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**PATENTS**

The authors discuss the challenges of protecting process patents infringed by AI systems and suggest that patent owner plaintiffs may successfully pursue claims using 35 U.S.C. § 295 burden shifting.

**Is 35 U.S.C. § 295 the Key to the AI Black Box?**



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Artificial intelligence (AI) is stepping out of science fiction and into our everyday lives at a rapid pace. As industries across the board adopt AI, instances of patent infringement are inevitable.

However, since much of an AI's operation occurs in a black box, alleging infringement of a patented process used by the AI presents a formidable task. Even if a plaintiff can survive the pleading stage, the difficulty of backtracking through an AI's decision-making process makes proving infringement by a preponderance of the evidence a particularly challenging endeavor.

We suggest that the burden-shifting provision of 35 U.S.C. § 295 provides a potent tool to protect patented processes in the age of AI.

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**Today's AI Landscape**

While AI has been in the public consciousness for decades, it has experienced a rapid rise in adoption and market penetration in the last few years. AI has the potential for significant impact in retail (e.g., warehousing and logistics, price setting, and promotion personalization), electric utilities (e.g., usage and supply optimization), manufacturing (e.g., supply and demand planning and price setting), and health care (e.g., diagnostic accuracy and tailored treatments/drugs), amongst others. McKinsey Global Institute, *Artificial Intelligence: The Next Digital Frontier*, Discussion Paper, 42-64 (June 2017).

Advances in AI have also made it a source of originality. "Recent successes have demonstrated that computers can independently learn how to perform tasks, prove mathematical theorems, and engage in artistic endeavours such as writing original poetry and music, and painting original works." Erica Fraser, *Computers as Inventors — Legal and Policy Implications of Artificial Intelligence on Patent Law*, 13:3 SCRIPTed 305 (2016) (<https://script-ed.org/?p=3195>).

In industry, AI has been entrusted with innovation. For example, Intel boosted its pipeline of integrated-circuit products after applying machine learning in its R&D department. McKinsey Global Institute, at 54. One startup's AI designs personalized cancer-treatment regimens by identifying the optimal drug for specific tumors or combination therapies. *Id.* at 62. Another company uses AI to recommend the optimal time for patients to take medication based on each patient's vitals. *Id.* at 62.

**Potential Infringement** As AI grows in ubiquity and advances in sophistication, so too does its potential for infringement. There have been at least 29 instances where AI has duplicated expired patents or infringed existing ones. John R. Koza, *Human-Competitive Re-*

sults Produced by Genetic Programming, 11 Genetic Programming & Evolvable Machines 251, 265 (2010).

An understanding of how AI may infringe a patent requires an understanding of how AI operates. While there are many variations, two approaches that have garnered particular attention are genetic programming (GP) and artificial neural networks (ANN). GP encompasses algorithms that begin with a known set of candidate solutions that are iteratively improved upon without human intervention until they meet termination criteria. See Fraser, 13:3 SCRIPTed, at 316. An ANN system, on the other hand, emulates the interconnected neurons of the human brain. Each artificial neuron carries a weight and corresponding strength that waxes or wanes with experience. *Id.* at 317. The weighting is set initially by seed information that passes through various layers of these artificial neurons, each applying different weights, until the data is transformed. *Id.* The weight setting can be either supervised (using labeled data) or unsupervised (interpreting unlabeled data). *Id.*

The key to understanding the difficulties of identifying and pleading infringement is that, after the seed or training data is sown in a GP or ANN system, its transformations occur in a black box. That is, while the inputs and outputs of the AI system can be viewed, the implementation of the internal process is hidden from view. Developers do not dictate the end result with their input as they would with basic software, and end users will see the end result without knowing the decision-making process of the GP or ANN system.

