# Reinventing the "Inventive Concept": Applying Copyright's Merger Doctrine to Patent Eligibility*

*Though the Patent Act broadly defines the types of inventions eligible for patenting—processes, machines, manufactures, or compositions of matter—judicially created exceptions exclude certain fundamental categories. No inventor may patent a natural law, mathematical formula, or an abstract idea. But what separates an abstract idea from a concrete implementation that integrates the abstract idea into a patentable invention? In* Mayo Collaborative Services v. Prometheus Laboratories, Inc.*, the Supreme Court required inventors to add significantly more to the underlying principle, formula, or abstract idea to receive a patent. And in* Alice Corp. v. CLS Bank*, the Court held that adding generic computer technology does not suffice. Subject matter eligibility of patents in the wake of* Mayo *and* Alice *has become a major obstacle to many inventions, and patentability has been difficult to predict. Asking whether a patent claim includes an inventive concept that adds significantly more to an ineligible idea is straightforward; answering consistently has proven elusive for both the courts and the patent office.*

*This Comment proposes borrowing a principle from copyright law—the merger doctrine—to bear on patent eligibility. Under the merger doctrine, if there are only very few ways of expressing an uncopyrightable idea, then each of those expressions is uncopyrightable because they are merged with the idea. The merger doctrine aim of separating the protectable from the unprotectable parallels the eligibility question in patents, and it offers more intuitive application and framing than what is currently used in the patent sphere.*

## INTRODUCTION

In 1952, Grace Hopper invented the first computer compiler, allowing programs to be written in words.[1] That same year, Congress passed the Patent Act of 1952.[2] The drafters of the Patent Act were probably not aware of the near-contemporary invention of computer programming, and they had no way to anticipate that the patent eligibility of thousands of computer programs some seventy years later would turn on the thirty-six prefatory words of Section 101 of the Act.[3] Yet that section was the basis for the rejection of over 20,000 patent applications in 2021.[4] Appeals from such rejections failed at a rate of approximately ninety percent.[5] Attorneys for patent applicants have even adopted sophisticated strategies for avoiding certain groups of patent examiners—called "art units"[6]—because those examiners reject patent

1. *Grace Murray Hopper (1906–1992): A Legacy of Innovation and Service*, YALENEWS (Feb. 10, 2017), https://news.yale.edu/2017/02/10/grace-murray-hopper-1906-1992-legacy-innovation-and-service [https://perma.cc/S3W7-67A9].

2. Patent Act of 1952, ch. 950, 66 Stat. 792 (codified as amended at 35 U.S.C. §§ 1–293; 15 U.S.C. § 1071).

3. "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101.

4. Aldo Martinez, *Still Receiving* Alice *Rejections? Time To Revisit USPTO Guidance*, IPWATCHDOG (Oct. 17, 2022, 11:15 AM), https://ipwatchdog.com/2022/10/17/still-receiving-alice-rejections-time-to-revisit-uspto-guidance/id=152173/ [https://perma.cc/WZ5D-JTRY].

5. Dennis Crouch, *PTAB Generally Affirms Eligibility Rejections*, PATENTLY-O (July 19, 2021), https://patentlyo.com/patent/2021/07/generally-eligibility-rejections.html [https://perma.cc/2NMF-AFEE].

6. An art unit is a "group of patent examiners in the U.S. Patent and Trademark Office specializing in a particular field of technology." *Art Unit*, BLACK'S LAW DICTIONARY (11th ed. 2019).

applications on subject matter eligibility grounds so reliably that they have been deemed the "pit of despair."[7]

The bare text of Section 101 reveals little potential for controversy. After all, what useful invention could be anything other than a "process, machine, manufacture, or composition of matter"?[8] The problem lies within a judicially created exception to the statutory categories.[9] The Supreme Court has "long held that [Section 101] contains an important implicit exception[:] Laws of nature, natural phenomena, and abstract ideas are not patentable."[10] But some of the most active areas of current innovation overlap substantially with these excluded subjects. Much of biotechnology leverages natural phenomena, such as the human genome, for beneficial effect; do therapeutics that incorporate human genes deserve patent protection? Computer algorithms implemented in software are at some level always describable as moving data and doing math; at what point do we consider such an algorithm to be a patentable process instead of an unpatentable abstraction?

The most difficult question in the eligibility[11] analysis often arises not at the point of determining whether a claimed invention implicates an abstract idea or natural phenomenon, but rather in assessing whether the application includes enough of an "inventive concept" that adds "significantly more" to that ineligible idea to create a patentable claim.[12] In answering this question, *Alice Corp. v. CLS Bank International*[13] ended an era of permissive software patent eligibility by holding that a computer implementation on its own is insufficient to transform an abstract idea into a patentable process, while leaving as an open question what *would* be enough.[14] Though detailed guidance from the United States Patent and Trademark Office ("USPTO") has clarified the process, fundamental questions of interpretation continue to make patent eligibility an unpredictable enterprise that sharply divides the Federal Circuit.[15]

7. *See* Gene Quinn, *Avoid the Patent Pit of Despair: Drafting Claims Away from TC 3600*, IPWATCHDOG (June 25, 2020, 4:15 PM), https://www.ipwatchdog.com/2020/06/25/avoid-patent-pit-despair-drafting-claims-away-tc-3600/id=122838/ [https://perma.cc/4JRU-SSZH] (describing a group of business method art units known for high rates of Section 101 rejections as a "pit of despair").

8. 35 U.S.C. § 101.

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

10. *Id.* (alteration in original) (quoting Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 70 (2012)).

11. Patent eligibility includes other requirements beyond subject matter eligibility under Section 101. *See* 35 U.S.C. §§ 102–103, 112. But for simplicity, "eligibility" will serve as shorthand in this work for the subject matter eligibility of the patent in the context of Section 101 and its judicial exceptions, such as abstract ideas and natural laws.

12. *See Mayo*, 566 U.S. at 72–73.

13. 573 U.S. 208 (2014).

14. *See id.* at 226–27.

15. Federal courts have exclusive subject matter jurisdiction over patent-related litigation, and the Federal Circuit has exclusive appellate jurisdiction over patent-related appeals from district courts

To resolve the Section 101 inventiveness question, patent law may look to other intellectual property disciplines for principles that accomplish similar goals. Copyright law, for example, draws eligibility lines between an abstract idea and a specific expression of that idea. One of these lines is drawn by the merger doctrine, which inquires whether an expression is "merged" with an idea by the uniqueness of available expressions of the idea.[16] If there are too few ways that an idea may be expressed, then the idea and its expressions become merged; the expressions become uncopyrightable because ideas are inherently uncopyrightable.[17]

This Comment proposes adapting copyright's merger doctrine and applying it to patent law to analyze the sufficiency of a claimed inventive concept. The Comment proceeds in four parts. Part I summarizes the evolution and current state of subject matter eligibility doctrine in patent law. Part II discusses how this doctrine is applied and the shortcomings of the present approach. Part III introduces the merger doctrine and analyzes the suitability of applying it to patents. Part IV then analyzes several representative patent eligibility cases to test the consistency of the merger doctrine with existing results.

## I. PATENT ELIGIBILITY: HISTORY AND PRESENT LAW

### A. *Evolution from 1952 to 2012*

The rise of the computer industry in the years following the enactment of the Patent Act of 1952 tested the generality of the Section 101 categories.[18] In *Gottschalk v. Benson*,[19] the Supreme Court rejected a patent on a computer program written to convert decimal numbers to binary numbers.[20] However, despite skepticism that the patent system in 1972 was properly equipped to examine computer programs,[21] the *Benson* Court made a point of refusing to hold that such programs are categorically unpatentable.[22]

and denials of patents from the Patent Trial and Appeal Board. 28 U.S.C. §§ 1295, 1338; 35 U.S.C. § 141(a). For a discussion of one case that highlights the divisions within the Federal Circuit, see *infra* Section II.B.

16. Not coincidentally, the merger doctrine is taught as a component of subject matter eligibility in copyright law. *See, e.g.*, JEANNE C. FROMER & CHRISTOPHER JON SPRIGMAN, COPYRIGHT LAW: CASES AND MATERIALS 64 (version 5.0 2023).

17. *See infra* Section III.A.

