the substantive statutory criteria of patentability, for an invention that is new, useful, and nonobvious is more readily distinguished from the generalized knowledge that characterizes ineligible subject matter.”).

²⁰¹ See *supra* notes 108–111 and accompanying text.

ultimately invalidated another Trading Technologies patent, the court simply noted that it was not bound by a non-precedential decision.²⁰²

Another relatively early decision, *Core Wireless Licensing S.A.R.L. v. LG Electronics, Inc.*,²⁰³ also upheld claims to an “improved user interface[].”²⁰⁴ The patent disclosed displaying on the home screen of a smart phone a summarized list of commonly used functions, so that the user can access desired content more quickly.²⁰⁵ *Core Wireless’s* finding of eligibility for “a specific manner of displaying a limited set of information,” in order to save the user the trouble of having to “scroll around and switch views many times,”²⁰⁶ is difficult to reconcile with *Erie Indemnity, BSG Techs.*, and other Federal Circuit “index” cases that rejected claims to a display that helps a person to find what he or she wants more quickly—or with the Second Circuit’s rejection of a consolidated railroad tariff index in *Guthrie v. Curlett*.

Finally, *Data Engine Technologies LLC v. Google LLC*²⁰⁷ upheld claims to “a highly intuitive, user friendly interface with familiar notebook tabs” that enhance the “user’s ability to find or access . . . commands and features” and reduce the “complexity of . . . navigating between multiple spreadsheets.”²⁰⁸ *Data Engine* relied on *Core Wireless* and the non-precedential *Trading Techs.* decision.²⁰⁹

These ripples in the case law have not gone unnoticed. When Trading Technologies petitioned the Supreme Court for review of its cases, it insisted that “[t]he Federal Circuit is hopelessly divided on the patent eligibility of computer-implemented inventions.”²¹⁰ Trading Technologies noted that while some cases hold that such claims must be directed to improvements in the functioning of the computer or other advances in technology,²¹¹ “[a] conflicting line of Federal Circuit decisions” recognizes that eligibility may be predicated on “functionality provided to users”—“irrespective of whether th[e] inventions improve the computer’s basic functions.”²¹² Trading Technologies’

²⁰² See *Trading Techs. Int’l v. IBG LLC*, 921 F.3d 1084, 1095 (Fed. Cir. 2019).

²⁰³ 880 F.3d 1356 (Fed. Cir. 2018).

²⁰⁴ *Id.* at 1362.

²⁰⁵ See *id.* at 1359 & 1363.

²⁰⁶ *Id.* at 1363.

²⁰⁷ 906 F.3d 999 (Fed. Cir. 2018).

²⁰⁸ *Id.* at 1008.

²⁰⁹ See *id.* at 1009.

²¹⁰ Petition for Writ of Certiorari at 18, *Trading Tech. Int’l, Inc. v. IBG, LLC*, 921 F.3d 1378 (2019) (No. 19–522), 2019 WL 5420564.

²¹¹ See *id.* at 20–22 (citing *BSG Tech. LLC v. Buyseasons, Inc.*, 899 F.3d 1281 (Fed. Cir. 2018) & *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335 (Fed. Cir. 2018)).

²¹² *Id.* at 22.

principal examples of this second line of authority were *Core Wireless* and *Data Engine*.²¹³

Given the volume of Federal Circuit decision-making in this area, it is inevitable that divisions in the case law will be harmonized over time. Until then, however, *Core Wireless* and *Data Engine* will likely continue to play a starring role in the briefs of litigants seeking to preserve dubious claims to methods of displaying information to a person.²¹⁴

3. Detecting and Preventing Fraud and Human Error

A smaller subcategory of cases concerns a human activity that is not a business method or an economic practice and that does not relate to content selection or data display. These inventions involve fraud and human error—or rather, ways of countering it. Inventions in this area typically are directed to identifying the signs or anticipating the tactics of computer hackers, identity thieves, spammers, and others engaged in illegal or illicit behavior. A related set of cases involves catching and correcting innocent human mistakes.

The leading case in this subcategory is *Fair Warning IP, LLC v. Iatric Systems, Inc.*,²¹⁵ which involved a patent that broadly claimed monitoring computer log data that “is indicative of improper access” to a medical patient’s computer files in order to identify “potential snooping or identity theft.”²¹⁶ The court found that the claims were directed to the ineligible concept of “collecting and analyzing information to detect misuse.”²¹⁷ The patent disclosed searching for indicia of improper use such as “accesses in excess of a specific volume, accesses during a pre-determined time interval,” and “accesses by a specific user.”²¹⁸ The court found that “[t]hese are the same questions (though perhaps phrased with different words) that humans in analogous situations detecting fraud have asked for decades, if not centuries.”²¹⁹

²¹³ See *id.* at 23–24; see also *id.* at 25 (arguing that *Core Wireless* and *Data Engine* properly “focused the Section 101 inquiry on user functionality”).

²¹⁴ See, e.g., Petition for a Writ of Certiorari at 15, *TS Patents LLC v. Yahoo! Inc.*, 731 F.App’x 978 (Fed. Cir. 2019) (No. 18–1114) (claims to allowing a computer user to view files in a hierarchical list); Appellant’s Reply Brief at 8–9, *Ameranth v. Domino’s Pizza*, 792 F.App’x 780 (Fed. Cir. 2019) (No. 2019–1141) (formatting a computerized food menu for a handheld device); Corrected Opening Brief of Appellant at 14–15, *KCG Techs., LLC v. CarMax Auto Superstores, Inc.*, 826 F.App’x 928 (Fed. Cir. 2020) (No. 2020–1327) (reproducing a smart phone’s display screen on another device).

²¹⁵ 839 F.3d 1089 (Fed. Cir. 2016).

²¹⁶ *Id.* at 1092.

²¹⁷ *Id.* at 1095.

²¹⁸ *Id.*

²¹⁹ *Id.*

Similarly, claims to a system for identifying an email as spam or carrying a virus were invalidated in *Intellectual Ventures I LLC v. Symantec Corp.*²²⁰ The patent addressed the problem that “senders of spam have become much more sophisticated at avoiding [prior art] filters”—their “ever changing methods” include things such as using “dynamic addressing schemes, very long-length subject lines and anonymous re-routing services.”²²¹ The claimed method consisted of classifying all incoming emails by their characteristics and sharing this information among the users of the system.²²² “For example,” in one embodiment, “if a particular ID indicating the same message is seen some number of times per hour,” and the email does not come from a source that is known to be reputable, “the system classifies the message as spam.”²²³ The Federal Circuit analogized this type of filtering for indicia of unwanted email messages to the “long-prevalent practice” of sorting U.S. mail at home by, for example, discarding generically addressed mail as presumptive junk mail.²²⁴

The Federal Circuit has also voided claims to a system that prevented fraud in internet sales by determining whether a credit card has previously been used in relation to an internet address in *CyberSource Corp. v. Retail Decisions, Inc.*²²⁵ And a claimed system for detecting fraud in financial transactions was held ineligible in *Bozeman Financial LLC v. Federal Reserve Bank of Atlanta*.²²⁶ That system consisted of having the parties to a transaction each store records of the transaction at a third site, and then check that at least two “parameters”—names, account numbers, or other identifying information—matched each other.²²⁷ The court concluded that the claims were “directed to the abstract idea of collecting and analyzing information for financial transaction fraud or error correction.”²²⁸

In a related category, a system for identifying and correcting innocent human errors was held to be ineligible in *Voter Verified, Inc. v. Election System & Software LLC*.²²⁹ The claimed invention verified the accuracy of a person’s

²²⁰ 838 F.3d 1307, 1313–14 (Fed. Cir. 2016).

²²¹ U.S. Patent No. 6,460,050 B1 col. 1 ll. 57–64 (filed Dec. 22, 1999) (issued Oct. 1, 2002).

²²² See *Symantec Corp.*, 838 F.3d at 1313–14.

²²³ ’050 Patent col. 6 ll. 5–8.

²²⁴ See *Symantec Corp.*, 838 F.3d at 1314; *id.* at 1314 n.6.

²²⁵ 654 F.3d 1366, 1367–68 (Fed. Cir. 2011).

²²⁶ 955 F.3d 971, 974 (Fed. Cir. 2020).

²²⁷ See *id.* at 976–77; U.S. Patent No. 8,768,840 col. 9 ll. 54–58 (filed Jun. 25, 2012) (issued Jul. 1, 2014).

²²⁸ *Bozeman Financial*, 995 F.3d at 980; see also *Prism Techs. LLC v. T-Mobile USA, Inc.*, 696 F.App’x 1014, 1015–16 (2017) (invalidating claims to requiring authentication of computer’s identity before giving it access to resources on a network).

²²⁹ 887 F.3d 1376, 1379 (Fed. Cir. 2018).

vote submissions in an electronic voting system by printing out a copy of the voter's choices, having the person review the printed selections, and only tabulating the voter's choices after the voter confirmed that the printed selections are correct.²³⁰

It is important to note that not all inventions that involve the detection of computer viruses or data errors are ineligible for patenting. In *Finjan, Inc. v. Blue Coat Sys., Inc.*,²³¹ for example, the court upheld a patent for a virus filtering system. The claimed invention identified potentially dangerous software code on the basis of the operations that it performed—in particular, whether it performed a process that is inherently dangerous, such as to delete or rename files or to issue kill commands that stop a process.²³² And *Koninklijke KPN N.V. v. Gemalto M2M GmbH*²³³ affirmed the eligibility of claims to a system for determining whether data had been corrupted during its transmission by systemic errors such as equipment problems or interfering signals.²³⁴

What appears to distinguish these two cases from those where fraud and error-detection inventions were held ineligible is that their claimed inventions did not seek to anticipate or identify *human* malevolence or mistakes. *Finjan's* system searched for software functions that had the potential to do harm to a computer, without regard to the intent of the email's sender. It is the difference, by analogy, between preventing crime in a building by identifying suspicious behavior or individuals, and by barring firearms and knives to all persons in the building via a metal detector at the entrance. Only the former approach is directed to the mental processes of the involved persons. And *Koninklijke KPN's* invention did not involve any human role at all—the data errors at issue were caused by impersonal forces. These patents' lack of a focus on indicia of human behavior or intentions appears to be what excludes them from the human-activities category of ineligible subject matter.

Finally, the fraud-and-error line of cases also has an established lineage. The famous Second Circuit decision in *Hotel Security Checking Co. v. Lorraine Co.*²³⁵ belongs to this subcategory. The invention in that case addressed the problem of fraud committed by restaurant wait staff. The patent noted that “[w]aiters favor customers by giving them smaller checks or charging them smaller amounts than they should, . . . in the hope of a gratuity from the

²³⁰ See *id.* at 1385–86; U.S. Patent No. 6,769,613 B2 col. 1 ll. 35–42 (filed Dec. 7, 2000) (issued Aug. 3, 2004).

²³¹ 879 F.3d 1299 (Fed. Cir. 2018).

²³² See *id.* at 1304; Patent No. 6,154,844 col. 4 ll. 20–33 (filed Dec. 22, 1999) (issued Nov. 28, 2000).

²³³ 942 F.3d 1143 (Fed. Cir. 2019).

²³⁴ See *id.* at 1147.

²³⁵ 160 F. 467, 469 (2d Cir. 1908).

customer,” and that they will “sometimes . . . permit customers to leave without paying anything whatever.”²³⁶ The claimed solution was to record each order made by a waiter twice, once a ledger when the food or drink is given to the waiter and again on a slip of paper that the customer later submits to the cashier when paying.²³⁷ Each record is linked by a number to the waiter, and at the end of the day, the amounts on the slips in the register are added and checked against the sums on the ledger, revealing any discrepancy between the value of what was given to the waiter and what went into the till.²³⁸ Figure 3 from the patent illustrates an embodiment, with the claimed customer slips on the top row, ready to be added and checked against the ledger entries on the bottom row:

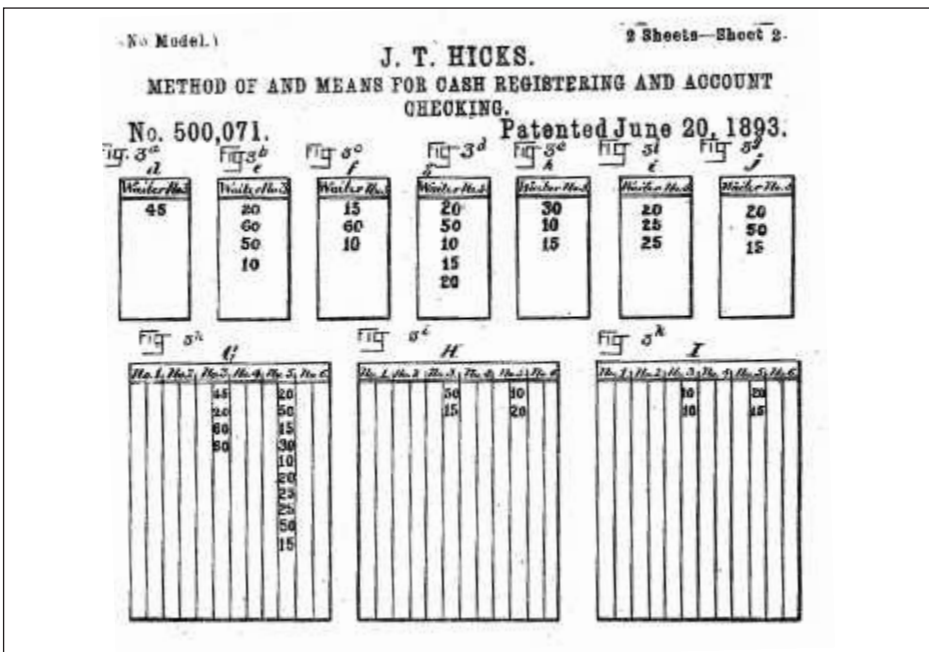


Figure 5: Sales Slips and Kitchen Sheets.²³⁹

The Second Circuit deemed this “[a] system of transacting business,” and concluded that such subject matter “is not, within the most liberal interpretation of the term, an art.”²⁴⁰

²³⁶ U.S. Patent No. 500,071 (’071 Patent), at 1 ll. 21–28 (filed Jul. 21, 1890) (issued Jun. 20, 1893).

²³⁷ See *Hotel Sec. Checking Co.*, 160 F. at 468; ’071 Patent at 1 ll. 79–92, 2 ll. 3–25.

²³⁸ See *Hotel Sec. Checking Co.*, 160 F. at 468; ’071 Patent at 1 ll. 79–92, 2 ll. 3–25.

²³⁹ See ’071 Patent at 2 ll. 59–70; *id.* at fig. 3.

²⁴⁰ *Hotel Sec. Checking Co.*, 160 F. at 469.

Another even older Second Circuit decision invalidated claims to “an improved method of preventing and rectifying mistakes in the transaction” of “the business of shipping and transportation.”²⁴¹ The patent in *Hocke v. New York Cent. & H.R.R. Co.*²⁴² prescribed maintaining two sets of records for an item to be shipped, each record identifying the item and its intended rail car.²⁴³ The second record was to be placed in the rail car when the item was placed there, and all records in the car would then be checked against the first set of records in order to identify any errors in placement.²⁴⁴ The Second Circuit, finding it “difficult to classify the subject of the patent,” simply concluded that it “does not rise to the level of invention.”²⁴⁵

4. Games and Human Conditioning

Only a handful of cases belong to this subcategory of ineligible human activities. Although a number of notorious patents were issued in this field in the 90s and aughts,²⁴⁶ few such patents or applications are litigated to the court of appeals. In the field of games, the Federal Circuit has rejected claims to a game of dice that uses a specially marked die in *In re Marco Guldenaar Holding B.V.*;²⁴⁷ claims to rules for a new version of Blackjack in *In re Smith*;²⁴⁸ and claims to a computerized bingo game in *Planet Bingo, LLC v. VKGS LLC*.²⁴⁹

And recently, *Ubisoft Entertainment, S.A. v. Yousician Oy*²⁵⁰ rejected claims to a method of teaching a person to play the guitar, and *In re Zunshine*²⁵¹ rejected a claimed method of dieting that requires the user, when hungry and tempted to eat more than the diet allows, to drink a glass of water and wait 15 minutes. Past patents for a method of putting a golf ball, or any other system of training or building mental endurance, also are best regarded as belonging to this subcategory of human conditioning.