For example, medical AI could independently discover and use a patented method to reach a diagnosis without the developer or end user knowing such a process was used. However, patent law cares not for the unaware. Infringement under 35 U.S.C. § 271(a) is a strict liability offense. *Commil USA, LLC v. Cisco Sys.*, 135 S. Ct. 1920, 1926 (2015). Nor does it matter that an AI system could evolve away from the patented process. “It is well settled that an accused device that ‘sometimes, but not always, embodies a claim[] nonetheless infringes.’” *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1333 (Fed. Cir. 2013) (quoting *Bell Commc’n Research, Inc. v. Vitalink Commc’n Corp.*, 55 F.3d 615, 622-23 (Fed. Cir. 1995)).

## Pleading and Pursuing AI Infringement by Section 295 Burden Shifting

With AI operating in a black box, pleading infringement of a patented process to the heightened pleading standard of *Iqbal/Twombly* presents a formidable challenge. That is, without knowing the AI’s internal machinations, it would be highly unlikely that the patent owner plaintiff could plead above a speculative level that every limitation, or equivalent thereof, in its claims can plausibly be found in the accused product or process. *Bell Atl. Corp. v. Twombly*, 550 U.S. 544, 555 (2007).

The case law is somewhat but not entirely sympathetic to the patent owner’s plight. “[T]here is no absolute requirement that a plaintiff engage in reverse engineering of an accused product prior to filing an infringement claim,” *Bender v. Maxim Integrated Prods.*, No. C 09-01152 SI, 2010 BL 393003, at \*5 (N.D. Cal. July 29, 2010). See also *K-Tech Telecomm., Inc. v. Time*

*Warner Cable, Inc.*, 714 F.3d 1277, 1283 (Fed. Cir. 2013) (finding plausibility based on circumstantial evidence of infringement because of plaintiffs’ lack of access to the underlying infringing products). However, the U.S. Court of Appeals for the Federal Circuit’s view in an analogous factual situation—indecipherable assembly language generated from compiled but unavailable source code—suggests that plaintiffs would have limited success beyond the pleading stage. *i4i v. Microsoft*, 598 F.3d 831, 848 (Fed. Cir. 2010) (“Although the absence of the source code is not Microsoft’s fault, the burden was still on Microsoft to show by clear and convincing evidence that S4 embodied all of the claim limitations.”).

We suggest that patent owner plaintiffs may instead fare better with the burden-shifting mechanism of 35 U.S.C. § 295. This process patent-specific statute provides:

“In actions alleging infringement of a process patent based on the importation, sale, offer for sale, or use of a product which is made from a process patented in the United States, if the court finds—

(1) that a substantial likelihood exists that the product was made by the patented process, and  
(2) that the plaintiff has made a reasonable effort to determine the process actually used in the production of the product and was unable so to determine, the product shall be presumed to have been so made, and the burden of establishing that the product was not made by the process shall be on the party asserting [non-infringement].”

“As a general proposition, the law places the burden of proving infringement on the patentee who alleges it.” *Nutrinova Nutrition Specialties & Food Ingredients GmbH v. ITC*, 224 F.3d 1356, 1359 (Fed. Cir. 2000). However, under Section 295, “[w]hen two conditions are met, the statute shifts that burden and requires the alleged infringer to disprove infringement.” *Nutrinova Nutrition Specialties & Food Ingredients GmbH v. ITC*, 224 F.3d 1356, 1359 (Fed. Cir. 2000).

The Federal Circuit has articulated the principle underlying this provision: “Because the accused infringer is in a far better position to determine the actual manufacturing process than the patentee, fairness dictates that the accused, likely the only party able to obtain this information, reveal this process or face the presumption of infringement.” *Creative Compounds, LLC v. Star-mark Labs.*, 651 F.3d 1303, 1314-15 (Fed. Cir. 2011). Section 295 was enacted as part of the Omnibus Trade and Competitiveness Act of 1987 with its purpose described as follows:

“This presumption addresses a great difficulty a patentee may have in proving that the patented process was actually used in the manufacture of the product in question in those cases, where the manufacturer is not subject to discovery under the Federal Rules of Civil Procedure. For example, patent owners will frequently be unable to obtain information concerning the nature of processes being practiced by foreign manufacturers. Shifting the presumption should create no substantial burden, as an accused infringer should be in a much better position to establish that the product was made by another method.” H.R. Rep. 100-60, p.16 (1987).