18. *See* John W. Cox & Joseph L. Vandegrift, *A Brief History of Supreme Court Interest in Patent-Eligible Subject Matter Under 35 U.S.C. § 101*, 19 J. TECH. L. & POL'Y 181, 189–90 (2014).

19. 409 U.S. 63 (1972).

20. *See id.* at 71–73 (noting that the patented computer program effectively claimed the underlying mathematical algorithm, which had no practical application except in computing).

21. *See id.* at 72–73 ("If these programs are to be patentable, considerable problems are raised which only committees of Congress can manage . . . .").

22. *Id.* at 71.

On the cusp of the 1980s, the Supreme Court decided an influential "trilogy" of patent eligibility cases.[23] First came *Parker v. Flook*,[24] which involved a mathematical formula for computing an "alarm limit" when monitoring a chemical reaction.[25] The Court concluded that setting an alarm to automatically trigger according to a formulaically determined threshold value was "post-solution activity."[26] Where such activity is conventional and obvious, it does not add enough to the underlying formula to make a patentable claim.[27] Second, in *Diamond v. Chakrabarty*,[28] the question was the patent eligibility of genetically engineered bacteria.[29] Though naturally occurring bacteria would be ineligible, the *Chakrabarty* Court found nothing in Section 101 that prevents a patent on an artificially generated organism that "is not nature's handiwork, but [the patentee's] own."[30] Third, in *Diamond v. Diehr*,[31] the Supreme Court returned to the vexing question of mathematical formulas.[32] A patent applicant's claim for using a mathematical formula to optimize the cure time of rubber was held to be patent eligible, despite its reliance on an equation.[33] Unlike in *Flook*, the *Diehr* Court found that the equation was used within a claimed process for the curing of rubber, rather than a claim on the equation itself.[34]

For many years after, Section 101 was interpreted expansively to include "anything under the sun."[35] This changed in 2010 when the Supreme Court decided *Bilski v. Kappos*,[36] holding that a business method patent that claimed a method for hedging market risks was an unpatentable abstract idea.[37] *Bilski* did not throw open the door to patentability challenges based on abstract ideas, as it only affirmed the Federal Circuit's application of the existing, although rarely invoked, abstract idea exclusion.[38] But cracks in the armor began to show; the

23. *See* Cox & Vandegrift, *supra* note 18, at 191–97.

24. 437 U.S. 584 (1978).

25. *See id.* at 596–97.

26. Pre- and post-solution activities are "nominal or tangential addition[s] to the claim." MPEP § 2106.05(g) (9th ed. Rev. 7, Feb. 2023). If the invention is a computer that generates the report, sending the report to a printer is post-solution activity. *Id.*

27. *See Flook*, 437 U.S. at 589–90.

28. 447 U.S. 303 (1980).

29. *See id.* at 310.

30. *Id.*

31. 450 U.S. 175 (1981).

32. *See id.* at 177.

33. *Id.* at 192–93.

34. *See id.* Lest we are tempted to find clear principles that distinguish *Diehr* from *Flook*, we must note that the author of the majority opinion in *Flook*—Justice Stevens—wrote the dissent in *Diehr*. *See* Parker v. Flook, 437 U.S. 584, 585 (1978); *Diehr*, 450 U.S. at 193 (Stevens, J., dissenting).

35. Cox & Vandegrift, *supra* note 18, at 198 (quoting Diamond v. Chakrabarty, 447 U.S. 303, 309 (1980)).

36. 561 U.S. 593 (2010).

37. *Id.* at 609. A business method patent claims a "series of process steps that, as a whole, constitutes a method of doing business." *Patent*, BLACK'S LAW DICTIONARY (11th ed. 2019).

38. Cox & Vandegrift, *supra* note 18, at 200–01.

multiple concurring opinions in *Bilski* revealed the wide disagreement between the justices with respect to what made the claimed invention unpatentable, despite their unanimity on the outcome.[39]

### B. *The Current Framework:* Mayo v. Prometheus

In 2012, a new framework emerged in *Mayo Collaborative Services v. Prometheus Laboratories, Inc*.[40] The patent at issue in *Mayo* taught a method of tailoring the dosage of a type of drug, thiopurine, for the treatment of gastrointestinal autoimmune disease.[41] To correct for patient-to-patient variability in the rate of thiopurine clearance from the body, the inventors proposed monitoring the bloodstream concentration of the drug's byproducts—"metabolites"[42]—and prescribed two benchmarks.[43] Metabolite concentrations less than a specific minimum would indicate a need to increase dosage; concentrations above a specific maximum would indicate the opposite.[44]

The key independent claim of the patent at issue in *Mayo* recited:

> 1. A method of optimizing therapeutic efficacy for treatment of an immune-mediated gastrointestinal disorder, comprising:
>
> (a) administering a drug providing 6-thioguanine to a subject having said immune-mediated gastrointestinal disorder; and
>
> (b) determining the level of 6-thioguanine in said subject having said immune-mediated gastrointestinal disorder,
>
> wherein the level of 6-thioguanine less than about 230 pmol per $8\times10^8$ red blood cells indicates a need to increase the amount of said drug subsequently administered to said subject and
>
> wherein the level of 6-thioguanine greater than about 400 pmol per $8\times10^8$ red blood cells indicates a need to decrease the amount of said drug subsequently administered to said subject.[45]

39. Justice Stevens favored holding business methods to be categorically unpatentable rather than reading in new limitations on the word "process." *Bilski*, 561 U.S. at 613–14 (Stevens, J., concurring). Justice Breyer joined this concurrence, but he wrote separately to underscore that "although the text of § 101 is broad, it is not without limit." *Id.* at 658 (Breyer, J., concurring).

40. 566 U.S. 66 (2012).

41. *Id.* at 72.

42. A metabolite is a "product that remains after a medicine is broken down (metabolized) by the body." *Metabolite*, MEDLINEPLUS, https://medlineplus.gov/ency/article/002258.htm [https://perma.cc/SW7Y-R2P4] (last updated Feb. 2, 2023).

43. *Mayo*, 566 U.S. at 73–75.

44. *Id.*

45. U.S. Patent No. 6,355,623 col. 20 ll. 10–24. 6-thioguanine is a metabolite of the thiopurine drug 6-mercaptopurine. *Id.* col. 1 ll. 48–51.

The *Mayo* Court set out a two-step analysis: Does the patent set forth natural laws?[46] If so, do the claims add "significantly more" than a simple recitation of those laws?[47] On the first step, the Court held that the patent did recite natural laws, finding that the predictable relationship between the effectiveness of thiopurine and the presence of metabolites is a fact of science, not invention.[48]

On the second step, the patent also failed to add significantly more to this natural phenomenon.[49] The Court conceptually condensed the main patent claim into "an 'administering' step, a 'determining' step, and a 'wherein' step."[50] Dispensing the thiopurine drug—the "administering" element—was a common and routine process,[51] which the Court had previously held could not transform a natural law into a patent-eligible application.[52] Measuring the blood concentration of thiopurine metabolite—the "determining" step—was also accomplished as a matter of course and with well-known technology.[53] Prescribing zones of excess and insufficiency—the "wherein" step—is another natural law, since it is the body that determines whether a concentration of metabolite is helpful or harmful.[54]

The two-part *Mayo* test is the current framework used by both patent examiners and courts to evaluate the subject matter eligibility of a patent claim.[55]

### C. Mayo *Spreads:* Alice Corp. v. CLS Bank

The case that is now synonymous with subject matter eligibility doctrine is *Alice Corp. v. CLS Bank International*.[56] The Alice Corporation ("Alice") held a patent for limiting financial risk by channeling exchanges of financial obligations through a third party.[57] The third party would create a "shadow" account for the two parties, keeping track of their transaction requests and permitting only those that would be sufficiently funded.[58] The third party would then periodically execute the accumulated requests while synchronizing the real accounts with the shadow ones.[59]

46. *Mayo*, 566 U.S. at 77.
47. *Id.*
48. *Id.*
49. *Id.* at 78.
50. *Id.*
51. *Id.*
52. Parker v. Flook, 437 U.S. 584, 590 (1978).
53. *Mayo*, 566 U.S. at 79.
54. *Id.* at 78.
55. *See infra* Section II.A.
56. 573 U.S. 208 (2014).
57. *Id.* at 213.
58. *Id.*
59. *Id.* at 213–14.