²⁴¹ *Hocke v. New York Cent. H.R.R. Co.*, 122 F. 467, 469 (2d Cir. 1903).

²⁴² 122 F. 467 (2d Cir. 1903).

²⁴³ *See id.* at 468.

²⁴⁴ *See id.*

²⁴⁵ *Id.* at 469.

²⁴⁶ *See In re Bilski*, 545 F.3d 943, 1009 (Fed. Cir. 2008) (Mayer, J., dissenting) (citing patents to a method of putting a golf ball and to a method of swinging on a swing suspended on a tree branch). *Cf.* Carl A. Kukkonen, III, *Be a Good Sport and Refrain from Using My Patented Putt: Intellectual Property Protection for Sports Related Movements*, 80 J. PAT. & TRADEMARK OFF. SOC'Y 808 (1998).

²⁴⁷ 911 F.3d 1157, 1162 (Fed. Cir. 2018).

²⁴⁸ 815 F.3d 816, 820 (Fed. Cir. 2016).

²⁴⁹ 576 F.App'x 1005, 1009 (Fed. Cir. 2014).

²⁵⁰ 814 F.App'x 588, 591–92 (Fed. Cir. 2020).

²⁵¹ 816 F.App'x 477, 478–79 (Fed. Cir. 2020).

D. The Common Theme: A Focus on Influencing or Anticipating the Operation of the Human Mind

What ties together the diverse topics of the human-activities category of ineligible subject matter—business methods, content selection and display, fraud and error prevention, and games and conditioning—is that the operation of all these inventions depends on human thinking and mental reactions. Economic practices seek to influence purchasing decisions or ensure adherence to agreements; management techniques make people cooperate with each other, work more efficiently, and follow rules; content selection is about what people want to see and hear, and data displays help them to understand and access information; fraud and error prevention rely on identifying and predicting human behavior; and games are about having fun. In each of these cases, the effectiveness of the invention depends entirely on a human being's mental reaction to it.

The line between human-centered inventions, on the one hand, and advances in the technological arts on the other is analogous to that which universities typically draw between their different departments. It is distinction between the engineering and the physical sciences departments on one side of campus and the humanities and social sciences on the other. Universities' use of this organizational structure appears to recognize a fundamental difference between the types of knowledge that are taught in these different departments. It is only the subject matter that is taught in the former departments, science and engineering, that qualifies as a "useful art" that can be the subject matter of a patent.

As to *why* the law excludes innovations in human activities from patent protection, legislators are not required to explain themselves and may write laws based solely on intuition and unarticulated judgments. *Alice Corp.* states that "pre-emption" is "the concern that drives" the abstract-idea exception,²⁵² but this explanation is unsatisfying. After all, it is *Alice* itself that confirmed that "economic practice[s]" and other "method[s] of organizing human activity"²⁵³ are excluded as a subject matter regardless of whether they are claimed as a series of specific steps or reduced to a formula.²⁵⁴ Nor, obviously, would *every* human-activities patent necessarily claim more than what it fully and specifically discloses. To the extent that such a patent, with fully supported claims, is nevertheless deemed to unjustifiably "preempt," it is because the law regards this class of subject matter as inherently unsuitable for a patent.

Justice Stevens and Judge Mayer, in their respective *Bilski* opinions, summarize the best of the academic commentary as to why at least business methods

²⁵² *Alice Corp. Pty. Ltd. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

²⁵³ *Id.* at 219–20.

²⁵⁴ *See id.*

should not be patentable: the balance of risk and reward is more than sufficient to spur innovation in entrepreneurial activity without the need to award exclusive rights,²⁵⁵ and there is something inherently vague and amorphous about business ideas that makes them insusceptible to either being captured in patent claims or documented for purposes of establishing prior art.²⁵⁶

Professor Jay Thomas, in his commentary on the nature of technology, suggests another reason for treating human activities differently in intellectual property law: “[t]he character of thinking involved” in the liberal arts or social sciences “is different from the character of thinking involved in technological activities.”²⁵⁷ Whereas human activities are “intuitive and more dependent on the senses,”²⁵⁸ “technology is concerned with the conscious articulation of rules and principles”²⁵⁹ that can be applied “for the attainment of a causally predictable result.”²⁶⁰

Unlike inventions in the technological arts, the effectiveness of methods of influencing people, teaching them information, or making them happy does not depend solely or even principally on the application of set of predictable rules and principles. Rather, it requires “intuition” and a knowledge of the people themselves. Whether a particular method of persuasion closes a sale, or media content appeals to an audience, obviously will vary across cultures and times. (Thus the most important rules of sales and entertainment are to know your customer and your audience.) And the same audience will be less susceptible to a tactic of influence or persuasion that has been used before, or if the audience is aware that it is being manipulated. Similarly, fraud prevention methods are much less effective if their target is aware of the technique that is being applied. Even at the individual level, the effectiveness of a teaching method will depend on the student’s aptitude and preferred mode of learning and on what the person already knows.

Patents, of course, cannot capture any of these things. They describe an invention—a specific way of applying of a set of rules and principles to achieve a useful result. And in technological fields, that is all that is needed. The ingredients in a chemical composition or the components of a mechanical or

²⁵⁵ See *Bilski v. Kappos*, 561 U.S. 593, 650–52 (2009) (Stevens, J., concurring in judgment); *In re Bilski*, 545 F.3d 943, 1005–07 (Fed. Cir. 2008) (Mayer, J., dissenting).

²⁵⁶ See *Bilski*, 561 U.S. at 655 (Stevens, J., concurring in judgment); *Bilski*, 545 F.3d at 1007 (Mayer, J., dissenting).

²⁵⁷ Thomas, *supra* note 74, at 1172 (quoting PAUL W. DEVORE, TECHNOLOGY: AN INTRODUCTION 226 (1980)).

²⁵⁸ *Id.* at 1174 (quoting CARL MITCHAM, THINKING THROUGH TECHNOLOGY: THE PATH BETWEEN ENGINEERING AND PHILOSOPHY 230 (U. Chi. ed. 1994)).

²⁵⁹ *Id.*

²⁶⁰ *Id.* at 1178 (quoting Gert Kolle, *The Patentable Invention in the European Patent Convention*, 5 Int’l Rev. Indus. Prop. & Copyright L. 140, 146 (1974)).

electronic device neither know nor care that they are being manipulated for others' ends and they reliably produce their results for different people across times and cultures. Thus a patent can capture and convey all that is necessary to fully exploit a technological invention. But a patent cannot account for the infinite variability of human thinking and human societies. And because it is these things that are so critical to the effectiveness of methods that seek to produce a mental response, a claimed invention in human activities is inherently less reliable and valuable. Even the most complete disclosure of the method will not impart the knowledge of people that is necessary to ensure that a sales or management technique will be effective, that media content will entertain, or that a spam filter will outsmart the spammer. It is perhaps out of a recognition of the more limited and transient value of social-sciences and liberal-arts inventions that the law has steadfastly refused to extend patent protection to these fields.

III. “Function of a Machine:” Results, Effects, or Fields of Use as an Abstract Idea

Another set of Federal Circuit decisions identifies a class of abstract ideas that is wholly apart from human activities. This set of abstract ideas has been held to include basic computer functions such as “gathering and analyzing information,”²⁶¹ “filtering content,”²⁶² “parsing, comparing, storing, and editing data,”²⁶³ and “encoding and decoding image data.”²⁶⁴ It also includes methods of electronic communication: “communication over a network”²⁶⁵ and “wirelessly communicating status information”²⁶⁶ have been designated as abstract ideas.

Obviously, if the law treated this last category of abstract ideas the same way that it treats the human-activities category—that even a non-obvious, fully disclosed, and useful application of the subject matter is still an abstract idea—then all computer operations and all forms of telephony would be ineligible subject matter. It is thus not surprising that, in applying this third category, the Federal Circuit has made clear that “improvements in computer-related

²⁶¹ Elec. Power Grp. v. Alstom S.A., 830 F.3d 1350, 1354 (Fed. Cir. 2016).

²⁶² BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC, 827 F.3d 1341, 1348 (Fed. Cir. 2016); *see also* Intellectual Ventures I LLC v. Symantec Corp., 838 F.3d 1307, 1313 (Fed. Cir. 2016) (“filtering files/emails — is an abstract idea”).

²⁶³ Berkheimer v. HP Inc., 881 F.3d 1360, 1366 (Fed. Cir. 2018).

²⁶⁴ RecogniCorp, LLC v. Nintendo Co., 855 F.3d 1322 (Fed. Cir. 2017).

²⁶⁵ ChargePoint, Inc. v. SemaConnect, Inc., 920 F.3d 759, 766 (Fed. Cir. 2019).

²⁶⁶ Chamberlain Grp., Inc. v. Techtronic Indus. Co., 935 F.3d 1341, 1346 (Fed. Cir. 2019).

technology” and “claims directed to software” are *not* “inherently abstract.”²⁶⁷ The court has indicated that while computer operations such as “output of data analysis . . . *can* be abstract,”²⁶⁸ its “cases confirm that software-based innovations can also make ‘non-abstract improvements to computer technology’ and be deemed patent-eligible subject matter at step 1 [of the *Mayo/Alice* test].”²⁶⁹ Thus for example, although filtering content on a computer has been deemed an abstract idea,²⁷⁰ claims directed to this subject matter are eligible if the patent’s “particular arrangement of elements is a technical improvement over prior art ways of filtering content.”²⁷¹ And while parsing, editing, storing, and comparing data has been labeled an abstract idea,²⁷² a specific, inventive method of carrying out these functions is potentially patent eligible.²⁷³

This category of abstract ideas operates in a different way from the other categories. It focuses on the function of the claimed device: claims are ineligible if they are directed to the function itself—to an intended result or effect, rather than the means for achieving it; and claims are ineligible if they are directed to the routine or characteristic function of a prior-art device in a field of use.

A. Claiming an Effect or Result

The most frequently cited and influential Federal Circuit decision in this category of abstract ideas is *Electric Power Group, LLC v. Alstom S.A.*²⁷⁴ That decision synthesizes the recent case law and concludes by emphasizing the “important common-sense distinction between ends sought and particular means of achieving them, between desired results (functions) and particular

²⁶⁷ *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016); *see also* *Visual Memory LLC v. NVIDIA Corp.*, 867 F.3d 1253, 1258 (Fed. Cir. 2017) (“we must . . . ask whether the claims are directed to an improvement to computer functionality versus being directed to an abstract idea.”) (citations and quotation marks omitted) (quoting *Enfish*, 822 F.3d at 1335) (citations and quotation marks omitted).

²⁶⁸ *Credit Acceptance Corp. v. Westlake Servs.*, 859 F.3d 1044, 1056 (Fed. Cir. 2017) (emphasis added).

²⁶⁹ *Finjan Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1304 (Fed. Cir. 2018) (quoting *Enfish*, 822 F.3d at 1335), *aff’d* 777 F.App’x 508 (2019).

²⁷⁰ *See* *BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1348 (Fed. Cir. 2016).

²⁷¹ *Id.* at 1350.

²⁷² *See* *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1366 (Fed. Cir. 2018).

²⁷³ *See id.* at 1370; *see also* *Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1303–05 (Fed. Cir. 2016); *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1336, 1339 (Fed. Cir. 2016) (finding that claims to an innovative version of a data structure are not directed to an abstract idea).

²⁷⁴ 830 F.3d 1350, 1356 (Fed. Cir. 2016).

ways of achieving (performing) them.”²⁷⁵ The same rule was actually articulated and applied a year earlier in *Internet Patents Corp. v. Active Network, Inc.*,²⁷⁶ which invalidated claims to a system of retaining the state of data in online forms while navigating between forms. The court found the claims ineligible because they “contain[] no restriction on how the result is accomplished. The mechanism for maintaining the state is not described, although that is stated to be the essential innovation.”²⁷⁷ *Internet Patents* ruled that § 101 prohibits claims that only “describe[] the effect or result disassociated from any method by which . . . [it] is accomplished.”²⁷⁸

Many subsequent decisions apply this principle. The patents in these cases often claim what appear to be nonobvious and quite useful technological inventions, but they fall short of eligibility because they fail to identify the means by which these results are accomplished. Thus claims to a system for converting medical-treatment data into a machine-independent format were held ineligible in *University of Florida Research Found., Inc. v. General Electric Co.*²⁷⁹ The problem, as the court noted, was that neither the “patent, nor its claims, explains how the [claimed] drivers do the conversion that [the patent owner] points to. That is, the drivers are described in purely functional terms.”²⁸⁰ Similarly, claims to automatic editing between incompatible custom XML formats were held ineligible in *Intellectual Ventures I LLC v. Capital One Fin. Corp.*²⁸¹ because the patent offered “only a result-oriented solution, with insufficient detail for how a computer accomplishes it.”²⁸² And claims to remotely accessing incompatible data files were voided in *Intellectual Ventures I LLC v. Erie Indemnity Co.*²⁸³ The court found that “[n]owhere do the claims recite elements or components that describe *how* the invention overcomes these compatibility issues.”²⁸⁴

²⁷⁵ *Id.* at 1356; *see also id.* (“[T]here is a critical difference between patenting a particular concrete solution to a problem and attempting to patent the abstract idea of a solution to the problem in general.”) (quotation marks omitted).

²⁷⁶ 790 F.3d 1343, 1348 (Fed. Cir. 2015).

²⁷⁷ *Id.* at 1348.

²⁷⁸ *Id.*

²⁷⁹ 916 F.3d 1363, 1369 (Fed. Cir. 2019).

²⁸⁰ *Id.* at 1368 (“The mere function of converting is not a ‘specific improvement to the way computers operate.’”).

²⁸¹ 850 F.3d 1332, 1342 (Fed. Cir. 2017).

²⁸² *Id.* at 1342.

²⁸³ 850 F.3d 1315, 1332 (Fed. Cir. 2017).

²⁸⁴ *Id.* at 133; *see also id.* at 1331–32 (“Without an explanation of the mechanism for how the result is accomplished, this purported feature of the invention cannot supply an inventive concept.”) (quotation marks omitted); *Data Engine Techs., LLC v. Google, LLC*, 906 F.3d 999 1012 (Fed. Cir. 2018) (claims to identifying and storing electronic spreadsheet pages

The Federal Circuit's recent, hotly disputed decision in *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC*²⁸⁵ also belongs to this category. The patent in suit claimed a drive shaft with a liner that was “configured to damp shell mode vibrations” and “bending mode vibrations.”²⁸⁶ The initial panel decision concluded that “the solution to these desired results [of damping vibrations] is not claimed in the patent.”²⁸⁷ On rehearing, the panel amplified this analysis, emphasizing that the “Supreme Court has long held that claims that state a goal without a solution are patent ineligible,” and cited the foundational cases of *O'Reilly v. Morse*, *Corning v. Burden*, and *Le Roy v. Tatham*.²⁸⁸

The initial panel decision also went on to conclude that its decision was “reinforce[d]” by *Parker v. Flook*²⁸⁹ and that like *Flook*'s claims, American Axle's were ineligible because they were “directed to the utilization of a natural law.”²⁹⁰ This reasoning appeared to treat a law of nature as inherently ineligible subject matter that cannot be the focus of a patent. It drew a spirited dissent from

held ineligible; “claim 1 . . . covers any means for identifying electronic spreadsheet pages.”); *RecogniCorp, LLC v. Nintendo Co.*, 855 F.3d 1322, 1326 (Fed. Cir. 2017) (claims to building a composite facial image using constituent parts held ineligible) (noting that the Alice step-one inquiry “often is whether the claims are directed to ‘a specific means or method’ for improving technology or whether they are simply directed to an abstract end-result.”) (quoting *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016)); *In re Rosenberg*, 813 F.App'x 594, 595, 597 (Fed. Cir. 2020) (claims to evaluating clinic-trial data and “determining . . . whether procedures or parameters . . . require modification” held ineligible); *British Telecomms. PLC v. IAC/InterActiveCorp*, 381 F. Supp. 3d 293, 305 (D. Del. 2019) (Bryson, J., sitting by designation) (“[I]n determining whether a particular claim is directed to an abstract idea, courts have focused on whether the claim is purely functional in nature rather than containing the specificity necessary to recite how the claimed function is achieved.”) (discussing numerous Federal Circuit decisions).