While passed under the auspices of protecting U.S. interests against uncooperative foreign manufacturers, the statutory text is not so limited. Moreover, despite the reference to foreign manufacturers in the congress-

sional record, that the defendant is a foreigner has not been a prerequisite to application of the statute. *See, e.g., Aventis Pharm., Inc. v. Barr Labs., Inc.*, 411 F. Supp. 2d 490 (D.N.J. Jan. 30, 2006). Furthermore, while chemical processes are often the subject of cases invoking this provision, the statutory language and legislative intent do not limit this provision to chemical cases. Thus, neither the statutory language nor intent should preclude its use in matters of AI.

But what should plaintiffs make of Section 295's two preconditions? With limited case law on this issue, the Congressional record offers the clearest explanation.

As a preliminary matter, neither requirement is to be "casually established." H.R. Rep. 100-60, at 17 (1987). However, Congress understood that "at the time of giving notice, the plaintiff will not have had the benefits of the discovery process and thus the notice requirement is not intended to impose harsh evidentiary burden on the plaintiff." *Id.* "Rather, the plaintiff is expected to set forth facts which the plaintiff could reasonably be expected to have on hand and which form the basis for a reasonable belief that the product was made using the patented process." *Id.*

As to the "substantial likelihood of infringement" requirement, the House Judiciary Committee allows circumstantial evidence:

"Adequate circumstantial evidence for example, could include telltale signs of the use of the patented process which could be found in the product itself. When chemical processes are used, unique trace impurities or a characteristic pattern of impurities may be present which fingerprint the process of manufacture. Circumstantial evidence also could include a showing that the patented process represent a substantial improvement in efficiency over prior processes and that no alternative, economically feasible process exists. This could be demonstrated by showing that the sales price of the product would have to be considerably higher if the product was made by any known process other than the patented one." *Id.*

The Senate Committee on the Judiciary further adds that "[a] patentee might show that the patented process was the only known method, or the only commercially practical method, for producing the product, or that physical evidence, such as the exact chemical composition of the product, indicates the use of the patented process." S. Rep. No. 100-83, at 45 (1987); 132 Cong Rec S 17386, at 6 (Nov. 6, 1986).

For the second Section 295 prerequisite, "[c]oncerning reasonable efforts by the patentee, such efforts can be made by attempting to obtain discovery, or showing that efforts to obtain discovery of information located in a foreign country [have been or even] would be futile." H.R. Rep. 100-60 (1987). Thus, a patent owner plaintiff might look at the product produced by the AI to identify properties characteristic of the process that produced it or wait until the product hits the market to assess the economic feasibility of its price points without using an infringing method. The second requirement of "reasonable efforts" might be made through efforts to obtain the seed or training data for the AI to discern whether the developer took steps to steer the AI from patented subject matter or directly towards it.

Another feature of Section 295 that would benefit the patent owner plaintiff is the court's broad discretion in deciding at what point a Section 295 determination

should be made. *Nutrivona*, 224 F.3d at 1360. That is, a court may find Section 295 to be a triable issue that would allow plaintiffs the substantial benefits of proceeding to discovery. *See, e.g., Kemin Foods, L.C. v. Pigmentos Vegetales Del Centro S.A. de C.V.*, 369 F. Supp. 2d 1075, 1086 (S.D. Iowa 2005) ("Section 295 has served its purpose in shifting the burden at trial"). If the court should allow the case to proceed to discovery, the patent holder may obtain the initial GP solution set or ANN training data that might establish that developers steered the AI system towards the patented process through suggestive inputs or, at least, failed to train the AI away from patented subject matter.