The Supreme Court applied its two-step analysis outlined in *Mayo* to determine whether the invention in *Alice* was patentable.[60] In the first step, the Court held that the claim was directed to the abstract idea of "intermediated settlement."[61] Then, the Court examined the execution of that abstract idea in the second step, which required computer implementation.[62] Computers were needed for keeping the shadow accounts, communicating transactions, and requesting data.[63] But because these were "well-understood, routine, conventional activities," the Court held that the computerized steps in Alice's claim did not add enough to count as "significantly more."[64]

The *Alice* Court did not announce any new rules.[65] The key holding was in the application of *Mayo*'s rules.[66] After *Alice*, an abstract idea implemented on a computer would be ineligible for a patent if the computer implementation was merely "generic."[67]

*Alice* had an immediate effect on software patents and business method patents.[68] Patent application rejections based on Section 101 skyrocketed to a peak of over 100,000 in 2018.[69] Computer-related technology areas, such as data processing, communications, and graphical display systems, were affected as well.[70] Brand-new fields of inherently computerized innovation that are unavoidably abstract—such as cryptocurrency and blockchain technologies—are caught in perpetual limbo.[71]

The effect of *Alice* has not been limited to computer technology and business methods. The list of *Alice*-affected patent classifications compiled by

60. *Id.* at 217.

61. *Id.* at 218.

62. *Id.* at 221–26.

63. *Id.* at 224.

64. *Id.* at 225.

65. *See id.* at 217–18.

66. *See id.*

67. *See* Jasper L. Tran, *Two Years After* Alice v. CLS Bank, 98 J. PAT. & TRADEMARK OFF. SOC'Y 354, 355, 357 (2016); *Alice*, 573 U.S. at 225–26.

68. Patent rejections based on Section 101 immediately rose in the wake of *Alice*. ANDREW A. TOOLE & NICHOLAS A. PAIROLERO, U.S. PAT. & TRADEMARK OFF., ADJUSTING TO *ALICE* 3 (2020), https://www.uspto.gov/sites/default/files/documents/OCE-DH_AdjustingtoAlice.pdf [https://perma.cc/YG4B-ZT3L]; *see* Manny Schecter, Shawn Ambwani, Alexander Shei & Robert Jain, *The Effects of* Alice *on Covered Business Method (CBM) Reviews*, 14 NW. J. TECH. & INTELL. PROP. 381, 384 (2017).

69. Martinez, *supra* note 4.

70. ANDREW A. TOOLE & NICHOLAS A. PAIROLERO, U.S. PAT. & TRADEMARK OFF., ADJUSTING TO *ALICE*: USPTO PATENT EXAMINATION OUTCOMES AFTER *ALICE CORP. V. CLS BANK INTERNATIONAL* 27–30 (Supp. 2020) [hereinafter TOOLE & PAIROLERO, SUPPLEMENTAL MATERIAL], https://www.uspto.gov/sites/default/files/documents/OCE-Alice-supplement1.pdf [https://perma.cc/98PL-JS7H].

71. Matthew R. Schantz & Jeffery T. Gorham, *U.S. Intellectual Property Protection in the Blockchain Industry: Trends and Solutions*, 31 INT'L L. PRACTICUM 21, 21 (2018).

the USPTO includes "boring or penetrating the earth," analytical chemistry, industrial elevators, and video distribution systems.[72]

Biotechnology, and bioinformatics in particular, have been subject to increased skepticism by the patent office and the Federal Circuit in the wake of *Alice*.[73] Many biotechnology patents, including the invalidated one in *Mayo*, center on a natural phenomenon (such as the presence and role of a genetic marker) but introduce additional elements for treatment or detection.[74] Where such added elements are merely conventional within the field, *Alice* looms.[75]

## II. THE APPLICATION OF *MAYO*/*ALICE*

### A. *USPTO Practice: 2019 Revised Guidance*

To clarify the analysis for subject matter eligibility in light of *Mayo* and *Alice*, the USPTO issued a series of guidelines and memos regarding how to implement the Supreme Court holdings—and some Federal Circuit applications of *Alice*—into patent examination practice.[76] The most recent version, the 2019 Revised Guidance, is incorporated in the *Manual of Patent Examining Procedure* ("MPEP").[77]

The USPTO's guidance characterizes Step 1 in the *Mayo*/*Alice* test as a threshold inquiry based on the statutory text of Section 101.[78] A claim that does not include a process, machine, manufacture, or composition of matter is automatically ineligible.[79] This step ensnares few applications; even abstract

72. TOOLE & PAIROLERO, SUPPLEMENTAL MATERIAL, *supra* note 70, at 27–28, 30; *see infra* Section II.B.

73. *See* Daryl Lim, Response, *The Influence of* Alice, 105 MINN. L. REV. HEADNOTES 345, 356–57 (2021).

74. *See id.* at 357.

75. *See id.* at 358.

76. 37 C.F.R. § 1 (2014); Memorandum from Robert W. Bahr, Deputy Comm'r for Pat. Examination Pol'y, U.S. Pat. & Trademark Off., to Pat. Examining Corps, U.S. Pat. & Trademark Off. (Apr. 19, 2018), https://www.uspto.gov/sites/default/files/documents/memo-berkheimer-20180419.pdf [https://perma.cc/NNX6-ZXDZ]; 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50–57 (Jan. 7, 2019).

77. MPEP §§ 2106.03–05 (9th ed. Rev. 7, Feb. 2023). The USPTO publishes and updates the MPEP as the definitive reference for patent examiners and attorneys "on the practices and procedures relative to the prosecution of patent applications and other proceedings before the USPTO." MPEP Foreword. The MPEP "does not have the force of law." *Id.* But patent examiners are typically not attorneys, and they are often more familiar with examples and guidance from the MPEP than Federal Circuit caselaw that has not been incorporated into the manual. Brian Downing, *From Agent to Examiner and Back Again: Practical Lessons Learned from Inside the USPTO*, IPWATCHDOG (Jan. 16, 2021, 12:15 PM), https://ipwatchdog.com/2021/01/16/agent-examiner-back-practical-lessons-learned-inside-uspto/id=128986/ [https://perma.cc/N99M-8VAQ]; *see That's Not in the MPEP*, MR. IP LAW (Sept. 26, 2019), https://www.mriplaw.com/blog/n701apvgmt509kvjv2vtz3qz5j7r8c [https://perma.cc/5T6D-CLPM].

78. MPEP § 2106.03; 35 U.S.C. § 101.

79. MPEP § 2106.03.

methods are still processes, and the examiner is permitted to suggest amendments to deficient claims that can be reframed in terms of a statutorily permitted category.[80]

Step 2A, titled "Whether a Claim Is Directed to a Judicial Exception,"[81] is a two-pronged inquiry.[82] In the first prong, the examiner asks whether the claim recites "an abstract idea, law of nature, or natural phenomenon."[83] The MPEP further lists several specific groups of abstract ideas: mathematical concepts, methods of organizing human activity (including fundamental economic practices), and mental processes.[84]

But Step 2A has a second prong: the claim is only "directed to" the judicial exception if it fails to integrate the exception into a "practical application."[85] Most of the guidance on this prong derives from a body of Federal Circuit cases in the wake of *Alice*.[86] Accordingly, the guidance in the MPEP is mostly in the form of examples and counterexamples.[87] Approved integrations into practical applications include computer function improvements, effectuating disease treatments, and implementation "with a particular machine . . . that is integral to the claim."[88] By contrast, using a computer as a general tool to implement an abstract idea, adding "insignificant extra-solution activity," or generally linking an abstract idea to a field of use are all insufficient.[89]

If a claim is directed to a judicial exception without integrating it into a practical application, Step 2B is the final opportunity for the claim to redeem itself.[90] In this step, the examiner determines if the claim provides an "inventive concept" such that it amounts to "significantly more than the judicial exception itself."[91] Again, as in Step 2A, the rule is illustrated primarily by examples.[92] Many of these examples, such as improvements to computer function, overlap

80. *Id.*

81. "Judicial exception" is the somewhat awkward term that encompasses "subject matter that the courts have found to be outside of, or exceptions to, the four statutory categories of invention, and are limited to abstract ideas, laws of nature and natural phenomena (including products of nature)." *Id.* § 2106.

82. *Id.* § 2106.04.

83. *Id.*

84. *Id.* § 2106.04(a).

85. *Id.* § 2106.04(d).