²⁸⁵ 967 F.3d 1285 (Fed. Cir. 2020).

²⁸⁶ *Id.* at 1290 (quoting claim 1).

²⁸⁷ *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 939 F.3d 1355, 1363 (Fed. Cir. 2019) (“[T]he mechanisms for achieving the desired result . . . are not actually claimed.”), *superseded on reh'g*, 967 F.3d 1285 (2020).

²⁸⁸ *Am. Axle*, 967 F.3d 1285, at 1295–96; *see also Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347, 1352 (Fed. Cir. 2020) (Chen, J., concurring in the denial of rehearing en banc) (discussing *O'Reilly*).

²⁸⁹ 437 U.S. 584 (1978).

²⁹⁰ *Am. Axle*, 939 F.3d at 1365–66. Similarly, the district court found that the patent was ineligible because it was directed to Hooke's law, an equation that describes the natural relationship between an object's mass, stiffness, and the frequency at which it vibrates, and that the additional steps recited in the claims were routine and conventional. *See Am. Axle*, 967 F.3d at 1298.

Judge Moore²⁹¹ and led an evenly divided court to fall just short of rehearing the case en banc.²⁹² Given these judges' as well as industry groups'²⁹³ vigilance against assigning scientific principles to the second category of per se ineligibility, it is likely that *American Axle's* precedential effect will be limited to reinforcing the third, functional category of abstract ideas.

The Federal Circuit also has applied this type of analysis in cases where the claims are directed to subject matter that is itself ineligible, to confirm its conclusion of ineligibility. For example, *Affinity Laboratories of Texas, LLC v. Amazon.com, Inc.*²⁹⁴ invalidated claims to delivering via a portable device user selected content that is tailored based on information about the user.²⁹⁵ In addition to finding that tailoring content based on user information is an ineligible concept,²⁹⁶ the court placed emphasis on the fact that “[t]he patent . . . does not disclose any particular mechanism for wirelessly streaming content to a handheld device.”²⁹⁷ It concluded that “[t]he purely functional nature of the claim confirms that it is directed to an abstract idea.”²⁹⁸ Similarly, *Affinity Laboratories of Texas, LLC v. DIRECTV, LLC*²⁹⁹ found that streaming regional broadcast signals to cellphones located outside the region is ineligible subject

²⁹¹ See *Am. Axle*, 967 F.3d at 1304 (Moore, J., dissenting) (noting that “[a]ll physical methods must comply with, and apply, the laws of physics and the laws of thermodynamics,” and that “it cannot be that use of an unclaimed natural law in the performance of an industrial process is sufficient to hold the claims [impermissibly] directed to that natural law.”) (“Just because an invention operates according to laws of nature (as all inventions must) cannot mean that it is ‘directed to’ those laws”) (quoting the amicus brief of the Biotechnology Industry Organization).

²⁹² See *Am. Axle*, 966 F.3d at 1357 (Newman, J., dissenting from the denial of rehearing en banc) (“All technology is based on scientific principles . . . [t]he Supreme Court long ago recognized that what is required for patentability is that the inventor describes the useful application of [his or her] discovery.” Judge Newman further emphasizes “the distinction between the basic principles of science and their practical application”).

²⁹³ See Melissa Brand & Hans Sauer, *The Re-Written American Axle Opinion Does Not Bring Peace of Mind for Section 101 Stakeholders*, IP WATCHDOG (Aug. 9, 2020), <https://www.ipwatchdog.com/2020/08/09/re-written-american-axle-opinion-not-bring-peace-mind-section-101-stakeholders/id=123900/> [<https://perma.cc/249X-V7V6>].

²⁹⁴ 838 F.3d 1266 (Fed. Cir. 2016).

²⁹⁵ See *id.* at 1267–68, 1271.

²⁹⁶ See *id.* at 1271 (“[T]ailoring of content based on information about the user—such as where the user lives or what time of day the user views the content—is an abstract idea that is as old as providing different newspaper inserts for different neighborhoods.”).

²⁹⁷ *Id.* at 1269.

²⁹⁸ *Id.*

²⁹⁹ 838 F.3d 1253 (Fed. Cir. 2016).

matter,³⁰⁰ but also relied on the fact that “[t]here is nothing in [the] claim . . . that is directed to *how* to implement out-of-region broadcasting on a cellular telephone.”³⁰¹

In these latter cases, the fact that the patent claimed results or effects was part of the Federal Circuit’s § 101 analysis, but it is difficult to conclude that this was the ultimate basis for the court’s ineligibility finding. In both of the *Affinity Labs* cases, for example, the patent did not describe the means for streaming media content to a personal device, but it is apparent that readily available, off-the-shelf technology *could* execute this function. And it is equally apparent that selecting media content based on the viewer’s personal information or based on the content’s out-of-region status would remain ineligible subject matter even if the patent comprehensively described the use of such existing technology. The lack-of-means analysis in these cases is perhaps best regarded as an *Alice/Mayo* step two analysis—a double-checking by the court that behind the claimed ineligible subject matter there does not lurk some further technological invention.

³⁰⁰ See *id.* at 1258 (“The concept of providing out-of-region access to regional broadcast content is an abstract idea.”).

³⁰¹ *Id.* There are other cases where the Federal Circuit found that claims were ineligible because they were directed to content selection or data display, but also relied on the functional nature of the claims to confirm its ineligibility finding, including *Interval Licensing, LLC v. AOL, Inc.*, 896 F.3d 1335, 1344, 1346 (Fed. Cir. 2018) (holding that “the act of providing someone an additional set of information without disrupting the ongoing provision of an initial set of information is an abstract idea,” while also noting that “the patent is wholly devoid of details which describe *how* this is accomplished”); *Secured Mail Sols. LLC v. Universal Wilde, Inc.*, 873 F.3d 905, 910–11 (Fed. Cir. 2017) (holding that providing information about the contents or routing of a package is ineligible subject matter, while noting that “[t]his method is not limited to any particular technology of generating, printing, or scanning a barcode, of sending a mail object, or of sending the recipient-specific information over a network.”); *Two-Way Media Ltd. v. Comcast Cable Commc’ns, LLC*, 874 F.3d 1329, 1337 (Fed. Cir. 2017) (holding that maintaining records of the timing and delivery of audiovisual content over a communications network is ineligible subject matter, while emphasizing that the claim “recites a method for routing information using result-based functional language [It] does not sufficiently describe how to achieve these results.”); and *In re TLI Commc’ns LLC Patent Litig.*, 823 F.3d 607, 612 (Fed. Cir. 2016) (holding that classifying and storing digital photographs by the time and date that they were taken is ineligible subject matter, while also noting that “[t]he specification fails to provide any technical details for the tangible components, but instead predominately describes the system and methods in purely functional terms.”).

B. Claiming Prior-Art Functionality in a Field of Use

In another set of “functional” cases, the problem with a claimed invention is not that it fails to claim a means for achieving a result, but rather the opposite: the claimed means are a device that is undisputedly part of the prior art and the patent simply claims its functionality in a particular field of use or technological environment.

The leading case in this category—and the one that has drawn the most commentary—is *ChargePoint, Inc. v. SemaConnect, Inc.*³⁰² This decision concerned a system for recharging electric vehicles over a communications network: the network helps the vehicles to find available charging stations and also applies the economic principle of “demand response,” directing vehicles to be charged when demand for electricity is low and even allowing electricity to be drawn *from* some vehicles when demand for electricity is high.³⁰³ The court concluded that “the invention . . . is nothing more than the abstract idea of communication over a network for interacting with a device, applied in the context of electric vehicle charging stations”³⁰⁴—the claims simply “add networking capabilities to existing charging stations to facilitate various business transactions.”³⁰⁵ And as the court noted, “[d]emand response is itself an abstract concept—a familiar business choice to alter terms of dealing to help match supply and demand.”³⁰⁶

An earlier case that applied a similar analysis is *Apple Inc. v. Ameranth, Inc.*,³⁰⁷ which involved a patent for creating food menus and orders on a handheld computer. The claimed electronic devices were concededly in the prior art. The court grounded its ineligibility finding in its conclusion that “the claims are directed to certain functionality—here, the ability to generate menus with certain features.”³⁰⁸

The most recent case applying a field-of-use eligibility analysis is *The Chamberlain Group, Inc. v. Techtronic Indus. Co.*,³⁰⁹ which involved claims to a garage door that wirelessly communicates information with other devices and the user—for example, instructing the system to turn on ambient lighting when the door is opened or warning the user of the presence of an obstruction to the door.³¹⁰ The court concluded that “[t]he only described

³⁰² 920 F.3d 759 (Fed. Cir. 2019).

³⁰³ *See id.* at 763–64.

³⁰⁴ *Id.* at 768.

³⁰⁵ *Id.* at 770.

³⁰⁶ *Id.* at 771.

³⁰⁷ 842 F.3d 1229, 1330 (Fed. Cir. 2016).

³⁰⁸ *Id.* at 1241.

³⁰⁹ 935 F.3d 1341, 1346 (Fed. Cir. 2019).

³¹⁰ *See id.* at 1345.

difference between the prior art [garage door] . . . operator systems and the claimed . . . system is that the status information about the system is communicated wirelessly.”³¹¹ And, importantly to the court’s eligibility analysis, “transmitting information wirelessly was conventional at the time the patent was filed and could be performed with off-the-shelf technology”³¹²—and the patent did not claim “a specific means or method that improves the relevant technology.”³¹³ Rather, the patent claimed a functionality that was “simply a feature of wireless communication,”³¹⁴ and applied it in the technological context of operating a garage door.

Similarly, the Federal Circuit invalidated claims to “the use of . . . existing scanning and processing technology to recognize and store data from specific data fields such as amounts, addresses, and dates” in *Content Extraction and Transmission LLC v. Wells Fargo Bank*.³¹⁵ As the court noted, the claimed invention did no more than apply this prior-art functionality “to a particular technological environment.”³¹⁶ Claims to the use of prior-art radio frequency identification (“RFID”) tags to regulate a business’s inventory were held ineligible in *Automated Tracking Solutions, LLC v. The Coca-Cola Co.*³¹⁷ And claims to conducting electronic commerce more securely by employing a prior-art secure network when consummating a purchase were invalidated in *Innovation Sciences, LLC v. Amazon.com, Inc.*³¹⁸ The court in that case noted that the claims did no more than “limit the field of use of . . . [this pre-existing functionality] to a particular technological environment.”³¹⁹

C. Controversial, but Historically Well Grounded

The recent cases applying this approach have been fraught with controversy. The *ChargePoint* decision was criticized by several witnesses who

³¹¹ *Id.* at 1346.

³¹² *Id.* at 1349; *see also id.* at 1347 (noting that “the specification explains [that wireless communication] was already a basic, conventional form of communication.”).

³¹³ *Id.* at 1347 (quoting *McRo, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1314 (Fed. Cir. 2016)) (quotation marks omitted).

³¹⁴ *Id.*

³¹⁵ 776 F.3d 1343, 1348 (Fed. Cir. 2014) (noting that the patent owner conceded “that the use of a scanner or other digitizing device to extract data from a document was well-known at the time of filing, as was the ability of computers to translate the shapes on a physical page into typeface characters.”).

³¹⁶ *Id.*

³¹⁷ 723 F.App’x 989, 990 (Fed. Cir. 2018); *see also id.* at 991 (noting that “at the time of the invention, various companies . . . were already manufacturing RFID products”).

³¹⁸ 778 F.App’x 859, 860 (2019); *see also id.* at 867 (“The specification admits that merchant servers for carrying out a secure transaction were conventional.”).

³¹⁹ *Id.* at 865.

testified at the U.S. Senate Judiciary Committee’s June 2019 hearings on patent eligibility,³²⁰ as well as by other distinguished commentators.³²¹ While *ChargePoint* anchored its ruling in the Supreme Court’s decision in *O’Reilly v. Morse*,³²² academic commentators³²³—and even several members of the Federal Circuit³²⁴—have questioned whether *O’Reilly* creates a test that is grounded in § 101. And two Federal Circuit decisions appear to reject the notion that claiming only a result or an effect rather than the means for accomplishing it is a basis for ineligibility. *SRI International, Inc. v. Cisco Systems, Inc.*³²⁵ turned away a § 101 challenge to a patent that broadly claimed analyzing a variety of different types of network traffic data to detect “suspicious activity.”³²⁶

³²⁰ See *Senate Hearing II* (statement of Henry Hadad, President, Intellectual Property Owners Association), at 6 n.8, 8–9; *Senate Hearing II* (statement of Jeffrey A. Birchak, General Counsel, Secretary, and Vice President of Intellectual Property, Fallbrook Technologies, Inc., on behalf of the Innovation Alliance), at 3–4; *The State of Patent Eligibility in America: Part III, Hearing before the Subcomm. on Intellectual Prop. of the S. Comm. on the Judiciary*, 115th Cong. (2019) [hereinafter “*Senate Hearing III*”] (statement of Laurie C. Self, Senior Vice President and Counsel, Government Affairs, Qualcomm, Inc.), at 11; *Senate Hearing III* (statement of Manny Schecter, Chief Patent Counsel, International Business Machines Corporation), at 5–6.

³²¹ See Russell Slifer, *The Federal Circuit Must Revisit Its Imprudent Decision in ChargePoint v. SemaConnect*, IP WATCHDOG (July 14, 2019), <https://www.ipwatchdog.com/2019/07/14/federal-circuit-must-revisit-imprudent-decision-chargepoint-v-semaconnect/id=111278/> [<https://perma.cc/HR7W-JQPV>]; Gene Quinn, *A Strange Evolution: The Federal Circuit Has Entered the Theater of the Absurd*, IP WATCHDOG (Sept. 26, 2019), <https://www.ipwatchdog.com/2019/09/26/strange-evolution-federal-circuit-entered-theater-absurd/id=113948/> [<https://perma.cc/4EKV-W3P8>]. But see Josh Landau, *What Are We Really Talking About When We Talk About § 101?*, PATENT PROGRESS (July 10, 2019), <https://www.patentprogress.org/2019/07/10/what-are-we-really-talking-about-when-we-talk-about-%c2%a7-101/> [<https://perma.cc/6898-P96A>].

³²² 56 U.S. 62 (1853); see *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 769 (Fed. Cir. 2019).

³²³ See David O. Taylor, *Confusing Patent Eligibility*, 84 TENN. L. REV. 157, 202 (2017) (“*O’Reilly v. Morse* is a case regarding the enablement and written description requirements and not the eligibility requirement.”) (citing Joshua A. Kresh, *Patent Eligibility After Mayo: How Did We Get Here and Where Do We Go?*, 22 FED. CIR. B.J. 521, 523 (2013)); Adam Mossoff, *O’Reilly v. Morse* (Geo. Mason Univ. L. & Econ. Rsch. Paper Series No. 14–22, 2014); see also Judge Paul Michel & John Battaglia, *New Enablement-Like Requirements for 101 Eligibility: AAM v. Neapco Takes the Case Law Out of Context, and Too Far—Part I*, IP WATCHDOG (Aug. 19, 2020), <https://www.ipwatchdog.com/2020/08/19/new-enablement-like-requirements-101-eligibility-aam-v-neapco-takes-case-law-context-far-part-i/> [<https://perma.cc/GLZ8-MEL5>].

³²⁴ See *Am. Axle & Mfg., Inc. v. Neapco Holdings LLC*, 966 F.3d 1347, 1362 (Fed. Cir. Jul. 31, 2020) (Stoll, J., dissenting from denial of rehearing en banc) (questioning whether there is “an ‘*O’Reilly* test”).

³²⁵ 918 F.3d 1368 (Fed. Cir. 2019).