Even if the court does not permit the case to proceed to trial before settling the Section 295 issue, local patent rules might provide plaintiffs with the material they need early in the proceeding. These rules may require, for example, disclosure of source code or other documentation that may reveal the tendencies of the AI. *See, e.g., Patent L. R. 3-4* (E.D. Tex.) ("Source code, specifications, schematics, flow charts, artwork, formulas, or other documentation sufficient to show the operation of any aspects or elements of an Accused Instrumentality identified by the patent claimant . . ."); *Patent L. R. 3.4* (S.D. Cal.) (same).

And what response can plaintiffs then expect from defendants when the burden shifts? The House Judiciary Committee explained, "At a minimum, the Committee would expect that the defendant would have to introduce evidence, for example affidavits from the manufacturer with supporting documentation adequate to demonstrate that a non-infringing process was used." H.R. Rep. 100-60 (1987). This is admittedly a cumbersome task. Backtracking AI output through the layers of an ANN or evolutionary path of a GP algorithm is not an easy feat. But the defendant, with access to the training history of the AI and first-hand observation, is in a far better position to determine whether the AI developed an infringing process than the plaintiff.

### Third Party Liability: Indirect Infringement

Many entities that see a place for AI in their business have relied on third parties to provide AI capabilities. For example, Google's DeepMind has partnered with Moorfields Eye Hospital in the U.K., and IBM has deployed Watson at the Cleveland Clinic Lerner College of Medicine. McKinsey Global Institute, at 61. If the third-party AI provider simply licenses its AI capabilities, it may maintain an adequate distance from direct infringement liability. *See Joy Technologies, Inc. v. Flakt, Inc.*, 6 F.3d 770, 775 (Fed. Cir. 1993) ("A method claim is directly infringed only by one practicing the patented method."); *Engate, Inc. v. Esquire Deposition Servs., LLC*, No. 01-C-6204, Doc. No. 145, at \*9 (N.D. Ill. June 13, 2003) ("For a method claim to be infringed, [plaintiff] must show that the defendants did more than simply provide the equipment necessary to accomplish the claimed methods"). However, third-party providers will likely assist with training the AI. If the AI then develops and uses a patented process, would the third-party provider be liable for indirect infringement?

Such a pleading would be a difficult endeavor. Unlike direct infringement, induced and contributory infringement, pursuant to 35 U.S.C. §§ 271(b) and (c), have a

knowledge requirement. *Commil USA, LLC v. Cisco Sys.*, 135 S. Ct. 1920, 1926 (2015). While the black box of AI provides an obvious defense for actual knowledge, willful blindness to the infringement can stand in place of this requirement. *Warsaw Orthopedic, Inc. v. NuVasive, Inc.*, 824 F.3d 1344, 1347 (Fed. Cir. 2016). In the AI context, willful blindness may take the form of the seed or training data inputted into the GP or ANN. For example, developers may train an ANN with labelled data to guide its evolution towards a patented process while disclaiming knowledge of infringement due to the black box decision-making of the AI. Alternatively, developers may deliberately omit training the AI to avoid patented subject matter. Admittedly, willful blindness is a high standard and requires that “the alleged inducer (1) subjectively believe that there is a high probability that a fact exists and (2) take deliberate actions to avoid learning of that fact.” *Info-Hold, Inc. v. Muzak LLC*, 783 F.3d 1365, 1373 (Fed. Cir. 2015).

It would be extremely difficult to trace what seed or training data led a GP or ANN to a particular output. However, if plaintiffs can pass the pleading stage to dis-

covery, obtaining this seed or training data may indicate whether the input steered the AI system towards a patented process or failed to steer the AI away and thus created a high probability of infringement.

## Conclusion

The burden-shifting mechanisms of Section 295 may open the first door to process patent owners’ claims of infringement by AI. Given the influence that training and seed data has on the evolution of GP and ANN, courts may provide greater leniency at the pleading stage such that discovery can shed greater light on the machinations of the AI. As case law in this area accumulates, so too may the obligations of AI developers. What obligations do AI developers have to train their AI systems to steer clear of patented subject matter? What degree of training or seed data in GP or ANN will render developers liable or exculpate them?

Given the current pace of AI development, we can look forward to answers to these questions in the near future.