86. *See, e.g.*, Enfish, LLC v. Microsoft Corp., 822 F.3d 1327, 1339 (Fed. Cir. 2016) (finding that claims "directed to a specific implementation of a solution to a problem in the software arts" are not abstract); McRO, Inc. v. Bandai Namco Games Am. Inc., 837 F.3d 1299, 1303, 1316 (Fed. Cir. 2016) (finding that an automated 3D animation claim was directed to a "patentable, technological improvement" and not abstract).

87. MPEP § 2106.04(d).

88. *Id.*

89. *Id.*

90. *Id.* § 2106.05.

91. *Id.*

92. *See id.*

with what would have integrated the judicial exception into a practical application in Step 2A.[93] For example, on passing prong two of Step 2A, the MPEP states: "One way to demonstrate such integration [into a practical application] is when the claimed invention improves the functioning of a computer . . . ."[94] But if a claim fails Step 2A, and the examiner proceeds to the "significantly more" question of Step 2B, the MPEP counsels: "Limitations that the courts have found to qualify as 'significantly more' when recited in a claim with a judicial exception include . . . [i]mprovements to the functioning of a computer . . . ."[95] It is hard to imagine when this Step 2B guidance would ever come into play, since any claim directed to improving computer function should have passed Step 2A and avoided Step 2B altogether.

The contours of the two-step test from *Mayo* can be seen in the MPEP guidelines. The first prong of Step 2A is a replica of the first *Mayo* step, which asks whether the invention is directed at an abstract idea, natural law, or other judicial exception.[96] The second prong of Step 2A, which searches for a practical application, implements the second step of *Mayo*, querying whether the claims at issue add enough "to allow the processes they describe to qualify as patent-eligible processes that *apply* natural laws?"[97] The search for an "inventive concept," the task of Step 2B, was treated synonymously with the second step within *Mayo*.[98]

Defining "significantly more" and "inventive concept" by example instead of by rule allows interpolation but not extrapolation. The examples are helpful guideposts for future claims that can be readily analogized to past cases, but they offer little help for new inventions that do not fit neatly into one of the predefined categories. By their nature, patents seek to break new ground, and questions inherent to new technologies are rarely found within the catalog of existing rulings.

93. *Compare* MPEP § 2106.04 (explaining whether a claim is directed to a judicial exception), *with* MPEP § 2106.05 (explaining whether a claim amounts to significantly more than a judicial exception).

94. MPEP § 2106.04(d)(1).

95. *Id.* § 2106.05.

96. *See* MPEP § 2106.04; Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 77 (2012).

97. *See* MPEP § 2106.04(d); *Mayo*, 566 U.S. at 77.

98. *See Mayo*, 566 U.S. at 72–73 (referring to the search for an inventive concept as a query "sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the natural law itself").

### B. *Confusion in the Courts:* American Axle v. Neapco

The degree of current confusion on patent-eligible subject matter was evident in *American Axle Manufacturing v. Neapco Holdings*.[99] American Axle patented a method for damping certain vibrations in driveshafts by placing liners along the shafts that were matched to the resonant frequency of the shafts.[100] The relationship between resonant frequency and the forces on a structural element is governed by Hooke's law, a mathematical equation.[101] But does a patent claim that specifies the placement and tuning of that damping component only recite that natural law?

In district court, defendant Neapco won a motion for summary judgment of patent invalidity, convincing the court that American Axle's patent was directed to nonpatentable subject matter.[102] On appeal, a Federal Circuit panel majority affirmed,[103] but the decision drew an impassioned dissent from Chief Judge Kimberly Moore.[104] In response to American Axle's petition for panel and en banc rehearing, the Federal Circuit withdrew its earlier panel opinion[105] and reissued a substantially modified majority opinion, including a change to its holding.[106] The new opinion reversed the invalidity finding on one claim, holding that the claim was potentially directed to more than just Hooke's law by reciting "positioning the at least one liner" and "tuning at least one liner to attenuate at least two types of vibration."[107] The panel majority remanded this claim to the district court to further determine if the tuning step was itself an abstract idea.[108] However, there would be no en banc rehearing of *American Axle*; the vote for rehearing failed on a deadlocked vote of six to six.[109] Five concurrences and dissents were filed on the denial of en banc rehearing.[110]

*American Axle* illustrates the depth of substantive inconsistency surrounding patent eligibility. The patent at issue involved a physically rotating

99. Am. Axle & Mfg., Inc. v. Neapco Holdings LLC (*Am. Axle III*), 967 F.3d 1285 (Fed. Cir. 2020); *see* Yar R. Chaikovsky & David T. Okano, American Axle*: Highlighting Divisions in the Federal Circuit on Section 101 Natural Law Jurisprudence*, 33 INTELL. PROP. & TECH. L.J. 1, 3 (2021).

100. *Am. Axle III*, 967 F.3d at 1292–93.

101. *Id.* at 1291.

102. Am. Axle & Mfg., Inc. v. Neapco Holdings LLC, 309 F. Supp. 3d 218, 229 (D. Del. 2018), *aff'd in part and vacated in part*, 967 F.3d 1285.

103. Am. Axle & Mfg., Inc. v. Neapco Holdings LLC (*Am. Axle I*), 939 F.3d 1355, 1368 (Fed. Cir. 2019), *modified and superseded on reh'g by* 967 F.3d 1285.

104. *See id.* at 1368–75 (Moore, J., dissenting); Chaikovsky & Okano, *supra* note 99, at 3.

105. Am. Axle & Mfg., Inc. v. Neapco Holdings LLC (*Am. Axle II*), 966 F.3d 1294, 1295 (Fed. Cir. 2019) (granting petition for panel rehearing by withdrawing earlier panel opinion and reissuing a new one).

106. *Am. Axle III*, 967 F.3d at 1292.

107. *Id.* at 1300.

108. *Id.* at 1301.

109. Chaikovsky & Okano, *supra* note 99, at 2.

110. *Id.*

driveshaft,[111] not a nebulously defined flowchart of computer procedures. There was no relevant factual dispute.[112] Yet even such a superficially straightforward issue polarized the set of jurists most qualified to apply patent law doctrine.[113] If the "Supreme Court for Patents," as the Federal Circuit is sometimes known colloquially,[114] is so fractiously divided, then it is unsurprising that patent practitioners have found little predictability in this area of law.

### C. *Confusion at the PTAB: Similar Appeals, Different Outcomes*

Two patent applications from the IBM Corporation illustrate the difficulty of deciding the "significantly more" question. The applications were filed in 2015 and 2016, respectively, and both claimed methods of question answering for computerized smart assistants.[115] Both were rejected by their examiners for ineligibility under Section 101.[116] Both were appealed to the Patent Trial and Appeal Board ("PTAB"), where the 2015 application succeeded[117] and the 2016 application failed.[118]

Both the 2015 and 2016 applications disclosed methods of generating "candidate answers" to a human-posed question, followed by ranking their quality and outputting the ranked set of answers to another process.[119] The 2015 application included a claim element for receiving a function call in "closure form."[120] A closure in computer science is "a programming technique that allows variables outside of the scope of a function to be accessed."[121] The 2015 application did not originate this concept; indeed, closures were described

111. *Am. Axle III*, 967 F.3d at 1291.

112. *Id.* at 1294.

113. *See* Chaikovsky & Okano, *supra* note 99, at 4.

114. Ryan Davis, *USPTO Vexed by High Court's Limited IP Guidance, GC Says*, LAW360 (Nov. 9, 2012, 8:45 PM), https://www.law360.com/articles/393360/uspto-vexed-by-high-court-s-limited-ip-guidance-gc-says [https://perma.cc/76X3-EE8N (staff-uploaded, dark archive)].

115. *See* U.S. Patent Application No. 14/623,292, Publication No. 2016/0240095, at [0004] (published Aug. 18, 2016); U.S. Patent Application No. 15/182,972, Publication No. 2017/0364804, at [0006] (published Dec. 21, 2017).

116. *Ex parte* Baughman, No. 2019-000665, at 3 (P.T.A.B. Sept. 25, 2019); *Ex parte* Beller, No. 2021-000235, at 3 (P.T.A.B. Mar. 21, 2022).

117. *Ex parte Baughman*, No. 2019-000665, at 1, 9.

118. *Ex parte Beller*, No. 2021-000235, at 1, 18–19.