³²⁶ *Id.* at 1373–76. The patent at issue gave no instructions as to which combinations or quantities of the eight different types of generic data that it recited would identify “suspicious activity” and did not suggest that all combinations or quantities of such data would

And *Visual Memory LLC v. NVIDIA Corp.*³²⁷ upheld a claim to a computer cache memory that achieved the result of being compatible with different types of processors without any limitation as to how such a result was produced. The court rejected the defendant’s eligibility arguments, concluding that whether the patent shows “how to implement the claimed invention presents an enablement issue under 35 U.S.C. § 112, not an eligibility issue under § 101.”³²⁸

In the main, however, the prevailing law at the Federal Circuit is that a patent is invalid under § 101 if it claims only a result or an effect, or if it claims the routine functions of a prior-art device in a field of use. And as *ChargePoint* and other recent decisions have noted, these eligibility rules are supported by *O’Reilly* and other early nineteenth century decisions.³²⁹ In view of the ongoing controversy over these rules, however, it bears describing just how deeply they are rooted in American jurisprudence. For over a century, the Supreme Court and courts of appeals applied what they called the “function of a machine” test, which operated in a way that would be immediately

achieve the claimed result. *See id.*; U.S. Patent No. 6,711,615 B2. The ’615 patent thus appears to fall on the ineligible side of the line that *O’Reilly* draws between James Neilson’s broad but valid claim to a “vessel or receptacle for heating air,” whose “the effect” of promoting ignition “was always produced, whatever might be the form of the receptacle,” and Samuel Morse’s invalid eighth claim to the use of electro-magnetism for communicating letters, since “Professor Morse has not discovered that the electric or galvanic current will always print at a distance, no matter what may be the form of the machinery or mechanical contrivance through which it passes.” *O’Reilly*, 56 U.S. at 116–17.

³²⁷ 867 F.3d 1253 (Fed. Cir. 2017).

³²⁸ *Id.* at 1261. *But see id.* at 1263 (Hughes, J., dissenting) (“[The fact that the] claims are not directed to a specific means or method” of achieving compatibility “may also reveal a § 112 enablement problem, but that does not preclude its relevance to the § 101 analysis.”).

³²⁹ *See ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 769 (discussing *O’Reilly*, 56 U.S. at 62, and *Wyeth v. Stone*, 30 F. Cas. 723 (C.C.D. Mass. 1840)); *Finjan, Inc. v. Blue Coat Sys.*, 879 F.3d 1299, 1305 (Fed. Cir. 2018) (“[patents are granted] for the discovery or invention of some practicable method or means of producing a beneficial result or effect . . . and not for the result or effect itself”) (quoting *Corning v. Burden*, 56 U.S. 252, 268 (1853)); *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1342–43 (Fed. Cir. 2018) (“‘A patent is not good for an effect, or the result of a certain process,’ for such patents ‘would prohibit all other persons from making the same thing by any means whatsoever.’”) (quoting *Le Roy v. Tatham*, 55 U.S. 156, 175 (1853)); *see also id.* (discussing *Wyeth v. Stone*, 30 F. Cas. 723, *O’Reilly*, and *The Telephone Cases*, 126 U.S. 1 (1888)); *British Telecomm’ns PLC v. IAC/InterActiveCorp*, 381 F. Supp. 3d 293, 306 (D. Del. 2019) (Bryson, J., sitting by designation) (noting that *O’Reilly* and *Le Roy v. Tatham*, 55 U.S. 156, “emphasized that a claim to a result, however achieved, is not patentable, and that allowing such a patent would have impermissible preemptive effects.”); *Am. Axle*, 966 F.3d at 1348 (Dyk, J., concurring in the denial of rehearing en banc) (collecting cases).

recognizable to students of *ChargePoint*, *Electric Power Group*, and *Internet Patents*: that claims to mere results or effects, or to the characteristic functions of a prior-art device in a particular field of use, are ineligible for patenting.

1. *The U.S. Supreme Court Cases*

The foundational cases for these principles are *Corning v. Burden*³³⁰ and *O'Reilly v. Morse*.³³¹ *Corning v. Burden* articulated the rule that “[i]t is for the discovery or invention of some practicable method or means of producing a beneficial result or effect, that a patent is granted, and not for the result or effect itself.”³³² The Court noted that “the term process is often used in a more vague sense” as “the use of a machine.”³³³ “In this use of the term it represents the function of a machine,” but “it is well settled that a man cannot have a patent for the function or abstract effect of a machine, but only for the machine which produces it.”³³⁴

O'Reilly applied this principle to invalidate Morse’s famous attempt to claim the use of electro-magnetism for printing letters without “limit[ing] [him]self to [any] . . . specific machinery or parts of machinery.”³³⁵ The Court emphasized that such a claim would improperly preempt other inventors who might develop a more reliable or inexpensive means of producing the same result.³³⁶

Another Supreme Court decision articulated the same rule a decade earlier, albeit in dicta. *Carver v. Hyde*³³⁷ noted that “the end to be accomplished is not the subject of a patent. The invention consists in the new and useful

³³⁰ 56 U.S. 252 (1853).

³³¹ 56 U.S. 62 (1853).

³³² *Corning*, 56 U.S. at 268.

³³³ *Id.*

³³⁴ *Id.*

³³⁵ *O'Reilly*, 56 U.S. at 112.

³³⁶ *See id.* at 113. In *O'Reilly*, the court opined:

For 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. His invention may be less complicated—less liable to get out of order—less expensive in construction, and in its operation. But yet if it is covered by this patent the inventor could not use it, nor the public have the benefit of it without the permission of this patentee.

Id.

³³⁷ 41 U.S. 513 (1842).

means of obtaining it.”³³⁸ Similarly, although *Le Roy v. Tatham*³³⁹ applied the rule against patenting principles in the abstract, it also noted that “a patent is not good for an effect, or the result of a certain process, as that would prohibit all other persons from making the same thing by any means whatsoever.”³⁴⁰ And as *ChargePoint* notes, Justice Story applied the same rule while riding circuit in *Wyeth v. Stone*.³⁴¹

Nor is the “function of a machine” test a mere mid-nineteenth century hiccup. The Supreme Court repeatedly articulated and applied this rule over the succeeding century, stating that:

- “Because the law requires a patentee to explain the mode of operation of his peculiar machine, which distinguishes it from others, it does not authorize a patent for a ‘mode of operation as exhibited in a machine.’”³⁴²
- “[A patentee cannot claim] a *result* or an *effect*. He can only claim the . . . particular mode which he has devised. Any one can produce the same results by other and different modes, and still not violate the claim of the plaintiff.”³⁴³
- “[T]he end of purpose sought to be accomplished by the device is not the subject of a patent [T]he subject of a patent is the device or mechanical means by which the desired result is to be secured.”³⁴⁴

³³⁸ *Id.* at 519 (“And if the defendant had, by [a device] . . . of a substantially different form, . . . made an improvement which more effectually secured the object intended to be accomplished, it would be difficult to maintain that it cannot be lawfully used, because it produced the same result with the plaintiff’s invention.”).

³³⁹ 55 U.S. 156 (1852).

³⁴⁰ *Id.* at 175.

³⁴¹ 30 F. Cas. 723 (C.C.D. Mass. 1840); *see also id.* at 727. The court stated:

[The patent owner] claims an exclusive title to the art of cutting ice by means of any power, other than human power. Such a claim is utterly unmaintainable in point of law. It is a claim for an art or principle in the abstract, and not for any particular method or machinery, by which ice is to be cut. No man can have a right to cut ice by all means or methods, or by all or any sort of apparatus, although he is not the inventor of any or all of such means, methods, or apparatus.

Id.

³⁴² *Burr v. Duryee*, 68 U.S. 531, 570 (1863).

³⁴³ *Case v. Brown*, 69 U.S. 320, 325 (1864); *see also id.* at 328. The court also notes the tendency:

[O]f expanding patents for machines into patents for ‘a mode of operation,’ a function, a principle, an effect or result, so that . . . a patentee of an improved machine may suppress all further improvements. It is not necessary to again express the fallacy of the arguments by which these attempts are sought to be supported, though we cannot hinder their repetition.

Id.

³⁴⁴ *Knapp v. Morse*, 150 U.S. 221, 227–28 (1893).

- “It is not the result, effect, or purpose to be accomplished which constitutes invention, or entitles a party to a patent, but the mechanical means or instrumentalities by which the object sought is to be obtained.”³⁴⁵
- “[A] valid patent cannot be attained for a process which involves nothing more than the operation of a piece of mechanism, or, in other words, for the function of a machine.”³⁴⁶
- “[T]he mere function of a machine cannot be patented.”³⁴⁷
- “[A]ll the cases agree, that the mere function or effect of the operation of a machine cannot be the subject-matter of a lawful patent.”³⁴⁸
- “A claim so broad, if allowed, would operate to enable the inventor, who has discovered that a defined [composition of matter] . . . answers the required purpose, to exclude others from all other types . . . , and so foreclose efforts to discover other and better types. The patent monopoly would thus be extended beyond the discovery, and would discourage rather than promote invention. That the patentee may not by claiming a patent on the result or function of a machine extend his patent to devices or mechanisms not described in the patent is well understood.”³⁴⁹
- “But the vice of a functional claim exists not only when a claim is ‘wholly’ functional, if that is ever true, but also when the inventor is painstaking when he recites what has already been seen, and then uses conveniently functional language at the exact point of novelty.”³⁵⁰

2. “Function of a Machine” in the Courts of Appeals

In addition to these pronouncements from the high Court, up to the mid-twentieth century the “function of a machine” test was regularly applied by the regional U.S. Courts of Appeals in patent infringement cases,³⁵¹ as well

³⁴⁵ Miller v. Eagle Mfg. Co., 151 U.S. 186, 201 (1894).

³⁴⁶ Risdon Iron & Locomotive Works v. Medart, 158 U.S. 68, 77 (1895) (citing Wyeth v. Stone, 30 F. Cas. 723 (C.C.D. Mass. 1840)).

³⁴⁷ Boyden Power-Brake Co. v. Westinghouse, 170 U.S. 537, 554 (1898).

³⁴⁸ Expanded Metal Co. v. Bradford, 214 U.S. 366, 383 (1909).

³⁴⁹ Holland Furniture Co. v. Perkins Glue Co., 277 U.S. 245, 257 (1928).

³⁵⁰ Gen. Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 371 (1938). In General Electric, the court also notes:

A limited use of terms of effect or result, which accurately define the essential qualities of a product to one skilled in the art, may in some instances be permissible and even desirable, but a characteristic essential to novelty may not be distinguished from the old art solely by its tendency to remedy the problems in the art met by the patent.

Id.

³⁵¹ See, e.g., Trico Prods. Corp. v. Apco-Mosberg Corp., 45 F.2d 594, 598 (1st Cir. 1930) (“A function or mode of operation is not patentable.”); Buffalo Forge Co. v. City of Buffalo, 255 F. 83, 86 (2d Cir. 1918) (“It is and always was true that the mere function or effect of

as by the Court of Appeals for the District of Columbia when that court had the jurisdiction over appeals by dissatisfied patent applicants,³⁵² and by the Court of Customs and Patent Appeals after it acquired the latter jurisdiction in 1929.³⁵³

the operation of a machine is not patentable.”); *Demco, Inc. v. Doughnut Machine Corp.*, 62 F.2d 23, 25 (4th Cir. 1932) (“[I]t is elementary that the mere function of a machine is not patentable.”); *Black-Clawson Co. v. Centrifugal Eng’g & Patents Corp.*, 83 F.2d 116, 119 (6th Cir. 1936) (“It is now well settled that operations . . . which are only the peculiar functions of the respective machines which are constructed to perform them, do not constitute processes which are patentable in the United States.”) (citing *Corning v. Burden*, 56 U.S. 252, 267 (1853) and *Risdon*, 158 U.S. 68); *Thordarson Elec. Mfg. Co. v. General Transformer Corp.*, 93 F.2d 36, 37 (7th Cir. 1937) (“[I]t is well settled that one cannot have a patent for the function or effect but only for the machine which produces the same”); *Freeman v. Altwater*, 138 F.2d 854, 859 (8th Cir. 1943) (“the operation of a device covered by [a] . . . patent is not patentable as a process”); *U.S. Consol. Seeded Raisin Co. v. Selma Fruit Co.*, 195 F. 264, 270 (9th Cir. 1912) (“[T]he fact that the applicant claimed the apparatus as an invention prior to making the claim for a process is sufficient itself to eliminate the function or operation of that apparatus from the claim of invention for the process.”) (citing *Corning v. Burden*, 56 U.S. 252); *see also San Jose Canning Co. v. Oneal*, 10 F.2d 100, 101 (9th Cir. 1926).

³⁵² *See, e.g., In re Tallmadge*, 37 App. D.C. 590, 593 (D.C. Cir. 1911) (“[W]here the process is simply the function or operative effect of a machine, it is not an invention, but at most the result of one.”) (citing *Corning*, 56 U.S. 252, and *Boyden Power Brake Co. v. Westinghouse*, 170 U.S. 537 (1898)); *In re Weston*, 17 App. D.C. 431, 442 (1901) (“[A] process, which amounts to no more than the mere function of a machine, is not patentable.”).

³⁵³ *See, e.g., In re Gartner*, 223 F.2d 502, 504 (C.C.P.A. 1955); *In re Horvath*, 211 F.2d 604, 607, 608 (C.C.P.A. 1954) (“[W]e recognize the well settled law that process or method claims merely claiming the function of the apparatus are not allowable,” and that “mere alternatives in parts of a device which do not materially change its essential character cannot overcome the rejection.”); *In re Washburn*, 182 F.2d 202, 205 (C.C.P.A. 1950) (“The court has repeatedly held that process or method claims which merely recite the function of an apparatus are not allowable.”); *In re Kinderman*, 178 F.2d 937, 940 (C.C.P.A. 1949) (“[A] process which cannot be described otherwise than by describing the characteristic function of a machine is not validated by showing it may be carried on *by another machine which has the same characteristic function in respect to the precise result to be attained.*” (citing *Black-Clawson Co. v. Centrifugal Engineering & Patents Corp.*, 83 F.2d 116, 120 (6th Cir. 1936)) (quotation marks omitted); *In re Ashbaugh*, 173 F.2d 273, 274 (C.C.P.A. 1949) (“[C]laims which recite the mere function of an apparatus have been consistently rejected by the tribunals of the Patent Office, which rejections have been affirmed by this court.”); *In re Middleton*, 167 F.2d 1012, 1013 (C.C.P.A. 1948) (“It is well settled that a process which is the mere function of an apparatus is not patentable, and that a process which cannot be carried out apart from a particular apparatus is the mere function of that apparatus.”) (citing *In re Weston*, 17 App. D.C. 431 (D.C. Cir. 1901); *In re Ernst*, 71 F.2d 169 (C.C.P.A. 1934); *In re Wadman*, 94 F.2d 993 (C.C.P.A. 1938)); *In re Nichols*, 171 F.2d 300, 302, 303 (C.C.P.A. 1948) (“[A]

These court of appeals decisions articulate and apply rules for which one could just as readily cite the modern Federal Circuit decisions. *Electric Power Group* and *Internet Patents*, for example, would support the Sixth Circuit's condemnation of results-oriented claims in *Heidbrink v. McKesson*.³⁵⁴

[The claims] are invalid because functional. They are apparently most deliberately and skillfully drafted prior to cover any means which any one ever may discover of producing the result; that is, to accomplish the one thing while avoiding the other. We think they are clearly to be condemned under the rule stated in *O'Reilly v. Morse* [and] *Risdon v. Medart*.³⁵⁵

So, too, the Seventh Circuit's statement that "[a] patent is not good for an effect or the result of a certain process, as that would prohibit all other persons from making the same thing by any means whatsoever"³⁵⁶—or the First Circuit's ruling that "[i]t is for the discovery or invention of some practicable method or means of producing a beneficial result or effect that a patent is granted, and not for the result or effect itself."³⁵⁷

process claim which merely states the function or effect of a machine must be held to be unpatentable under the long established rule of this and other courts," including where a "substitution [of means] . . . does not change the essential character of the disclosed apparatus."); *In re Cornell*, 150 F.2d 569, 571 (C.C.P.A. 1945) ("[I]f the process be nothing more than the function of some particular mechanism, it is not a patentable process.") (citing *In re McCurdy*, 76 F.2d 400 (C.C.P.A. 1935); *In re Oakley*, 73 F.2d 934 (C.C.P.A. 1934); *In re Freeman*, 108 F.2d 244 (C.C.P.A. 1939)); *In re Mead*, 127 F.2d 302, 304 (C.C.P.A. 1942); *In re Wadman*, 94 F.2d 993, 998 (C.C.P.A. 1938) ("[A claim is invalid if it] sets forth nothing more than a function of a machine."); *In re Lindberg*, 79 F.2d 903, 904 (C.C.P.A. 1935) ("[P]rocess claims [that] merely recite the function of the machine [are] improper."); *In re Parker*, 79 F.2d 908, 910 (C.C.P.A. 1935); *In re Ernst*, 71 F.2d 169, 171 (C.C.P.A. 1934); *In re Weeks*, 48 F.2d 662, 664 (C.C.P.A. 1931); *In re Watson*, 44 F.2d 868, 870 (C.C.P.A. 1930) ("Where a process is simply the function or operative effect of a machine, it is not an invention, but at most, the result of one.") (citing *In re Moulton*, 40 App. D.C. 160 (D.C. 1913); *In re Tallmadge*, 37 App. D.C. 590 (D.C. Cir. 1911); *Westinghouse v. Boyden Power-Break Co.*, 170 U.S. 537 (1898); *Risdon Iron & Locomotive Works v. Medart*, 158 U.S. 68 (1895); *Carnegie Steel Co. v. Cambria Iron Co.*, 185 U.S. 403 (1902); *Corning v. Burden*, 56 U.S. 252 (1853); *In re White*, 31 App. D.C. 607 (D.C. Cir. 1908)).