119. *Ex parte Baughman*, No. 2019-000665, at 2–3; *Ex parte Beller*, No. 2021-000235, at 8–9. Computer systems designed to interact with humans in natural language often compose several possible answers and, in a subsequent step, analyze the quality of those candidate answers to give the best reply. *See* Poonam Gupta & Vishal Gupta, *A Survey of Text Question Answering Techniques*, 53 INT'L J. COMPUT. APPLICATIONS, Sept. 2012, at 1.

120. *Ex parte Baughman*, No. 2019-000665, at 2. A "function call" is a request to execute a computer routine—a function. *See Function Call*, COMPUT. HOPE, https://www.computerhope.com/jargon/f/funccall.htm [https://perma.cc/R54S-GR8X] (last updated Apr. 26, 2017).

121. *Closure*, COMPUT. HOPE, https://www.computerhope.com/jargon/c/closure.htm [https://perma.cc/3XUS-MQBB] (last updated Oct. 7, 2019).

therein as "known in programming languages."[122] Yet this conventional element convinced the PTAB to reverse the examiner's rejection,[123] while the absence of a comparable element in an otherwise similar claim doomed the appeal of the 2016 application.[124]

Why does the function call in closure form amount to "significantly more" when *Alice* makes it clear that conventional computer implementations of an abstract idea do not provide the required inventiveness? The difficulty in answering this question underscores the need for greater clarity in defining what is patentable.

### D. *Policy Goals of Patent Subject-Matter Exclusion*

In his plurality Federal Circuit opinion in *Alice*, Judge Alan David Lourie laid out the common themes he perceived behind patent eligibility jurisprudence.[125] Chief among these was that "patents should not be allowed to preempt the fundamental tools of discovery."[126] While the purpose of patents is to preempt others from using the same tools, "claims should not be coextensive with a natural law, natural phenomenon, or abstract idea."[127]

Another theme is the prevention of manipulation by patent drafters to circumvent substantive requirements with linguistic sleight of hand.[128] "[H]ollow" limitations or "token" post-solution activity should not confer eligibility.[129] A related third theme is flexibility; Judge Lourie cautioned against overly rigid, formalistic rules that invite manipulation while lacking adaptability to new technologies.[130] Judge Lourie went on to propose an integrated approach that identifies the fundamental principle wrapped up in the claim and analyzes the degree to which the claim would violate these identified policy goals, particularly the risk of preemption.[131]

In the period between *Mayo* and *Alice*, preemption was identified as a "leading contender for conceptual grounding of the . . . exclusion of abstract ideas and natural phenomena from patentability."[132] However, the Supreme Court did not adopt Judge Lourie's preemption-centered approach in its *Alice*

122. U.S. Patent Application No. 14/623,292, Publication No. 2016/0240095, at [0020] (published Aug. 18, 2016); U.S. Patent No. 10,573,190 col. 3 ll. 1–2.

123. *Ex parte Baughman*, No. 2019-000665, at 8–9.

124. *Ex parte Beller*, No. 2021-000235, at 18–19.

125. CLS Bank Int'l v. Alice Corp. Pty., 717 F.3d 1269, 1280–82 (Fed. Cir. 2013) (Lourie, J., concurring), *aff'd*, 573 U.S. 208 (2014).

126. *Id.* at 1280.

127. *Id.* at 1281.

128. *Id.*

129. *Id.*

130. *Id.*

131. *Id.* at 1282.

132. *See* Katherine J. Strandburg, *Much Ado About Preemption*, 50 HOUS. L. REV. 563, 563 (2012) (identifying preemption as a widely adopted theory but offering a different framework).

decision, instead maintaining the two-step process from *Mayo*.[133] The rapid increase in Section 101 rejections post-*Alice*[134] suggests that improper preemptions of abstract ideas and natural laws are indeed being prevented, if not over-prevented. But the inconsistent application of *Mayo*/*Alice* between art units at the USPTO has led to precisely the kind of drafting manipulation Judge Lourie cautioned against.[135]

## III. THE MERGER DOCTRINE

### A. *Idea/Expression Distinction in Copyright*

Copyright law, like patent law, must also draw subject matter eligibility lines.[136] The subject matter excluded from copyright is, uncoincidentally, quite similar to what is included in patents.[137] Specifically, Section 102(b) of the Copyright Act excludes "any idea, procedure, process, system, [or] method of operation" from copyright.[138] Though ideas and processes fall on different sides of the dividing line on copyright compared to patents, the line is drawn to separate the concrete from the abstract.[139]

The foundational case on the idea-expression distinction is *Baker v. Selden*,[140] where the Supreme Court held an author's blank ledger forms—an expression of a new method of accounting taught in the author's book—were uncopyrightable.[141] The author was trying to protect the accounting process embodied in the forms, but the *Baker* Court held that allowing such protection would have intruded on the patent domain.[142] Later cases began to describe the expression of an uncopyrightable idea as a "merger" of the idea and its

133. Alice Corp. Pty. v. CLS Bank Int'l, 573 U.S. 208, 217–18 (2014).

134. *See* John Robert Sepúlveda, *The Post-*Alice *Jurisprudence Pendulum and Its Effects on Patent Eligible Subject Matter*, 35 TOURO L. REV. 897, 897 (2019).

135. *See* Quinn, *supra* note 7 (advising patent drafters against using certain terms and claim elements to avoid low-acceptance art units).

136. *See generally* Dennis S. Karjala, *Distinguishing Patent and Copyright Subject Matter*, 35 CONN. L. REV. 439, 448–68 (2003) (comparing the subject matter covered by copyright and patent law).

137. *See id.* at 444–46.

138. Copyright Act of 1976, Pub. L. No. 94-553, ch. 1, § 102(b), 90 Stat. 2544, 2544–45 (codified at 17 U.S.C. § 102(b)).

139. *See* Karjala, *supra* note 136, at 452–58.

140. 101 U.S. 99 (1879).

141. *Id.* at 100, 107.

142. *See id.* at 104–05. Whether such an abstract idea would pass muster under the Patent Act's current Section 101 doctrine is another matter.

expression.[143] If the idea is uncopyrightable, and the expression is synonymous with the idea, then the expression must also be uncopyrightable.[144]

The merger doctrine is the modern test in copyright law to determine whether an expression is sufficiently distinct from the idea it embodies.[145] Under the merger doctrine, we must examine whether the expression in question is the only way, or one of a very few ways, that the underlying idea may be put into practice.[146] Putting *Baker* in terms of the modern doctrine, the question becomes: Once the idea of condensed bookkeeping is formulated, are there any available expressions of that idea that differ from the condensed ledger form printed in his book? If the answer is no, as it was in *Baker*, then the expression has merged with the idea, and cannot be separated.[147] Since the condensed ledger form is the only way to express the condensed accounting idea, the form and the idea are essentially one and the same and cannot be copyrighted.[148]

However, an alternative application of the merger doctrine is to check for merger as a defense to infringement, instead of as part of the copyright eligibility analysis.[149] Professor David Nimmer, author of the leading treatise on copyright, favors this approach.[150] One compelling reason to wait for an alleged infringement to check for merger is to place the burden of proving that the number of expressions is limited on the accused infringer.[151]

### B. *Merger Versus Preemption*

Merger doctrine analyses are often conducted in the language of preemption. In one classic merger doctrine case,[152] a jeweler asserted a copyright

143. *See* Apple Comput., Inc. v. Franklin Comput. Corp., 545 F. Supp. 812, 823 (E.D. Pa. 1982), *rev'd*, 714 F.2d 1240, 1253–54 (3d Cir. 1983); *see also* Pamela Samuelson, *Reconceptualizing Copyright's Merger Doctrine*, 63 J. COPYRIGHT SOC'Y U.S.A. 417, 420 n.12 (2016).

144. 4 MELVILLE B. NIMMER & DAVID NIMMER, NIMMER ON COPYRIGHT § 13.03[B][3][a], Lexis (database updated June 2023).

145. *Id.* § 13.03[B][3].

146. *Id.*

147. *See id.* § 13.03[B][3][b].

148. *See* Baker v. Selden, 101 U.S. 99, 104 (1879).

149. NIMMER & NIMMER, *supra* note 144, § 13.03[B][3][e] ("[I]t is the opinion of this treatise that the better view is to treat the merger doctrine under the rubric of substantial similarity, evaluating the inseparability of idea and expression in the context of a particular dispute, rather than attempting to disqualify certain expressions from protection *per se*.").

150. *Id.*

151. *Id.* (quoting NEC Corp. v. Intel Corp., No. C-84-20799, 1989 WL 67434, at *3 (N.D. Cal. Feb. 6, 1989)).

152. Herbert Rosenthal Jewelry Corp. v. Kalpakian, 446 F.2d 738 (9th Cir. 1971). The opinion analyzed the separability of an "idea" and its "expression" without explicitly calling it the merger doctrine. *Id.* at 742. The idea-expression dichotomy, and the *Kalpakian* case in particular, are synonymous with the merger doctrine. *See, e.g.*, Andrew B. Hebl, Comment, *A Heavy Burden: Proper Application of Copyright's Merger and* Scenes a Faire *Doctrines*, 8 WAKE FOREST INTELL. PROP. L.J. 128, 140 & n.66 (2007) (discussing *Kalpakian* as an application of the merger doctrine).

in a jeweled pin shaped like a bee.[153] The defendant made a jeweled bee that the plaintiff alleged was substantially similar to, and thus infringing, the plaintiff's copyrighted bee.[154] But enforcing this copyright "would effectively prevent others from engaging in the business of manufacturing and selling jeweled bees."[155]

There are particularly striking similarities to the preemption principles of Judge Lourie's *Alice* concurrence when the merger doctrine is applied to software:

> Under the merger doctrine, when an idea can be expressed in only one fashion, that expression is not protected by copyright, as the result would be to provide a monopoly over the idea itself. In the realm of computer programs, merger issues may arise in somewhat unusual ways. Although, theoretically, many ways may exist to implement a particular idea, efficiency concerns can make one or two choices so compelling as to virtually eliminate any other form of expression.[156]

However, this definition leaves room for merger in situations short of total preemption.[157] "[M]erger may apply 'when there is a limited number of expressions of the idea, albeit greater than one.'"[158] Merger is thus somewhat broader than strict preemption of an idea.

### C. *Applying the Merger Doctrine to Patents*

Under current USPTO procedure, after an examiner determines that a claim is directed to a judicial exception in the first prong of Step 2A in the *Mayo*/*Alice* test, there are two further points at which the claim may be rescued from ineligibility.[159] In the second prong of Step 2A, the examiner asks if the judicial exception is "integrated into a practical application."[160] If not, in Step 2B, the examiner asks whether the claim is directed to "significantly more than the judicial exception" by contributing an "inventive concept."[161]

153. *Kalpakian*, 446 F.2d at 739.

154. *Id.* at 740.

155. *Id.*

156. *See* NIMMER & NIMMER, *supra* note 144, § 13.03[F][2][b]; *cf.* CLS Bank Int'l v. Alice Corp. Pty., 717 F.3d 1269, 1280–82 (Fed. Cir. 2013) (Lourie, J., concurring).

157. *See* NIMMER & NIMMER, *supra* note 144, § 13.03[F][2][b] (defining merger when one "or two" forms are clearly most efficient, and when alternatives are "virtually" eliminated).

158. *Id.* § 13.03[B][3][d] (quoting N.Y. Mercantile Exch., Inc. v. IntercontinentalExchange, Inc., 497 F.3d 109, 117 n.9 (2d Cir. 2007)).

159. MPEP § 2106.04–05 (9th ed. Rev. 7, Feb. 2023).

160. MPEP § 2106.04.

161. MPEP § 2106.05.

Though these two steps are described as separate analyses, examiners and patent judges rarely reach differing conclusions on these two steps in practice.[162] The only substantive difference is that, in Step 2B, the examiner considers whether the additional elements to the claim are well understood or unconventional.[163] The USPTO published six example hypothetical cases, each with one to three claims, to illustrate where each should pass or fail based on its 2019 guidance.[164] Even in this set of examples meant to highlight the differences between each step, none included a claim that failed Step 2A yet passed Step 2B.[165] This is likely because the question of whether an abstract idea has been integrated into a practical application is decided by whether a sufficiently inventive process was needed to implement it.[166]

The analysis in the second prong of Step 2A centers on limitation; the examiner asks whether a "meaningful limit" has been imposed to prevent the inventor from monopolizing the whole judicial exception.[167] This echoes the operation and purpose of the merger doctrine.[168]

Step 2B also searches for limits to the claim on the judicial exception.[169] The inquiry here is whether the "inventive concept" called for in *Mayo* and *Alice* has been added to the judicial exception.[170] In his plurality Federal Circuit opinion in *Alice*, Judge Lourie described the inventive concept not as one that duplicates the nonobviousness and novelty requirements of a patent, but rather in terms of its narrowing effect on the underlying abstract concept.[171] An inventive concept should provide "substantive limitations that narrow, confine, or otherwise tie down the claim so that, in practical terms, it does not cover the full abstract idea itself."[172] This also speaks the same language as the merger

162. *See* C. Brandon Rash & Brooks J. Kenyon, *Ten Years Since* Bilski*: Challenges Remain in Deciding Patent Eligibility of Computer-Implemented Inventions in the Emerging Technologies Space*, 13 LANDSLIDE 52, 56 (2020) (describing the path to an inventive concept as "narrow" when a claim fails to integrate to a judicial exception into a practical application).

163. MPEP § 2106.05(d).

164. U.S. PAT. & TRADEMARK OFF., SUBJECT MATTER ELIGIBILITY EXAMPLES: ABSTRACT IDEAS 1 (2019), https://www.uspto.gov/sites/default/files/documents/101_examples_37to42_20190107.pdf [https://perma.cc/45T9-7ZRM].

165. *Id.*

166. *See* Rash & Kenyon, *supra* note 162, at 56.

167. MPEP § 2106.04.

168. NIMMER & NIMMER, *supra* note 144, § 13.03[F][2][b] ("Under the merger doctrine, when an idea can be expressed in only one fashion, that expression is not protected by copyright, as the result would be to provide a monopoly over the idea itself.").

169. *See* MPEP § 2106.05 (listing "meaningful limitations beyond generally linking the use of the judicial exception to a particular technological environment" as an acceptable demonstration of "significantly more").

170. Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 72–73 (2012); Alice Corp. Pty. v. CLS Bank Int'l, 573 U.S. 208, 217–18 (2014); MPEP § 2106.05.

171. CLS Bank Int'l v. Alice Corp. Pty., 717 F.3d 1269, 1282 (Fed. Cir. 2013) (Lourie, J., concurring), *aff'd*, 573 U.S. 208.

172. *Id.*

doctrine: "If other methods of expressing that idea are not foreclosed as a practical matter, then there is no merger."[173]

Thus, the second prong of Step 2A and Step 2B both essentially inquire whether there is room left outside the claim to implement a judicial exception in a practical application.[174] Is there a path for other inventive concepts to use the abstract idea or natural law to an advantage? If so, then the claim is sufficiently limited and can be patent eligible.[175] This is identical to the function of the merger doctrine.[176]

To analogously apply the merger doctrine, the judicial exception is the "idea," and the practical application, defined by the patent claim, is the "expression." The merger doctrine would consider them melded if the claim recites the only way to effectively apply the judicial exception to the targeted solution. On the other hand, if the judicial exception is only a component, and the claim teaches a nonexclusive way of implementing that exception, then the judicial exception is "integrated into," but not merged with, the application.

Whether a patent applicant has added an inventive concept to the idea can be measured under the merger framework. Instead of asking how new or enabling the inventive concept is,[177] the invention can be measured by how much room it leaves others to apply alternative inventive solutions to the same abstract idea.

Sometimes, the novelty in an invention is in realizing the applicability of a particular equation to a solution when more than one is available. The merger doctrine is also adaptable to account for these scenarios because it is implicitly application oriented. For example, in *Morrissey v. Procter & Gamble Co.*,[178] the merger doctrine prevented an author from enforcing a copyright on sweepstakes rules.[179] Though there are conceivably many ways to write sweepstakes rules, these rules were not copyrightable because "'the topic necessarily requires' . . . if not only one form of expression, at best only a limited number."[180] By considering what the "topic" requires instead of a more general universe of expressions, the *Morrissey* court implicitly counted only expressions that work for the topic of sweepstake rules. Thus, the merger doctrine would not credit

173. Apple Comput., Inc. v. Franklin Comput. Corp., 714 F.2d 1240, 1253 (3d Cir. 1983).

174. *See* MPEP § 2106.04–.05 ("The treatment or prophylaxis limitation must be 'particular,' i.e., specifically identified so that it *does not encompass all applications of the judicial exception(s)*." (emphasis added)).