³⁵⁴ 290 F. 665, 668–69 (6th Cir. 1923).

³⁵⁵ *Id.* at 668 (citations omitted).

³⁵⁶ *Cont'l Can Co. v. Cameron Can Mach. Co.*, 76 F.2d 173, 176 (7th Cir. 1935) (citing *Miller v. Eagle Mfg. Co.*, 151 U.S. 186 (1894)); see also *id.* ("Claims 8 and 9 are . . . invalid because they define merely the function or result of the machine. Claim 8, if valid, would preclude every one except appellant from producing round cans by breaking the grain of metal blanks from which they are formed.").

³⁵⁷ *Trico Prods. Corp. v. Apco-Mosberg Corp.*, 45 F.2d 594, 598 (1st Cir. 1930); see also *id.* ("It is only when the term 'process' is used to represent the means or method of producing a result that it is patentable."); *Bauer Bros. Co. v. Bogalusa Paper Co.*, 96 F.2d 991, 995 (5th

And the Federal Circuit's *ChargePoint* and *Chamberlain Group* decisions are consonant with the approach to patent eligibility that was applied in cases such as the Sixth Circuit's influential decision in *Black-Clawson Co. v. Centrifugal Eng'g & Patents Corp.*³⁵⁸ That case involved claims to the use of a centrifugal separator to remove impurities from paper pulp. The patent noted that the prior art employed sand traps and mesh strainers to remove impurities from pulp but that these were unsatisfactory because the sand did not remove all of the heavier impurities and the strainer tended to clog.³⁵⁹ The claimed invention, shown in cross section and from above in figures 1 and 2 below, directs paper pulp into the centrifugal separator via center tube 7, where it is rotated in the drum by vanes 9; propelled by centrifugal force, the heavier impurities remain at the side 3, lighter particles are held back by the ring 11, and the cleansed paper pulp is pushed over the edge 10, from where it is caught in the stationary receiver 12.³⁶⁰

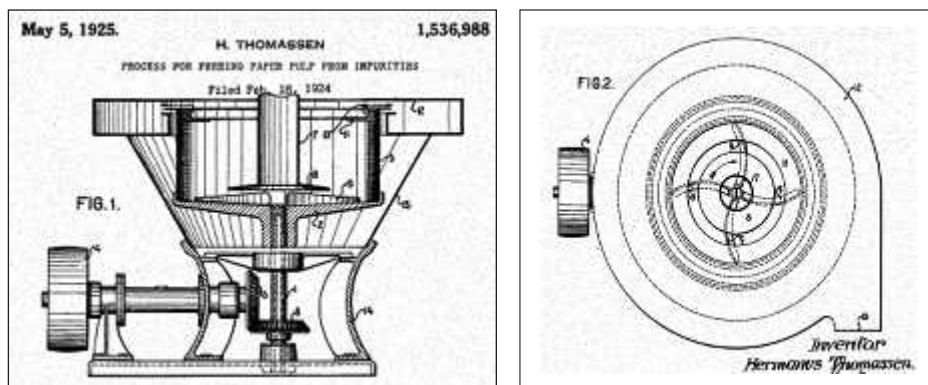


Figure 6: Centrifugal Separator for Removing Impurities from Paper Pulp.³⁶¹

This process may have been a substantial improvement over prior art methods, but as the Sixth Circuit noted, “[c]entrifugal separators were old in the arts. They are described in many patents as designed to separate heavy and light impurities from a variety of materials other than paper pulp.”³⁶² The court invoked the “well settled [principle] that operations . . . which are only the

Cir. 1938) (“[I]t is well settled that a man cannot have a patent for the function or abstract effect of the machine, but only for the machine which produces it.”); *In re Tallmadge*, 37 App. D.C. 590, 594 (D.C. Cir. 1911) (“[The applicant’s] machine patent would not, of course, prevent others from reaching the same result in an entirely different way, but the granting of his . . . [process] application would.”).

³⁵⁸ 83 F.2d 116 (6th Cir. 1936).

³⁵⁹ See U.S. Patent No. 1,536,988 col. 1 ll. 9–33.

³⁶⁰ See *id.* at col. 1 ll. 74–97.

³⁶¹ See *id.* at col. 1 ll. 66–69, col. 2 ll. 23–28.

³⁶² *Black-Clawson Co.*, 83 F.2d at 118.

peculiar functions of the respective machines which are constructed to perform them, do not constitute processes which are patentable in the United States.”³⁶³ The patent owner in *Black-Clawson* argued that its claimed process was patentable because it required the centrifugal separator to be operated at a particular speed in order to achieve the desired result for wood pulp. The Sixth Circuit disagreed, finding that such a limitation still amounted to no more than claiming the “characteristic function of [the] . . . machine” in this particular context;³⁶⁴ the court noted that “[o]ne might make a similar observation in respect to any machine. A machine is designed to accomplish a certain result when operated at a certain speed.”³⁶⁵ The court concluded that “if all of the acts constituting the process . . . are merely the results of following the operation of a machine,” or another device “employing the [same] characteristic principle,” then “the validity of the process claims cannot be upheld.”³⁶⁶

Other cases of this era similarly inquired whether a process that is claimed in a particular technological context or field of use is directed to the “characteristic function” of a machine.³⁶⁷ And when patentees sought to overcome the “function of a machine” rule by relying on other devices or components, courts asked whether those substitutes were “mere alternatives in parts of a device which do not materially change its essential character,”³⁶⁸ or whether “[t]he alternative apparatus is . . . no more than the obvious equivalent of . . . [an] apparatus” that “will inherently carry out the [claimed] steps.”³⁶⁹

The same “function of a machine” rule supports the reasoning of decisions such as *Chamberlain Group* and *ChargePoint*. Relying on wireless transmitters to operate a garage door may avoid the expense and vulnerabilities associated with physical signal paths,³⁷⁰ and the use of network communications doubtless improves the management of electric vehicles, but these claimed inventions amount to no more than employing the “characteristic functions” of wireless and network communication in these particular fields and contexts.

³⁶³ *Id.* at 119 (citing *Corning v. Burden*, 56 U.S. 252, and *Risdon Iron & Locomotive Works v. Medart*, 158 U.S. 68 (1895)).

³⁶⁴ *Id.* at 120.

³⁶⁵ *Id.*

³⁶⁶ *Id.*

³⁶⁷ See *Detroit Gasket & Mfg. Co. v. Fitzgerald Mfg. Co.*, 89 F.2d 178, 183 (2d Cir. 1937); see also *Miller v. Zaharias*, 168 F.2d 1, 2 (7th Cir. 1948) (holding that a patent is invalid as functional when the “prescribed operations of the purported method are obviously inherent in the elements of the patented device as the peculiar and characteristic functions thereof”).

³⁶⁸ *In re Horvath*, 211 F.2d 604, 608 (C.C.P.A. 1954).

³⁶⁹ *In re Washburn*, 182 F.2d 202, 205 (C.C.P.A. 1950).

³⁷⁰ See *Chamberlain Gp., Inc. v. Techtronic Indus. Co.*, 935 F.3d 1341, 1346 (Fed. Cir. 2019).

3. *End of the Line: The CCPA and Tarczy-Hornoch*

The “function of a machine” doctrine met its sudden demise at the hands of the Court of Customs and Patent Appeals (“CCPA”) in 1968. *In re Tarczy-Hornoch*³⁷¹ determined that the rule was a mere “legacy of the 19th century controversy over the patentability of processes,”³⁷² that it was an “illogical distinction unwarranted by, and at odds with, the basic purposes of the patent system,” and that it was “productive of a range of undesirable results.”³⁷³ The court overruled its precedents applying the test.³⁷⁴

Tarczy-Hornoch’s disdain for the doctrine as it was applied at that time is not without some justification. The rule was enforced during the era when a patent’s term ran from its issuance, and thus the grant of separate patents to an inventor for patentably indistinct inventions could result in a substantial extension of patent term.³⁷⁵ The “function of a machine” test was most frequently applied as an obviousness-type double patenting limitation, to ensure that the inventor of a machine did not engage in such abuses by separately patenting its inherent functions.³⁷⁶ At some point, however, the CCPA

³⁷¹ 397 F.2d 856 (C.C.P.A. 1968).

³⁷² *Id.* at 857.

³⁷³ *Id.* at 867 (describing the doctrine as “inconsistent with the broad goal of the patent systems, the promotion of the useful arts”).

³⁷⁴ *See id.* at 856–57.

³⁷⁵ *See, e.g., In re Basell Poliolefine Italia S.P.A.*, 547 F.3d 1371 (Fed. Cir. 2008) (rejecting attempt to obtain 34 noncontiguous years of patent protection).

³⁷⁶ *See Vapor Car Heating Co. v. Gold Car Heating & Lighting Co.*, 7 F.2d 284, 286 (2d Cir. 1925). In *Vapor Car Heating*, the court opined:

The patent in suit was applied for . . . one day before the issuance of the apparatus patent. . . , and therefore, if . . . the method patent merely provides for the method or function of the apparatus patent, it prolongs the patent monopoly granted on the vapor system for at least four years.

Id.; *see also* *Smith Eng’g Works v. Nordberg Mfg. Co.*, 68 F.2d 492, 494 (7th Cir. 1934) (“[T]he mere function or effect of the operation of the machine cannot be the subject of a lawful patent” because “the monopoly represented by the machine patent measures the extent of the statutory monopoly lawfully obtainable.”); *In re Watson*, 44 F.2d 868, 870 (C.C.P.A. 1930) (“The law is well settled that one may not claim a patent or monopoly of a process of what inherently happens in a normal and intended operation of a device which has already been the subject of a patent.”). Courts also applied the “function of a machine” test to ensure that a separate patent for the “function” did result in harassment of those who had already licensed the patent for the machine. *See Detroit Gasket & Mfg. Co. v. Fitzgerald Mfg. Co.*, 89 F.2d 178, 183 (2d Cir. 1937). In that case, the court opined:

It has been shown that the so-called method of the above claim is but the result of operating a machine for which [a patent was already granted to the same inventor]. Regardless of any other possible defects, this claim is invalid because a user of the

lost sight of these purposes and began applying the doctrine against different claims within the *same* patent³⁷⁷—a practice that *Tarczy-Hornoch* rightly criticized.³⁷⁸ In addition, the courts that heard appeals from patent applicants tended to reduce the doctrine to an odd focus on whether the claimed process could also be performed by hand.³⁷⁹ It is easy to see why the doctrine may have been unpopular with the patent bar of the era.

Nevertheless, lower courts generally lack the authority to overrule decisions of the U.S. Supreme Court. *Tarczy-Hornoch* was the subject of a vigorous dissent, which accused “the majority [of] overrul[ing] a line of decisions . . . affirming and applying a rule which is about as solidly established as any rule of the patent law.”³⁸⁰ But *Tarczy-Hornoch* stuck,³⁸¹ and within a few years functional claims began to be permitted in the patent system.³⁸² In effect, the “function of a machine” test was the first casualty of the late CCPA’s campaign to rewrite patent eligibility rules. For almost half a century, the doctrine was defunct and largely forgotten—but today it reigns again through decisions such as *Electric Power Group* and *ChargePoint*.

D. Finally, a Rule Based on Preemption—But Should It Be an Eligibility Rule?

Even the critics of the “function of a machine” test would have to acknowledge that it has the virtue of providing a scenario that makes sense of the Supreme Court’s insistence on grounding eligibility limits in a “concern [about] . . . preemption.”³⁸³ As *O’Reilly* and lower-court decisions persuasively explain,³⁸⁴ if a patent could claim a result rather than the means for accom-

patented machine lawfully so doing under [the first patent] . . . would inevitably practice the so-called method of claim 4.

Id.

³⁷⁷ See, e.g., *In re Mead*, 127 F.2d 302, 304 (C.C.P.A. 1942); *In re Lindberg*, 79 F.2d 903, 904–05 (C.C.P.A. 1935).

³⁷⁸ See *In re Tarczy-Hornoch*, 397 F.2d 856, 857 (1968) (questioning why “a process claim, otherwise patentable, should be rejected because the application, of which it is a part, discloses an apparatus that will *inherently* carry out the recited steps”).

³⁷⁹ See, e.g., *In re Weston*, 17 App. D.C. 431, 442 (D.C. Cir. 1901); *In re Washburn*, 182 F.2d 202, 205 (C.C.P.A. 1950).

³⁸⁰ *Tarczy-Hornoch*, 397 F.2d at 868 (Kirkpatrick, J., dissenting); see also *id.* at 869 (“[T]here has been no showing that the practical working of the rule has been other than entirely satisfactory.”).

³⁸¹ See *In re Ghiron*, 442 F.2d 985, 987–88 (C.C.P.A. 1971) (noting the overruling of the “function of the machine” precedents).

³⁸² See, e.g., *In re Sherwood*, 613 F.2d 809, 810 (C.C.P.A. 1980).

³⁸³ *Alice Corp. v. CLS Bank Int’l*, 573 U.S. 2018, 216 (2014).

³⁸⁴ See *supra* notes 354–357 and accompanying text.

plishing it, the patent would preempt later inventors who develop other and better means for achieving the same result. A different kind of preemption concern animates the rule against claiming the characteristic functions of a prior-art device: such a patent would unfairly preempt *the inventor* of the device, who should be free to apply the routine use of his or her own invention in different fields and contexts—and should be the only party who may compel others to take a license for doing so.

As to whether the “function of a machine” test *should* be grounded in § 101, rather than in § 112 or § 103, the short answer, from the practitioner’s perspective, is that the courts have already decided that it is an eligibility rule. *ChargePoint* notes that the Supreme Court has treated *O’Reilly* as a § 101 decision,³⁸⁵ and even the CCPA in *Tarczy-Hornoch* acknowledged that the “function of a machine” cases “clearly regarded the question as whether the processes at bar were within the statutory classes of invention.”³⁸⁶ In other words, the test derives from the Patent Act’s restriction of eligible subject matter to a “process, machine, manufacture, or composition of matter.”³⁸⁷ Things such as results, effects, and fields of use are not within any of these categories. As *Corning v. Burden* announced over a century and a half ago, although “the term process is often used in a more vague sense,” in which it “represents the function of a machine or the effect produced by it,” it is only when the term “is used to represent the means or method of producing a result that it is patentable.”³⁸⁸

Treating the bar on patenting results or fields of use as an eligibility question also appears to make sense as a matter of legal administration. Whether the claims of a patent fail to recite any means or steps for achieving a claimed result (as opposed to whether claimed means are enabled) is a categorical determination—it is a conclusion that what has been claimed does not amount to a “process” as that term is used in patent law. It is the type of question that generally does not depend on extrinsic evidence or expert testimony, but rather is a question of claim interpretation that can be decided as a matter of law by a judge. So, too, the field-of-use determinations made in cases such as *Chamberlain Group* and *ChargePoint*. The fact that claims recite only the routine or characteristic functions of a pre-existing technology usually is conceded or at least clear in these cases. The critical determination is

³⁸⁵ See *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 769 n.5 (Fed. Cir. 2019).