175. *See id.*

176. *See* NIMMER & NIMMER, *supra* note 144, § 13.03[B][3][c].

177. These are bridges that must still be crossed at other points in a patent application. *See* 35 U.S.C. §§ 102, 112.

178. 379 F.2d 675 (1st Cir. 1967).

179. *See id.* at 678–79.

180. *See id.* (quoting Sampson & Murdock Co. v. Seaver-Radford Co., 140 F. 539, 541 (1st Cir. 1905)).

the ingenuity involved in selecting the judicial exception to be a part of the solution if it is one of only a few that work for a given problem.

### D. *Does the Merger Doctrine Meet the Policy Goals of Patent Subject-Matter Gatekeeping?*

A merger doctrine analysis is implicitly centered around the prevention of preemption, often identified prior to *Alice* as the foremost consideration in patent eligibility doctrine.[181] The primary purpose of the merger doctrine is to "preserv[e] opportunities for meaningful competition."[182] By asking whether a claim is "coextensive" with an underlying judicial exception, Judge Lourie frames the preemption question in terms of merger.[183]

The merger doctrine builds in flexibility as well. An idea does not need to have a literally unique expression; even a limited number of expressions may still be considered merged with the idea.[184] This flexibility is useful for new technologies, where the number of future available expressions may not yet be determinable. Like in copyright, under Professor Nimmer's preferred formulation, perhaps this analysis is best deferred to an infringement analysis.[185] Under this alternative framework, claims that do not clearly preempt all use of an abstract idea could be allowed by the patent office but later held unenforceable if an accused infringer can show that the claim exercises one of only a few sensible expressions of the idea.

This flexibility also has the advantage of discouraging manipulation, as artificially limiting a claim to ostensibly allow other avenues of expression may not escape a judicial finding of merger. It also distinguishes the application of the merger doctrine to patents from purely preemption-based rules that analyze whether any other use of the underlying idea is foreclosed.[186]

181. *See, e.g.*, CLS Bank Int'l v. Alice Corp. Pty., 717 F.3d 1269, 1280 (Fed. Cir. 2013) (Lourie, J., concurring) ("First and foremost is an abiding concern that patents should not be allowed to preempt the fundamental tools of discovery . . . ."), *aff'd*, 573 U.S. 208 (2014); Strandburg, *supra* note 132, at 563 (identifying preemption as a widely adopted theory but offering a different framework); Rochelle C. Dreyfuss & James P. Evans, *From* Bilski *Back to* Benson*: Preemption, Inventing Around, and the Case of Genetic Diagnostics*, 63 STAN. L. REV. 1349, 1351–52 ("[W]ith the return of preemption, it is time to operationalize the concept.").

182. *See* Samuelson, *supra* note 143, at 459.

183. *Alice*, 717 F.3d at 1281 (Lourie, J., concurring).

184. NIMMER & NIMMER, *supra* note 144, § 13.03[B][3][d].

185. *Id.* § 13.03[B][3][e] ("Confusion has arisen in the case law whether the merger doctrine should serve as a bar to copyright protection itself (element one) or, alternatively, as a negation of infringement via absence of actionable similarity (element two). . . . Given the more nuanced results that can emerge from treating a copyrighted composition in the context of a particular work that has copied it rather than in the abstract, it is the opinion of this treatise that the better view is to treat the merger doctrine under the rubric of substantial similarity . . . ." (citations omitted)).

186. *See* Michael Oliver, Note, *Greasing the Wheels of Patent Law: Clarifying the Judicial Exceptions via* American Axle & Manufacturing, Inc. v. Neapco Holdings LLC, 29 J. INTELL. PROP. L. 370, 377 (2022).

However, there are limitations to applying this copyright-based approach to patents. Where a claim is not merged with a judicial exception because a substantial number of implementations are available, a patent applicant may still attempt to accomplish a monopoly on the underlying idea by claiming every one of its permutations. This "kitchen sink" approach is only feasible, however, where every permutation can be identified. In such cases, the outcome is no worse than in current practice, where well-funded inventors file dozens of applications totaling hundreds of dependent claims in an effort to secure a more complete dominion over the invention.[187] Moreover, each alternate embodiment must still fulfill other patentability requirements, including enablement and nonobviousness.[188] This is part of the patent bargain; the price of each piecemeal monopoly is an enabling disclosure to the public.[189]

Take, for example, an inventor who patents a rubber curing machine. The machine uses a mathematical equation to predict how long the process should take based on the temperature readings and includes an arrangement of temperature sensors to obtain those readings.[190] In order to monopolize the equation itself, the inventor could claim not just the one sensor arrangement, but every possible method of obtaining the temperature readings that the equation depends on. But even if the inventor can anticipate every workable permutation, simply claiming each one is not enough; the inventor must also disclose how to make and use them without undue experimentation.[191] This extracts a fair price for each alternate implementation the inventor puts forward. The window also remains open for others to develop variations unanticipated by the patentee.

## IV. TESTING IT OUT: APPLYING THE MERGER DOCTRINE TO PATENT ELIGIBILITY CASES

### A. *Mathematical Formula:* Diamond v. Diehr

In *Diamond v. Diehr*, a manufacturer patented a process of optimizing the cure time for molded synthetic rubber.[192] The cure process was temperature dependent, and the well-known Arrhenius equation related temperature to the

187. *See* Kristen Osenga, *The Shape of Things To Come: What We Can Learn from Patent Claim Length*, 28 SANTA CLARA COMPUT. & HIGH TECH. L.J. 617, 624 (2012) (postulating a correlation between the financial resources of a patentee and the number of claims applied for).

188. *See* 35 U.S.C. §§ 103, 112.

189. *See* Amgen Inc. v. Sanofi, 598 U.S. 594, 614–16 (2023) (holding that a patent must enable each variation of a claimed invention for the public to "receive its benefit of the bargain").

190. This factual scenario is borrowed from *Diamond v. Diehr*, 450 U.S. 175, 177–79 (1981), discussed *infra* in Section IV.A.

191. *See Amgen*, 598 U.S. at 614–16; *In re* Wands, 858 F.2d 731, 737 (Fed. Cir. 1988).

192. Diamond v. Diehr, 450 U.S. 175, 177 (1981).

rate of cure.[193] The manufacturer claimed a process for determining the optimal cure time for the rubber based on constant temperature measurements within the mold, which allowed precise cure times to be computed over the entire product by a computer applying the Arrhenius equation.[194] The Supreme Court held that this was a patent-eligible process; the inventors were not monopolizing the equation, but only claiming a process that included the constant and precise measurements of temperature.[195] Let us test this claim under the proposed merger doctrine framework.

The judicial exception in this case is an equation.[196] The application is the optimization of rubber curing.[197] Does the equation merge with the application of optimizing cure time? In other words, is what the manufacturer claimed one of the only ways to use the Arrhenius equation for making cured rubber pieces? The claim prescribes measuring the temperature in the cavity, computing the right rates and times by using the equation, and opening the mold at the specified time.[198]

In this case, we can imagine other ways to use the Arrhenius equation to optimize curing time. The computer automation portion adds little because every solution that uses the equation to optimize curing time would have needed a computer to control the process.[199] But the claim also prescribes the location and timing of measuring the temperature.[200] Temperature is a required input to the equation.[201] But other successful applications might derive the temperature through modeling, sporadically measuring, or inferring through the success or failure of other cures. Thus, the unpatentable equation has not merged with the claim; the manufacturer would not monopolize the Arrhenius equation itself. Others may find ways of determining the temperature of the rubber and use the same equation to optimize their own curing processes.

### B. *Natural Law:* Mayo v. Prometheus

In *Mayo*, the Supreme Court held that a claimed method for tailoring drug dosage to a patient's measured responses did not add "significantly more" to a natural phenomenon and was thus unpatentable.[202] Does an application of the merger doctrine yield a consistent result?

193. *Id.* at 177–78, 177 n.2.
194. *Id.*
195. *Id.* at 192–93.
196. *See id.* at 185.
197. *See id.* at 187.
198. *Id.*
199. The Supreme Court in *Diehr* noted that computers are not strictly needed for curing rubber but may be an essential part of preventing over- or undercuring as claimed. *See id.*
200. *Id.* at 179 & n.5.
201. *See id.* at 177 n.2.
202. Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc., 566 U.S. 66, 73–75 (2012).

Let us begin with the natural law recited in the claim: the dependence of therapeutic efficacy of a dose of thiopurine on metabolite concentrations in the patient's bloodstream.[203] In our parlance, the question would be: Is the natural law merged with the practical application?

To apply the merger doctrine, we ask: How many ways are there to apply this principle for the benefit of optimizing dosage? Besides the method recited in the claim—measuring the metabolites, lowering the dosage if too high, elevating the dosage if too low[204]—what other ways would there be to advantageously use the natural law? Perhaps there are many ways of measuring the concentration of the metabolite. But the claim provides no such specifics, and none are needed for one skilled in the art—measuring thiopurine concentration is easy.[205] Even if another inventor were to develop a novel and patentable means of measuring thiopurine, there would be no room to apply that for dosage optimization without infringing the patent claim.[206]

The claim does provide specific upper and lower limits for thiopurine concentrations that define the boundaries between harmful, helpful, and ineffectual dosages.[207] But any room left for others to use different limits is illusory. Prior to the invalidation of the patent, Mayo was found to infringe by selling a test utilizing a slightly higher upper limit since the ranges still overlapped.[208]

Thus, there is no conceptual room to develop other means of using the natural law without infringing this claim. The testing steps in the claim are thus merged with the natural law. This result is consistent with the *Mayo* Court's holding that the testing and administration steps of the claim did not add "significantly more" to the natural law.[209] But instead of looking in isolation at how "inventive" these additional elements are, the merger doctrine focuses our attention on what other solutions may exist to achieve the same benefit.

### C. *Abstract Idea:* Alice v. CLS Bank

The abstract idea in *Alice* was an intermediated settlement scheme.[210] Several claims recited generic computer elements, for example, a "computer-

203. *Id.* at 74–75.

204. *Id.*

205. *Id.* at 79.

206. The measurement step in Prometheus's claim was generic: "[D]etermining the level of 6-thioguanine." U.S. Patent No. 6,355,623 col. 20 l. 16 (filed Apr. 8, 1999) (issued Mar. 12, 2002). By not specifying a particular method, the claim sweeps up *any* means of determining the thioguanine level—including not-yet-invented methods.

207. *Mayo*, 566 U.S. at 74–75.

208. *Id.* at 75–76.

209. *Id.* at 77.

210. Alice Corp. Pty. v. CLS Bank Int'l, 573 U.S. 208, 218 (2014).

based data processing system."[211] Some claims did not include any computer elements,[212] but the patentee Alice stipulated that the method "requires the use of a computer to create electronic records, track multiple transactions, and issue simultaneous instructions."[213]

The application of the merger doctrine to *Alice* is straightforward. The computer is a needed component to apply the underlying abstract idea.[214] The computer-implemented version of the idea is therefore coextensive with the idea itself and should be unpatentable.

### D. *Software: Two PTAB Appeals Revisited*

We now return to the two similar patent applications with diverging outcomes introduced in Section II.C, which both involved abstract methods of ranking candidates' answers to a human-posed question.[215] The eventually-allowed 2015 application included a limiting element of its key claim: a "closure form" function call.[216] The closure form is a well-known type of function call in computer science,[217] and "conventional" implementations have been held to be insufficient to transform a judicial exception into a patentable invention.[218] This is a seemingly inconsistent result.

Under a merger doctrine analysis, however, this is a logical outcome. The closure form function call scheme represents an efficient way of sharing data between iterations of the method, such as when a user asks a follow-up question.[219] But this technique is only one of many ways that data can be passed from run to run for the purpose of ranking candidate answers. Data could be directly passed as arguments, passed through as pointers, stored in a database, or designated with a global scope to be shared by all functions.[220] By reciting

211. U.S. Patent No. 5,970,479 col. 60 l. 38 (filed May 28, 1993) (issued Oct. 19, 1999).

212. Most claims included either a computer or a "data processing system," but claims 33 and 34 describe the risk management method without reference to any apparatus. *Id.* at col. 65 ll. 33–34.

213. *Alice*, 573 U.S. at 224.

214. *Id.*

215. *Ex parte* Baughman, No. 2019-000665, at 3 (P.T.A.B. Sept. 25, 2019); *Ex parte* Beller, No. 2021-000235, at 2–3 (P.T.A.B. Mar. 21, 2022).

216. U.S. Patent Application No. 14/623,292, Publication No. 2016/0240095, at [0004] (published Aug. 18, 2016).

217. *See Function Call*, *supra* note 120; *Closure*, *supra* note 121.

218. Parker v. Flook, 437 U.S. 584, 590 (1978).

219. *See* U.S. Patent No. 10,573,190 col. 2 l. 63 to col. 3 l. 39 (filed Feb. 16, 2015) (issued Feb. 25, 2020).

220. *See, e.g.*, *Closure*, MOZILLA, https://developer.mozilla.org/en-US/docs/Web/JavaScript/Closures [https://perma.cc/F5HK-NJAU] (last updated Oct. 6, 2023) (discussing alternative strategies to closures in JavaScript). There are many ways to pass data between functions. For general encyclopedia definitions of several possibilities, see, for example, *Argument*, PCMAG, https://www.pcmag.com/encyclopedia/term/argument [https://perma.cc/28SJ-7ZE6]; *Pointer*, PCMAG, https://www.pcmag.com/encyclopedia/term/pointer [https://perma.cc/5YMQ-

the closure form as the specific means of sharing data between iterations, however, the claim does not prevent other implementations of the same ranking scheme. Indeed, there are many possible ways beyond the claimed closure form method. The claim does not merge with the abstract ranking method and should be patent eligible.

By contrast, the 2016 application lacks a similar claim element that limits its preemptive potential.[221] Without such a limitation, there is no way to apply the underlying idea of ranking candidate answers. Compared to the 2015 application, the 2016 application does introduce a new claim element: a "specificity score" that indicates how close to the mark a candidate's answer is.[222] However, the idea of scoring possible answers by specificity is an abstract one, and the claim recites no particular method for computing the specificity score. Since the only way to apply the abstract idea is to do so in a way that infringes the claim, the abstract idea merges with the claim.

These conclusions are consistent with the holdings of the PTAB in the respective appeals of examiner rejections. Under the merger doctrine, however, we avoid the misdirected analysis of how conventional a closure form function is, and instead ask whether there are so few other practical implementations that the claim and the abstract idea are merged.

## CONCLUSION

The merger doctrine serves many of the same purposes in copyright that patent subject matter eligibility doctrine attempts to capture. Unlike the vague benchmarks of an "inventive concept" that adds "significantly more," the merger doctrine is intuitive to apply and adaptable to a variety of circumstances. In some ways, the merger doctrine is better suited to patents than to copyrights. Every copyrighted work contains a continuum of elements from specific to general, and the scope of an expression (and the applicability of the merger doctrine) is difficult to identify. Patents, on the other hand, have enumerated claims that define their scope. The expression is always clearly defined.

The term "merger" also connotes a single identity: a merging of the idea and the expression such that they are one and the same. The expression is not protectable because it *is* the idea. This ontology is also well suited to the patent sphere. An abstract idea is not patentable; an abstract idea implemented by a run-of-the-mill computer is not patentable because the combination still *is* the abstract idea.

QUTN]; *Database*, PCMAG, https://www.pcmag.com/encyclopedia/term/database [https://perma.cc/MKY5-6GY5]; *Global Variable*, PCMAG, https://www.pcmag.com/encyclopedia/term/global-variable [https://perma.cc/GJ27-LYSR].

221. *See Ex parte* Beller, No. 2021-000235, at 6 (P.T.A.B. Mar. 21, 2022).

222. *Id.* at 9.

Ultimately, the merger doctrine is substantially focused on the preemptive potential of a particular expression. Preemption of natural principles is also the undercurrent beneath the judicial exceptions to the otherwise inclusive categories of Section 101. The merger doctrine is a flexible approach, which is essential for keeping up with new technologies and preventing manipulation.

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