³⁸⁶ *In re Tarczy-Hornoch*, 397 F.2d 856, 867 (C.C.P.A. 1968).

³⁸⁷ 35 U.S.C. § 101 (2018).

³⁸⁸ *Corning v. Burden*, 56 U.S. 252, 268 (1853); see also *In re Tallmadge*, 37 App. D.C. 590, 593 (D.C. Cir. 1911) (“[A] function or operative effect . . . is not an invention, but at most the result of one.”).

whether the recited context or field of use is the type of limitation that can confer patentability—again, a categorical and legal judgment.

Indeed, in many of the field-of-use cases, such a limitation itself is clearly ineligible subject matter. *ChargePoint's* “demand response” is an economic concept, and *Ameranth's* handheld computers were used to conduct the business of running a restaurant. It would be strange to require the patentability analysis in such a case to be conducted as an obviousness analysis. Patent examiners do not maintain files of or develop expertise in economic concepts and other ineligible subject matter, and in any event, even a specific, novel, and nonobvious version of such subject matter is still ineligible subject matter. Because of the types of questions that are being resolved in the “function of a machine” cases, it seems best to conduct the analysis under § 101’s legal framework rather than to treat it as a factual question under § 103 or § 112.³⁸⁹

IV. How the Three Categories of Abstract Ideas Are Applied to Particular Types of Subject Matter

Some of the recent controversies and disagreements in patent law can be explained as the courts effectively assigning or reassigning different classes of inventions to the three categories of abstract ideas—or applying the different categories to the same type of subject matter. The final section of this article explores some of these developments.

A. From *Flook* to *Diehr*: Moving Mathematical Equations from Category 2 (Inherently Ineligible) to Category 1 (Eligible if Claimed in a Practical Application)

The U.S. Supreme Court’s decisions in *Gottschalk v. Benson*³⁹⁰ and *Parker v. Flook*³⁹¹ effectively assigned mathematical equations to the category of inherently ineligible subject matter.³⁹² *Flook* held that “an improved method of calculation, even when tied to a specific end use, is unpatentable subject matter under § 101”³⁹³ and thus a mathematical formula “cannot support a patent unless there is some other inventive concept in its application.”³⁹⁴ *Flook* treated mathematical equations the same way that current law treats business

³⁸⁹ See *Senate Hearing I* (statement of Professor Paul R. Gugliuzza, Boston University School of Law) (arguing that eligibility law is a more efficient means for addressing particular validity problems).

³⁹⁰ 409 U.S. 63 (1972).

³⁹¹ 437 U.S. 584 (1978).

³⁹² *Id.* at 594.

³⁹³ *Id.* at 595 n.18.

³⁹⁴ *Id.* at 594.

methods—as ineligible per se, even when claimed for a practical application in a novel and nonobvious form.

Had *Flook* remained the law, computer programs, all of which operate via mathematical equations, would be ineligible subject matter. That is how the Patent Office understood and applied *Flook* when it was decided. It reasoned that “because the data involved in . . . [a software] invention are stored and manipulated in a computer necessarily in some mathematical form,” such a process “must be considered an *algorithm*, ‘a procedure for solving a mathematical problem within the meaning . . . of *Benson* and *Flook*, *supra*.’”³⁹⁵

Flook also posed the challenge that mathematical equations are not so much a type of subject matter as a means for communicating and describing other natural relationships and phenomena—and often provide the most precise way of doing so. As the CCPA noted, “*all* machines function according to laws of physics which can be mathematically set forth if known.”³⁹⁶ An eligibility prohibition on ‘using math’ would effectively “penalize the inventor who . . . discover[s] new and unobvious mathematical relationships which he then utilizes in a machine, as against the inventor who makes the *same machine* by trial and error and does not disclose the laws by which it operates.”³⁹⁷

Just three years after *Flook* was decided, it was effectively overruled by *Diamond v. Diehr*.³⁹⁸ That decision reassigned mathematical equations and the phenomena that they recite to the first category of abstract ideas, making them subject matter that can be claimed in a practical application. *Diehr* held that “an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”³⁹⁹

The *Diehr* majority was not forthcoming in its treatment of *Flook*, purporting to merely interpret and apply that decision.⁴⁰⁰ There is no mistaking, however, that *Flook* held that a practical application of a mathematical formula is *not* sufficient to confer patent eligibility, while *Diehr* held that such

³⁹⁵ *In re Phillips*, 608 F.2d 879, 881 (C.C.P.A. 1979) (quotation marks omitted); *see also In re Benson*, 441 F.2d 682, 687 (C.C.P.A. 1971) (noting the Patent Office’s view that “a programmable computer is merely a tool of the mind and the method is basically mental in character, . . . because the workstuff of the method is numbers which are mathematical abstractions”).

³⁹⁶ *In re Bernhart*, 417 F.2d 1395, 1399 (C.C.P.A. 1969) (emphasis added).

³⁹⁷ *Id.* at 1399–1400.

³⁹⁸ 450 U.S. 175 (1981).

³⁹⁹ *Id.* at 187.

⁴⁰⁰ *See id.* at 191–92 n.14. Justice Rehnquist, who wrote the opinion for the Court in *Diehr*, may have avoided a direct confrontation with *Flook* because his 5–4 majority included Justices White and Powell, who both had also joined the opinion for the Court in *Flook*. *See id.*; *see also Parker v. Flook*, 437 U.S. 584 (1978).

an application *is* sufficient to create eligibility.⁴⁰¹ It is thus somewhat jarring to see recent Supreme Court decisions discuss and rely on both *Flook* and *Diehr* as relevant § 101 authority⁴⁰²—as if the Patent Office and lower courts are supposed to be able to follow both decisions simultaneously. *Diehr*'s core holding, however, has prevailed over *Flook* and remains the law: mathematical equations and the phenomenon that they describe can be claimed in a practical application.⁴⁰³

B. Laws of Nature, Natural Phenomena . . . and Medical-Diagnostic Methods

All laws of nature and natural phenomena are assigned to the first category of abstract ideas and can be claimed in a practical application of the underlying science, except for medical-diagnostic methods. The general test was recently articulated by the Federal Circuit in *Illumina, Inc. v. Ariosa Diagnostics, Inc.*,⁴⁰⁴ which noted that “[l]aws of nature and natural phenomena are not patentable, but applications and uses of such laws and phenomena may be patentable.”⁴⁰⁵ As a result, “[a] claim to otherwise statutory subject matter does not become ineligible by its use of a law of nature or natural phenomenon.”⁴⁰⁶ This is a textbook statement of American law as it has been applied for over a century and a half to allow the patenting of practical applications of scientific principles. It is the rule that was first announced in *Le Roy v. Tatham*,⁴⁰⁷ and that was employed in *McClurg v. Kingsland*⁴⁰⁸ to allow

⁴⁰¹ Justice Stevens, who wrote the majority opinion in *Flook*, was not to be fooled. Dissenting in *Diehr*, he noted that *Flook* “made it clear that an improved method of calculation, even when employed as part of a physical process, is not patentable subject matter under § 101.” *Diehr*, 450 U.S. at 204 (Stevens, J., dissenting). Justice Stevens further noted that *Diehr*'s ruling “trivializes the holding of *Flook*” and that “[c]ommentators . . . have noted the essential similarity of the . . . inventions [in *Flook* and *Diehr*].” *Id.* at 205, 209 n.31; see also *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 927 F.3d 1333, 1344–46 (Fed. Cir. 2019) (Chen, J., concurring in denial of rehearing) (discussing *Diehr*'s departure from *Flook*).

⁴⁰² See, e.g., *Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc.*, 566 U.S. 66, 80–82 (2012).

⁴⁰³ See, e.g., *Thales Visionix Inc. v. United States*, 850 F.3d 1343, 1347–49 (Fed. Cir. 2017) (applying *Diehr*).

⁴⁰⁴ 952 F.3d 1367 (Fed. Cir. 2020).

⁴⁰⁵ *Id.* at 1371.

⁴⁰⁶ *Id.*

⁴⁰⁷ 55 U.S. 156 (1852).

⁴⁰⁸ 42 U.S. 202 (1843); see also *Burr v. Duryee*, 68 U.S. 531, 569 (1863); *supra* notes 46–54 and accompanying text.

fluid dynamics to be used to cast a better iron roll, in *Eibel Process*⁴⁰⁹ to apply gravity to overcome the rippling of pulp stock, and that was reaffirmed by *Diehr*'s holding that “an *application* of a law of nature . . . may well be deserving of patent protection.”⁴¹⁰

This rule applies to all scientific principles, in all contexts—except when a law of nature is used to diagnose a disease or other medical condition. As Judge Stoll noted in her dissent in *Athena Diagnostics, Inc. v. Mayo Collaborative Services, LLC*,⁴¹¹ the Court has “established a bright line rule of ineligibility for all diagnostic claims.”⁴¹² Diagnostic methods have effectively been assigned to the second category of inherently abstract ideas—they are treated by the law the same way as a novel card game or a new way of targeting advertising on the internet.

The Federal Circuit has felt compelled to adopt this approach in view of the Supreme Court's decision in *Mayo Collaborative Services v. Prometheus Laboratories, Inc.*⁴¹³ That case held ineligible the claims to a method of determining the appropriate dose of a drug to treat an autoimmune disease on the basis of measurements of the levels of metabolites in the patient's blood.⁴¹⁴ The Supreme Court acknowledged that “all inventions can be reduced to [the] underlying principles of nature” which control their operation,⁴¹⁵ but nevertheless concluded that the natural relationship between metabolite levels and a drug's toxicity could not be applied to regulate the dosing of the drug.

A House Judiciary Committee report noted that “[i]t is not entirely clear why the [*Mayo*] Court concluded that the discovery of a means of determining the amount of a drug that will cure—rather than kill—the patient is an invention inherently unworthy of a patent.”⁴¹⁶ Prometheus's invention clearly was a practical application of a law of nature. The answer to the committee's question is comprehensively provided in a series of articles and briefs written by Professors Jeffrey Lefstin and Peter Menell.⁴¹⁷

⁴⁰⁹ 261 U.S. 45 (1923).

⁴¹⁰ *Diamond v. Diehr*, 450 U.S. 175, 187 (1981).

⁴¹¹ 927 F.3d 1333 (2019).

⁴¹² *Id.* at 1370 (Stoll, J, dissenting from the denial of rehearing en banc); *see also id.* at 1363 (Moore, J, dissenting from denial of rehearing en banc) (“Since *Mayo*, every diagnostic claim to come before this court has been held ineligible.”).

⁴¹³ 566 U.S. 66 (2012).

⁴¹⁴ *See id.* at 73–74.

⁴¹⁵ *Id.* at 90.

⁴¹⁶ H.R. REP. 114–235, at 47, n.91 (2015).

⁴¹⁷ *See Inventive Application*, *supra* note 37, at 581; Brief of Professors Lefstin and Menell as Amici Curiae in Support of Petition for a Writ of Certiorari, *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, No. 19–430 (2019); Jeffrey A. Lefstin, *The Three Faces*

In summary, *Mayo*'s reasoning has its origins in the Supreme Court's 1948 decision in *Funk Brothers Seed Co. v. Kalo Inoculant Co.*,⁴¹⁸ which a "small but significant lines of cases in the 1950s and 1960s carried forward . . . to *Flook*, which in turn became the foundation of *Mayo*."⁴¹⁹ The *Funk Bros.* invention involved the use of bacteria to promote nitrogen fixation by plants such as soy beans and alfalfa. The prior art understood that different plants needed different bacteria, and that the different bacteria inhibited each other's work, and thus a different bacterium needed to be produced and used for each plant.⁴²⁰ The inventor discovered that some bacteria did *not* inhibit each other and therefore a combination of bacteria could be developed that would work for multiple plants.⁴²¹

Funk Bros. acknowledged the inventor's "[d]iscovery of the fact that certain strains of each species of these bacteria can be mixed without harmful effect," and noted that the claimed invention was "an application of that newly-discovered natural principle."⁴²² But *Funk* then held that the nonobvious inventiveness that is required to sustain a patent cannot be "borrowed . . . from the discovery of the natural principle itself."⁴²³ It concluded that the scientific discovery must be treated as if it was already known, and that once the Court so assumed, "the production of a mixed inoculant [became] a simple step" that "certainly was not the product of invention."⁴²⁴

As Professor Lefstin's article exhaustively documents, *Funk Bros.*'s rule—that a practical application of a novel scientific discovery alone cannot sustain a patent—is contrary to every Supreme Court decision, court of appeals decision, and patent law treatise from the 19th and early 20th centuries.⁴²⁵ It is contrary to *Burr v. Duryee*'s gloss on *McClurg v. Kingsland* and those "inventions which consist in a new application of certain natural forces to produce a certain result,"⁴²⁶ but which "require[] no skill or invention to devise a plan for the application of the principle."⁴²⁷ It would have required invalidation

of *Prometheus: A Post-Alice Jurisprudence of Abstractions*, 16 N.C.J.L. & TECH. 647 (2015); *Senate Hearing I* (statement of Professor Lefstin).

⁴¹⁸ 333 U.S. 127 (1948).

⁴¹⁹ *Inventive Application*, *supra* note 37, at 623–24, 640–44.

⁴²⁰ *See id.* at 624.

⁴²¹ *See id.*; *see also Funk Bros.*, 333 U.S. at 131 (noting the advantage of the invention that "[t]he farmer need not buy six different packages for six different crops" and can instead "buy one package and use it for any or all of his crops of leguminous plants.").

⁴²² *Funk Bros.*, 333 U.S. at 131.

⁴²³ *Id.* at 132.

⁴²⁴ *Id.*

⁴²⁵ *See Inventive Application*, *supra* note 37, at 609.

⁴²⁶ *Burr v. Duryee*, 68 U.S. 531, 568 (1863).

⁴²⁷ *Id.* at 568–69.

of the patent to William Eibel, whose use of the law of gravity could not have qualified as “invention” if his discovery of the natural phenomenon that caused pulp stock to wave and ripple were assumed to be known.⁴²⁸ *Funk Bros.* does not reflect even a minority position—it is contrary to *everything* that came before it.

Funk Bros. reasoned that the “laws of nature” are “part of the storehouse of knowledge of all men,” and must remain “free to all . . . and reserved exclusively to none.”⁴²⁹ But with all due respect, *Funk Bros.* has it exactly backward. A scientific principle that has not been discovered and disclosed by someone is not “free to all men”—it is available to no one. The principles of three-axis control of flight have always been part of nature, but before the Wright brothers discovered and applied them, no one had access to controlled heavier-than-air flight. And before the antibiotic properties of penicillin were discovered, they were not part of anyone’s “storehouse of knowledge,” and people simply died of bacterial infections.

Mayo also found support for its ruling in *Neilson v. Harford*, the case that *O’Reilly* and *Risdon* applied to draw the distinction between claiming a principle in the abstract and claiming the means for applying it.⁴³⁰ *Mayo* suggests that *Neilson*’s nonobvious inventive contribution resided not in his discovery of the principle that injecting hot air better promotes ignition, but rather in his “unconventional steps” of using a “receptacle” that directs heated air into the furnace.⁴³¹ But as Professor Lefstin shows, such a “receptacle” was acknowledged at the time to be known in the prior art.⁴³² Indeed, this point should hardly require documentary proof. As benighted and primitive as the nineteenth century may seem from our twenty-first century perspective, it was not the Stone Age. It was an era that knew the stove, and even the steamboat—a “receptacle for heating air” was not an invention.

The only legal expert who defended *Mayo* and *Funk Bros.* at the June 2019 Senate hearings was Professor Joshua Sarnoff. His arguments against patents that exploit scientific discoveries can be grouped as follows: patents are unnecessary to promote innovation; *Funk Bros.* and “international law” preclude them; and such patents are “religiously sinful against God . . . by making property of and trafficking in the sacred world of nature given by God to all

⁴²⁸ See *supra* note 66 and accompanying text.

⁴²⁹ *Funk Bros.*, 333 U.S. at 130.

⁴³⁰ See *infra* Part I(A).

⁴³¹ See *Mayo Collaborative Servs. v. Prometheus Lab’ys, Inc.*, 566 U.S. 66, 83–84 (2012).

⁴³² See *Inventive Application*, *supra* note 37, at 586; see also *Final Report of the Berkeley Center for Law & Technology Section 101 Workshop: Addressing Patent Eligibility Challenges*, 33 BERKELEY TECH. L.J. 551, 574 (2018).

for human benefit.”⁴³³ As Professor Sarnoff notes, “the medieval belief that ‘genius was a gift from God largely precluded an earlier development of the concept of intellectual property. For how could one seek to obtain commercial value from that which . . . [had] been granted by the grace of God.’”⁴³⁴

Whether or not Professor Sarnoff was being serious, the policy decision whether to have an intellectual property system in the United States was made long ago. The Constitution’s framers apparently believed in an enlightened deity who wanted humans to discover and enjoy the secrets of nature, rather than waiting for divine “gifts” while dying from cold, hunger, and disease. And as Professor Sarnoff acknowledges, *Funk Bros.* is irreconcilable with *Le Roy v. Tatham*, *Diamond v. Diehr*, and other decisions which “permit[] patents for practical applications” of scientific principles.⁴³⁵

It is unclear how this tension in the case law will be resolved. The Federal Circuit has limited *Mayo* to methods of diagnosis and thereby protected methods of medical treatment,⁴³⁶ but the line between the two is indistinct.⁴³⁷ *Mayo* itself involved a dosing determination—why is that a method of diagnosis rather than treatment? And more fundamentally, there is no principled distinction between applying a law of nature to diagnose a disease and applying such a law to provide a treatment for the disease. Before *Funk Bros.*, courts applied *Le Roy v. Tatham*’s practical application test to allow patents for diagnostic methods⁴³⁸ and in the years after *Funk Bros.*, courts applied that

⁴³³ *Senate Hearing I* (statement of Professor Sarnoff), at 7.

⁴³⁴ *Id.* at 7, note 1 (quoting EDWARD C. WALTERSCHEID, *THE NATURE OF THE INTELLECTUAL PROPERTY CLAUSE: A STUDY IN HISTORICAL PERSPECTIVE* 39 (2002)).

⁴³⁵ *Senate Hearing I*, at 23 n.75.

⁴³⁶ *See Vanda Pharms. Inc. v. West-Ward Pharms.*, 887 F.3d 1117, 1134 (Fed. Cir. 2018).

⁴³⁷ *See, e.g., INO Therapeutics LLC v. Praxair Distrib. Inc.*, 782 F.App’x 1001, 1005 (Fed. Cir. 2019) (concluding that adjusting treatment to exclude patients with a condition that renders the treatment dangerous is an ineligible method of diagnosis); *Natural Alts. Int’l, Inc. v. Creative Compounds, LLC*, 918 F.3d 1338, 1351 (Fed. Cir. 2019) (Reyna, J., dissenting from finding of eligibility); *see also Senate Hearing II* (statement of Hans Sauer, Ph.D., Deputy General Counsel and Vice President for Intellectual Property, Biotechnology Industry Organization), at 8 (“[I]n an extrapolation of *Mayo*, it is increasingly being argued that the relationship between dose and effect of a drug is, basically, a natural phenomenon or law of nature. But all methods of drug treatment, without exception, depend on the body’s reaction to the drug.”).

⁴³⁸ *See Dick v. Lederle Antitoxin Lab’ys*, 43 F.2d 628, 631 (S.D.N.Y. 1930) (upholding a patent for an invention that consisted of “determin[ing] what was the cause of scarlet fever,” despite the fact that once this was discovered, “the process[] could be devised” by “application of what was already known in the art”).

decision to invalidate pharmaceutical compositions.⁴³⁹ Some may criticize the Federal Circuit for refusing to rehear *Athena* en banc and cabin *Mayo*, but the fact that the Supreme Court requested the views of the Solicitor General in *Vanda* suggests that discretion may have been the better part of valor in that case. The last thing that the United States' biotechnology industry needs is another Supreme Court decision declaring that methods of medical diagnosis or treatment are ineligible for "using science."

In the meantime, *Mayo* continues to be applied to invalidate patents for valuable and important inventions. The Federal Circuit has held ineligible methods of diagnosing cardiovascular disease, identifying tuberculosis, and even a method for detecting Down's syndrome during pregnancy without the need for an invasive amniocentesis, which frequently resulted in miscarriages.⁴⁴⁰ Although these same inventions can still obtain patent protection in Europe and elsewhere,⁴⁴¹ the domestic market is always important to research laboratories and investors. The exclusion of diagnostics from patent protection is now sufficiently clear and entrenched that it is inevitably affecting investment and research decisions,⁴⁴² and likely jeopardizing U.S. preeminence in biotechnology—a field that was originally started in the United States.

⁴³⁹ See *Armour Pharm. Co. v. Richardson-Merrell, Inc.*, 396 F.2d 70, 75 (3rd Cir. 1968); see also *Senate Hearing I* (statement of Natalie Derzko on behalf of the Pharmaceutical Research and Manufacturers of America), at 12 (noting that "nearly all innovation in biopharmaceuticals can be said to relate to laws of nature and natural phenomena in some way").

⁴⁴⁰ See *Athena Diagnostics, Inc. v. Mayo Collaborative Servs., LLC*, 927 F.3d 1333, 1353 (Fed. Cir. 2019) (Moore, J., dissenting from denial of rehearing en banc) (discussing *Cleveland Clinic Found. v. True Health Diagnostics LLC*, 859 F.3d 1352, 1363 (Fed. Cir. 2017), *Roche Molecular Sys., Inc. v. CEPHEID*, 905 F.3d 1363, 1374 (Fed. Cir. 2018), and *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1378 (Fed. Cir. 2015)).

⁴⁴¹ See Timo Minssen & Robert M. Schwartz, *Separating Sheep from Goats: a European View on the Patent Eligibility of Biomedical Diagnostic Methods*, J. OF L. & THE BIOSCIENCES, 365–72 (2016) (noting that the EPO upheld essentially the same claims as were invalidated in *Mayo*, *Myriad*, and *Sequenom*).

⁴⁴² See *Senate Hearing II* (statement of Peter O'Neill, Executive Director of Cleveland Clinic Innovations), at 3 ("At Cleveland Clinic Innovations, we have an established process to assess inventions, based on their likelihood to be able to be developed into commercial products. Ability to get protectable intellectual property (usually in the form of a patent) is the first, and most influential factor in our assessment. If an invention can't get intellectual property protection, usually that is a fatal flaw and the invention is abandoned at that point."); *Senate Hearing I* (statement of Professor David O. Taylor) (describing survey results indicating the overwhelming importance of patent protection to institutional investors in life sciences industries); see also H.R. REP. 114–235, at 47 n.91 (2014) (noting the biotechnology industry's fear that *Mayo* would result in "the jurisprudential equivalent of the bombing of Dresden").

C. The Uncertain Status of the Mental Steps Doctrine

Some of the Federal Circuit's recent decisions cite the unpatentability of mental steps or processes as a background principle. *Electric Power Group*, for example, emphasizes the "implicit exclusion from § 101" of "mental processes,"⁴⁴³ while *Praxair Distribution*,⁴⁴⁴ a printed-matter case, states that "mental steps or processes are not patent eligible subject matter."⁴⁴⁵ These statements could be understood as simply expressing the rule that inventions directed to human thinking—that seek to generate or anticipate a human mental response—are ineligible subject matter. The Court has also held that "[m]ethods which can be performed entirely in the human mind are unpatentable."⁴⁴⁶

Viewed in this frame, the mental steps doctrine belongs to the second category of inherently ineligible subject matter. A process performed only in the human mind can only have a reaction or effect in that mind—it will not produce a useful technological result. As an early twentieth century treatise notes, purely mental processes generate "results [that] can be apprehended only through the intellect"—they are ineligible for the same reason as are other methods "that merely produce a desired state of mind," such as methods for "transacting business, methods of training animals, methods of solving problems, and rules for playing games."⁴⁴⁷

In the mid-twentieth century, however, the mental-steps doctrine was a distinct exception to eligibility that was *not* limited to inventions that were performed entirely in the human mind. Under this doctrine, any claimed method whose innovative step required a human being to make a decision

⁴⁴³ *Elec. Power Grp., LLC v. Alstom S.A.*, 830 F.3d 1350, 1355 (Fed. Cir. 2016).

⁴⁴⁴ 890 F.3d 1024 (Fed. Cir. 2018).

⁴⁴⁵ *Id.* at 1033; *see also* *Berkheimer v. HP Inc.*, 890 F.3d 1369, 1375 (Fed. Cir. 2018) (Lourie, J., concurring in the denial of rehearing en banc) ("Abstract ideas indeed should not be subject to patent. They are products of the mind, mental steps.").

⁴⁴⁶ *Genetic Techs. Ltd. v. Merial LLC*, 818 F.3d 1369, 1378 (Fed. Cir. 2016) (citing *CyberSource Corp. v. Retail Decisions, Inc.*, 654 F.3d 1366, 1373 (Fed. Cir. 2011) (citing *Gottschalk v. Benson*, 409 U.S. 63, 67 (C.C.P.A. 1972)); *see also* *Synposys, Inc. v. Mentor Graphics Corp.*, 839 F.3d 1138, 1149 (Fed. Cir. 2016) (holding ineligible claims that are so broad that they could be infringed by "an individual performing the claimed steps mentally or with pencil and paper").

⁴⁴⁷ *In re Yuan*, 188 F.2d 377, 381–82 (C.C.P.A. 1951) (quoting CHARLES W. RIVISE & A.D. CAESAR, *PATENTABILITY AND VALIDITY* 35 (1936)); *see also* *In re Sarkar*, 588 F.2d 1330, 1333 (C.C.P.A. 1978) ("Sets of steps occurring only in the mind have not been made subject to patenting because mental processes are but disembodied thoughts, whereas inventions which Congress is constitutionally empowered to make patentable are tangible embodiments of ideas in the useful, or technological, arts.").

or a calculation in response to observed data was deemed to be ineligible as directed to a mental process.

The principal authorities for the doctrine were the CCPA's decisions in *In re Abrams*⁴⁴⁸ and *In re Yuan*.⁴⁴⁹ *Abrams* involved a method of petroleum prospecting that consisted of drilling a number of bore holes, sealing them off, reducing the pressure in each hole with a vacuum pump to substantially below atmospheric pressure, and then measuring the rate at which the pressure rose again in each hole.⁴⁵⁰ Gas emanating from petroleum would affect the rate at which the pressure rises, and therefore by calculating and comparing such rates in the different boreholes, a prospector could identify the presence of oil.⁴⁵¹ The Patent Office rejected the claims on the basis that they were directed to the "mental process" of "calculating" and "comparing."⁴⁵² The CCPA agreed, applying the following rule:

If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the alleged novelty or advance over the art reside in one or more of the so-called mental steps, then the claim is considered unpatentable for the same reason that it would be if all the steps were purely mental in character.⁴⁵³

Yuan involved a method of determining the ideal shape of the leading edge of an airplane wing (*i.e.*, the airfoil profile) based on the pressure distribution between the leading and trailing edges of the wing.⁴⁵⁴ Prior art methods consisted of testing a known wing shape in wind tunnels and on an actual airplane until the optimal profile was discovered—a process that was "expensive and time-consuming."⁴⁵⁵ *Yuan's* innovation was a formula that converted pressure and velocity data into the ideal profile, without the need for the "cut and try procedure."⁴⁵⁶ The CCPA affirmed the Patent Office's eligibility rejection, concluding that "the heart of the claims" consisted of "purely mental steps dependent upon the mathematical formula."⁴⁵⁷

It is not entirely clear *why* this doctrine deemed the presence of a mental step in an otherwise technological process to be fatal to eligibility. *Abrams* and *Yuan* do not explain their reasoning, and a close review of the cases on

⁴⁴⁸ 188 F.2d 165 (C.C.P.A. 1951).

⁴⁴⁹ 188 F.2d at 377.

⁴⁵⁰ See *Abrams*, 188 F.2d at 165.

⁴⁵¹ See *id.*

⁴⁵² *Id.* at 167.

⁴⁵³ *Id.* at 167, 170; see also *id.* at 166, 170 (holding that the claims would be ineligible under this rule).

⁴⁵⁴ See *Yuan*, 188 F.2d at 378, 379.

⁴⁵⁵ *Id.* at 379.

⁴⁵⁶ *Id.* (quotation marks omitted).

⁴⁵⁷ *Id.* at 380; see also *id.* at 383 ("The sole novelty in the claim . . . resides in the method of mathematical computation by which the profile of the airfoil is determined.").

which they rely suggests that the mid-century doctrine may have been based on a misreading of case law. *Abrams* and *Yuan* both cite to the CCPA's decision in *In re Cooper*⁴⁵⁸ and to the Ninth Circuit's decision in *Don Lee, Inc. v. Walker*⁴⁵⁹ (as well as to other decisions that rely on *Cooper* and *Don Lee*).⁴⁶⁰

Cooper involved claims to a high-strength steel that was made by adding carbide-forming elements to iron until the amount of carbon that they contributed to the final product fell within a certain range.⁴⁶¹ Although *Cooper* contains a statement that the claimed formula "does not fall within any of the statutory classes of invention,"⁴⁶² the basis for the decision was that "[t]he alloys claimed by appellants fall within the upper ranges" disclosed by the prior art.⁴⁶³ *Cooper*'s principal argument was that he was entitled to a patent because the prior art did not involve his particular formula producing the desired alloy.⁴⁶⁴ The CCPA disagreed, affirming the Patent Office's decision regarding the rule of inherent anticipation that "there can be no patentability in the discovery of a general formula if it covers a number of . . . compositions described in the prior art."⁴⁶⁵

Similarly, *Don Lee* concerned claims to a formula for counterbalancing the drive shafts for an engine.⁴⁶⁶ The decision concluded with a broad statement that "such a computation is not a 'new and useful art, machine, manufacture, or composition of matter' within the meaning of [the Patent Act]."⁴⁶⁷ Again, however, the court made clear that it based its holding on the fact that the

⁴⁵⁸ See *Abrams*, 188 F.2d at 169 (citing *In re Cooper*, 134 F.2d 630 (C.C.P.A. 1943)); see also *Yuan*, 188 F.2d at 382.

⁴⁵⁹ See *Abrams*, 188 F.2d at 169 (citing *Don Lee, Inc. v. Walker*, 61 F.2d 58 (9th Cir. 1932)); see also *Yuan*, 188 F.2d at 382.

⁴⁶⁰ See *Yuan*, 188 F.2d at 382 (citing *In re Heritage*, 150 F.2d 554, 556 (C.C.P.A. 1945); see also *id.* at 558 ("[P]atentability cannot be predicated on mental processes as steps in a method claim."); *Halliburton Oil Well Cementing Co. v. Walker*, 146 F.2d 817, 821 (9th Cir. 1944) ("Walker's method . . . consists in setting down three knowns in a simple equation and from them computing an unknown . . . We think these mental steps, even if novel, are not patentable."); *In re Musgrave*, 431 F.2d 882, 889 (CCPA 1970) (noting that *Don Lee* is "apparently the genesis of the 'mental steps' concept in patent law").

⁴⁶¹ See *Cooper*, 134 F.2d at 630.

⁴⁶² *Id.* at 632.

⁴⁶³ *Id.*; see also *id.* ("[I]f the prior art shows a range, as appellants apparently admit that it does in this case, which includes the range claimed in their application, in the absence of the production of a different product they are not entitled to a patent.").

⁴⁶⁴ See *id.*

⁴⁶⁵ See *id.* at 631–32.

⁴⁶⁶ See *Don Lee, Inc. v. Walker*, 61 F.2d 58, 58–59 (9th Cir. 1932).

⁴⁶⁷ *Id.* at 67 (quoting Section 4866 of Title 60 of the Revised Statutes, the predecessor to 35 U.S.C. § 101).

patent claimed “a monopoly on a formula for determining dynamic forces . . . [that] were fully recognized and considered by engineers in textbooks long before the appellee applied for his patent.”⁴⁶⁸

Thus *Cooper* and *Don Lee*, which themselves cite no authority that articulates a mental-steps exception, appear to have been based on prior art rather than an eligibility rule. And as *Musgrave* notes, a literal application of the *Abrams/Yuan* doctrine would produce counterintuitive results, invalidating claims to a host of useful industrial processes.⁴⁶⁹ As one Board decision of that era noted, it cannot be the law that “a method is per se unpatentable merely because its practice requires that the operator thereof must think.”⁴⁷⁰

The CCPA continued to apply the mental steps doctrine at least through the 1950s⁴⁷¹ until the rule was finally abolished in 1970 by *In re Musgrave*.⁴⁷² The doctrine’s current status is not entirely clear. On the one hand, aside from a vague statement in *Benson*⁴⁷³ (which itself was effectively overruled by *Diehr*), the Supreme Court has never embraced the mental steps test. It is a creature of the courts of appeals, and the CCPA was thus within its rights to overturn it. And more recent decisions appear to reaffirm *Musgrave*’s holding

⁴⁶⁸ *Id.* at 62. *Accord id.* at 61 (finding persuasive a witness’s testimony that the prior art “not only recognized the problem dealt with by the . . . [patent], but also disclosed methods of solving the same which in the particular form of engine and crankshaft dealt with by the . . . [patent] produced the same result”); see also *In re Prater*, 415 F.2d 1378, 1387 (C.C.P.A. 1968) (noting that *Don Lee* involved “subject matter that was not even novel”) (citing *Don Lee*, 61 F.2d at 67).

⁴⁶⁹ See *In re Musgrave*, 431 F.2d 882, 891–92 (C.C.P.A. 1970). The court, quoting *Ex parte McNabb*, 127 U.S.P.Q. 456, 457–58 (Pat. Off. Bd. App. 1959), noted any process that requires the use of the human eyes for detection or determination of any condition, such as temperature, pressure, time . . . , or the use of the hands for the purpose of manipulating, such turning off or on or regulating a certain device in a certain manner or at a certain time . . . to produce a certain result necessarily involves the human mind and hence can be classified as a mental step.

⁴⁷⁰ *Id.* at 892 (quoting *Ex parte Kahn*, 124 U.S.P.Q. 511, 512 (Pat. Off. Bd. App. 1959)).

⁴⁷¹ See, e.g., *In re Lundberg*, 197 F.2d 336, 339 (C.C.P.A. 1952) (upholding the rejection of claims to a method of geophysical prospecting whose final limitation “involves a purely mental step”); see also *In re Venner*, 262 F.2d 91, 95 (C.C.P.A. 1958) (upholding the rejection of claims to improved method of molding aluminum and magnesium alloy pistons because computing the molding period is a “mental process”).

⁴⁷² 431 F.2d 882, 893 (C.C.P.A. 1970). The CCPA initially abandoned the doctrine in *Prater*, but vacated that decision on rehearing. See *In re Prater*, 415 F.2d 1393, 1406 (C.C.P.A. 1969).

⁴⁷³ See *Gottschalk v. Benson*, 409 U.S. 63, 67 (“Phenomena 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.”).

that “that the presence of a mental step [in a process] is not of itself fatal to § 101 eligibility.”⁴⁷⁴

On the other hand, decisions such as *Electric Power Group* and *Praxair* refer to the ineligibility of mental processes as a foundational principle⁴⁷⁵ and a recent decision appears to enforce the original and undiluted version of the doctrine. *In re Rudy*⁴⁷⁶ upheld the rejection of claims to a method of fishing that involved selecting the color of the fishhook based on the light intensity in the water at the depth at which the fishing was conducted.⁴⁷⁷ The court held that the claims were ineligible as directed to the “mental process of hook color selection based on” observed water conditions.⁴⁷⁸

It seems unlikely that the original 1950s mental steps doctrine will make a comeback. The rule propounded in *Abrams* and *Yuan* lacks a substantial legal foundation or a persuasive rationale. But recent pronouncements from the courts make it impossible to write the doctrine off entirely.

V. Comprehensive Legislation is Unlikely

In June 2019, the Intellectual Property Subcommittee of the U.S. Senate Judiciary Committee held an extraordinary three days of hearings on patent eligibility. The committee heard testimony from 45 witnesses, including academics, retired judges and former Patent Office Directors, leaders of intellectual-property professional and trade associations, and representatives of a wide variety of industries. Virtually every patents interest had its say. Given this sustained attention in the Senate and the overall critical commentary on the current jurisprudence, expectations naturally rose that Congress might substantially revise the current eligibility test.

Since that time, however, no legislation has advanced. Indeed, no Senator has even introduced a bill that proposes amendments to § 101.⁴⁷⁹ The answer

⁴⁷⁴ *Classen Immunotherapies, Inc. v. Biogen IDEC*, 659 F.3d 1057, 1065 (Fed. Cir. 2011) (citing *Prater*, 415 F.2d at 1402 n.22).

⁴⁷⁵ See *Elec. Power Grp. v. Alstom S.A.*, 830 F.3d 1350, 1365 (Fed. Cir. 2016).

⁴⁷⁶ 956 F.3d 1379 (Fed. Cir. 2020).

⁴⁷⁷ See *id.* at 1386.

⁴⁷⁸ *Id.* at 1384 (citing *Elec. Power Grp.*, 830 F.3d at 1354). The Federal Circuit also applied the mental-steps doctrine as an alternative basis for its decision in *PerkinElmer*. See *PerkinElmer, Inc. v. Intema Ltd.*, 496 F.App'x 65, 71 (Fed. Cir. 2012) (“Looking to the claims as a whole, the steps in combination do not make the ineligible mental step and natural law patent-eligible.”).

⁴⁷⁹ Senator Tillis, the Chairman of the IP Subcommittee, recently acknowledged that the legislation has stalled. See *AIPLA Q&A with Senator Thom Tillis*, AM. INTELL PROP. L. ASS'N (July 1, 2020), <https://www.aipla.org/detail/news/2020/07/01/aipla-q-a-with-senator-thom-tillis> [<https://perma.cc/2Q6V-GSKT>] (“[T]he biggest missed opportunity was

why is apparent from the testimony in the Senate hearings: eliminating the current abstract-idea exception was opposed by businesses representing major portions of the United States economy. The legislative proposals under discussion would have required for a patent to be eligible only that its claimed invention be useful “in a field of technology”—thus apparently permitting human-activities subject matter to be claimed if implemented on a computer⁴⁸⁰—and also appeared to eliminate the “function of a machine” rule against claiming only a result or a field of use.⁴⁸¹

These proposed changes were vigorously opposed by witnesses testifying on behalf of high-technology hardware manufacturers,⁴⁸² software developers,⁴⁸³ internet companies,⁴⁸⁴ and the financial services industry,⁴⁸⁵ as well as a coalition of retailers, automobile manufacturers, construction companies, and the hospitality industry.⁴⁸⁶ The high-technology sector “strongly favor[ed] retaining the current eligibility test,” arguing that “it is critical that Congress not . . . abandon the underlying principle that only inventions that embody an advance in technology are entitled to patent protection.”⁴⁸⁷ It condemned “business method patents [as] driv[ing] unproductive litigation that disrupts internal R&D and drains resources out of productive companies,” and flatly rejected the notion that the current test is “unworkable, excessively unpredictable, or harmful to U.S. innovation.”⁴⁸⁸ Similarly, the software industry

[not] enacting comprehensive Section 101 reform last year. We had a chance to achieve substantial reforms but it stalled out because there was a lack of consensus amongst those who supported reform.”).

⁴⁸⁰ See *Senate Hearing II* (statement of David W. Jones, Executive Director, High Tech Inventors Alliance), at 10–11; see also *Senate Hearing II* (response from Stephanie Martz, General Counsel, National Retail Federation, on behalf of United for Patent Reform, to Questions for the Record from Senator Hirono, question 2(b)).

⁴⁸¹ See *Senate Hearing I* (statement of Professor Mark A. Lemley, Stanford Law School) (noting that a “technological innovation requirement” would not “prevent Samuel Morse from patenting the entire idea of communicating over wires”).

⁴⁸² See *Senate Hearing II* (statement of David W. Jones), at 1.

⁴⁸³ See *Senate Hearing II* (statement of Christopher A. Mohr, Vice President for Intellectual Prop. and General Couns., Software and Info. Industry Ass’n), at 2–4, 12.

⁴⁸⁴ See *Senate Hearing II* (statement of Dr. William Jenks, The Internet Ass’n), at 2.

⁴⁸⁵ See *Senate Hearing III* (statement of Sean Reilly, Senior Vice President and Associate General Counsel, The Clearing House Payments Co.), at 1–4.

⁴⁸⁶ See *Senate Hearing II* (statement of Stephanie Martz, General Counsel, National Retail Federation, on behalf of United for Patent Reform), at 1, 6.

⁴⁸⁷ See *Senate Hearing II* (statement of David W. Jones), at 10, 4; see also *id.* at 1 (“[T]he Court’s historical precedents and the traditional limitations on statutory subject matter should be retained.”).

⁴⁸⁸ *Id.* at 1–2.

testified that its “experience with the abstract idea doctrine and *Alice* in particular has been a positive one.”⁴⁸⁹ It opposed the draft proposal as “turn[ing] back the clock and enabl[ing] the patenting of non-technical business methods claimed ‘on a computer,’” and argued that “[p]atents devoid of any technical contribution often block those who seek to make true technical advances.”⁴⁹⁰ Internet companies criticized the proposal as “doing more harm than good,” and expressed the view that the abstract-idea exception properly protects “progress in the useful arts,” rather than allowing patents to claim the mere “use of machines as those machines were intended to be used.”⁴⁹¹ The financial services sector stated that the recent jurisprudence has led to “a decline in lawsuits based on dubious patents,” and emphasized that “it is business method and e-commerce patents that are most often invalidated under Section 101”—although it acknowledged “very real and valid concerns” about how developments in the law have affected medical diagnostics.⁴⁹² And finally, the coalition of car manufacturers and service industries argued that eligibility rules are necessary to ensure that patents are restricted to “improvement[s] in technology, as opposed to . . . human endeavor[s],” whose creative contributions “are more appropriately protected through other forms of intellectual property.”⁴⁹³ These industries cited their “direct experience that patenting [human activities] does not serve the public interest,” instead producing “wasteful litigation that drains valuable resources from job creation and investment”⁴⁹⁴—and argued that non-technical patents frequently are asserted against small and medium-sized businesses.⁴⁹⁵

The breadth and depth of this criticism, from a cross-section of industries that are a major source of jobs and tax revenue in Senators’ and Representatives’

⁴⁸⁹ See *Senate Hearing II* (statement of Christopher A. Mohr, Vice President for Intell. Prop. and General Couns., Software and Info. Industry Ass’n), at 12.

⁴⁹⁰ *Id.* at 4, 3; see also *id.* at 11 (“[T]he discussion draft’s approach will lead to a recurrence of the overbroad business method patents that plagued the patent system and the courts before the *Alice* decision came down.”).

⁴⁹¹ See *Senate Hearing II* (statement of Dr. William Jenks, The Internet Ass’n), at 2–3.

⁴⁹² See *Senate Hearing III* (statement of Sean Reilly, Senior Vice President and Associate General Counsel, The Clearing House Payments Co.), at 3. Senator Tillis also recently contemplated the possibility of a legislative solution directed at diagnostic methods. See Senator Tillis, *supra* n. 479 (“I’m going to be working to put forward a very narrow, targeted fix for patent eligibility as it relates to diagnostic methods—something which had broad consensus at our 101 hearings. I view such a fix as a temporary Band-Aid to stop the bleeding until we can develop consensus around a larger, more comprehensive 101 reform.”).

⁴⁹³ *Senate Hearing II* (statement of Stephanie Martz, General Counsel, National Retail Federation, on behalf of United for Patent Reform), at 5.

⁴⁹⁴ *Id.*

⁴⁹⁵ See *id.* at 1–2.

states and districts, makes it unlikely that legislation will be enacted. Nor does this reaction to the initial proposal bode well for future efforts. It is a common fallacy among managers of a legislative initiative that it is best to start with the most extreme proposal, with the idea that one can always scale it back later. What such an approach tends to accomplish, however, is to motivate the opposition to mount its own counter-advocacy campaign, which will highlight the worst-case scenarios of what the legislation would do. When the original advocates later offer a more modest proposal, the first thing that they must explain to members of congress and their staffs is that the new proposal is not the same proposal about which they heard so many bad things in the past—a distinct disability in any legislative campaign. And the opposition and its congressional allies will remain distrustful: even if a new, revised bill seems acceptable, these skeptics know that the revised bill's proponents also endorsed the original extreme bill and must worry that any legislation that moves through the process will revert to that original form. Because of these dynamics, it is always best when organizing a legislative advocacy campaign to start with a reasonable proposal—one that attempts at the outset to address the legitimate concerns of those who are not part of one's own coalition.

Conclusion

The Supreme Court's concise articulation of its eligibility test—“[l]aws of nature, natural phenomena, and abstract ideas are not patentable”⁴⁹⁶—is perhaps a little too concise. The term “abstract ideas” has been made to encapsulate three distinct eligibility tests, some of which have little to do with the ordinary meaning of “abstract.” And the formula's implied parallelism in its treatment of the three enumerated subject matter is misleading. Anyone who thinks that this statement means that “laws of nature,” “natural phenomena,” and “abstract ideas” are treated equally under § 101 will quickly learn that some of these subject matters are more equal than others. In practice, “abstract ideas” (as defined in *Alice*) are assigned to category 2, and are per se ineligible, while “laws of nature” and “natural phenomena” (except for diagnostics) are in category 1 and can be claimed in a practical and useful application.

And the test *must* operate in this uneven way. If it treated each of its three subject matter the same way, it would be dysfunctional. If human-activities “abstract ideas” were assigned to category 1, and could be claimed in a practical application, then novel card games, new media-content promotion schemes, and a host of other embarrassments would become eligible for patenting—indeed, the results of *Bilski* and *Alice* would be reversed. But if “laws of nature”

⁴⁹⁶ *Alice Corp. Pty. v. CLS Bank Int'l*, 573 U.S. 208, 216, (2014) (quoting *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)).

and “natural phenomena” were assigned to category 2’s inherent ineligibility—that is, if the “focus of the claims” in a patent could not be innovation in a technological field—then *nothing* would be patentable. The phrase “laws of nature, natural phenomena, and abstract ideas” describes the universe of possible subject matter—both the technological and the non-technological arts. There is no “something more” out there to patent.

The *Alice/Mayo* formulation does not describe how the test actually works in practice and for that reason should perhaps be retired. Other things that could be improved include abandoning the word “abstract” as the sole and universal gateway to ineligibility. A communications device is ineligible when claimed only for its characteristic functions in a field of use, but it is not “abstract” in the same way that a strategy for hedging in the energy market is “abstract.” Using the same term to denote fundamentally different tests sows confusion. Also, the courts should acknowledge that *Diehr* displaced *Flook* and *Benson*. Unless the Supreme Court intends to impose a regime in which all computer operations are ineligible subject matter and math cannot be used to describe a natural phenomenon, then it should stop citing *Flook* as a lodestar of its eligibility jurisprudence. And finally, somebody needs to do something to rescue medical diagnostics from their American patent law purgatory.

All that said, the common law system of adjudication is generally working well for § 101. The Federal Circuit has taken *Bilski* and *Alice*’s general instructions and, case by case, woven them into a body of precedent that is increasingly clear and comprehensive. And however much criticism that jurisprudence may receive from academics and the patent bar, it is well-grounded in longstanding principles of American law. Patent practitioners should accept that the new eligibility case law is here to stay and should devote their energies to working with the courts to help elaborate and refine it.