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Remaking Making: Integrating Self-Replicating Technologies with the Exhaustion Doctrine

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REMAKING MAKING: INTEGRATING SELF-REPLICATING TECHNOLOGIES WITH THE EXHAUSTION DOCTRINE

Abstract: Self-replicating technologies such as genetically modified organisms have unquestionably improved the farming industry. In order to ensure continued innovation in this area, the law has increasingly established protections for this technology. Although the exhaustion doctrine serves as a limit to a patent holder's rights, the application of the current patent infringement regime may be over-inclusive as self-replicating technologies continue to advance. This Note identifies *Bowman v. Monsanto* as a recent example of how self-replicating patented products could lead to blanket infringement liability, including for innocent infringers. This Note recommends that the definition of "making" be redefined to include only those who knowingly reproduce a patented article. This new, more precise definition of "making" will improve the modern patent infringement framework and successfully integrate self-replicating technologies into the current exhaustion doctrine.

INTRODUCTION

In 2013, seventy-five year old Vernon Hugh Bowman, a small-scale farmer from Indiana, faced Monsanto, one of the most dominant agricultural biotechnology companies in the world.¹ The case was litigated for four years before it reached the U.S. Supreme Court.² The case presented a unique issue: self-replicating technologies, such as Roundup Ready seeds, can independently reproduce themselves with minimal human intervention.³ The question was

¹ Andrew Pollack, *Farmer's Supreme Court Challenge Puts Monsanto Patents at Risk*, N.Y. TIMES (Feb. 15, 2013), <http://www.nytimes.com/2013/02/16/business/supreme-court-to-hear-monsanto-seed-patent-case.html> [<https://perma.cc/X993-HS47>]. With only three hundred acres of land, Bowman did not consider himself as a farmer. *Id.*

² See *Patent Act of 1952—Patent Exhaustion Doctrine—Bowman v. Monsanto Co.*, 127 HARV. L. REV. 378, 379 (2013); Pollack, *supra* note 1. In 2009, the U.S. District Court for the Southern District of Indiana rebuffed Vernon Hugh Bowman's argument that the exhaustion doctrine did not apply to Monsanto's Roundup Ready seeds. *Patent Act of 1952—Patent Exhaustion Doctrine—Bowman v. Monsanto Co.*, *supra*, at 379. The U.S. Court of Appeals for the Federal Circuit affirmed the District Court's decision, rejecting the theory that self-replicating technologies required special treatment outside of the exhaustion doctrine's traditional application. *Id.*

³ See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1765, 1769 (2013) (noting that Bowman's theory that the soybeans replicate on their own fails to recognize the human labor involved, including buying the seeds from the grain elevator and spraying the herbicide in order to rid the crop of seeds without the Roundup Ready technology); Daryl Lim, *Self-Replicating Technologies and the Challenge for the Patent and Antitrust Laws*, 32 CARDOZO ARTS & ENT. L.J. 131, 131 (2013). Roundup Ready seeds are genetically modified seeds with traits that are transferred into each successive soy-

whether someone who buys the patent-protected Roundup Ready seeds can reproduce the seeds without the patent holder's consent.⁴ The Court was tasked with determining how to apply existing patent law doctrines to a situation that could not have been fathomed at the time the principles were established.⁵ The dispute also highlighted longstanding tensions within patent law between the right of inventors to exclusively profit from their creations and the rights of purchasers after a legitimate sale.⁶

The difficulty of applying patent law to new technologies was initially apparent in the Organic Seed Growers's Association's ("OSGA") lawsuit against Monsanto in 2012.⁷ There, OSGA sought to invalidate Monsanto's patents and challenge future infringement liability.⁸ Organic Seed Growers's primary claim was that farmers could be held liable as innocent infringers, bringing attention to the merits of patent infringement claims in relation to self-replicating technology.⁹ Currently, liability under patent infringement does not require that an infringer have knowledge that a violation has occurred.¹⁰ However, whether patent infringement should use a strict liability standard is debatable, since the patent statute does not directly speak to the issue.¹¹ Ultimately, *Organic Seed Growers & Trade Ass'n v. Monsanto Co.* highlighted the fact that self-replicating technologies have the ability to create copies of them-

bean crop. *Monsanto Co. v. Bowman*, 686 F. Supp. 2d 834, 835–36 (S.D. Ind. 2009), *aff'd*, 657 F.3d 1341 (Fed. Cir. 2011), *aff'd*, 133 S. Ct. 1761 (2013). Self-replicating technologies are those that have the ability to proliferate while they are being used. *Id.* Such technologies include seeds that have genetic material such as deoxyribonucleic acid (DNA) that is encrypted with the guidelines needed to replicate itself. Christopher M. Holman, *Bowman v. Monsanto Co.: A Bellwether for the Emerging Issue of Patentable Self-Replicating Technologies and Inadvertent Infringement*, 80 MO. L. REV. 665, 670 (2015).

⁴ *Bowman*, 133 S. Ct. at 1764.

⁵ See Pollack, *supra* note 1 (recognizing that, on the one hand, the patenting of living organisms is considered unethical and harmful to farmers because of increasing prices, while on the other hand, this kind of biotechnology has significantly increased crop yields).

⁶ See *id.* (noting that critics in the biotechnology industry have argued that the domination and power of Monsanto's patents should be challenged, while supporters of the industry believe that the rights of patent holders are well settled). Critics have described Monsanto's domination in the biotechnology industry as one that exerts excessive control over farmers and discourages the proliferation of other, non-engineered plant varieties. *Id.*

⁷ See *Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, 718 F.3d 1350, 1352 (Fed. Cir. 2013) (seeking a declaratory judgment to invalidate twenty-three Monsanto patents). Organic Seed Growers is an organization that represents organic farmers and seeks to protect their interests in cultivating uncontaminated seed. *OSGATA's Mission*, ORGANIC SEED GROWERS & TRADE ASS'N, <http://www.osgata.org/about/> [https://perma.cc/QAF8-Y383].

⁸ *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1352.

⁹ *Id.* at 1353.

¹⁰ See 35 U.S.C. § 271(b) (2012) (setting forth only the actual conduct that will be deemed patent infringement and remaining silent on the mental state that must accompany the conduct).

¹¹ See *id.*

selves with minimal intervention and, consequently, the traditional patent principles do not neatly apply.¹²

This inevitable issue again came to fruition in *Bowman v. Monsanto Co.*¹³ On its face, Bowman's argument seemed ill-considered and not one that would be granted a writ of certiorari by the U.S. Supreme Court.¹⁴ His argument went directly against traditional patent law doctrines, reasoning that purchasers of a patented article should be able to make unlimited copies of the product.¹⁵ Despite what seemed like a meritless argument, Bowman's situation was unique because of the kind of patented article at issue: a genetically modified soybean that can independently self-replicate by replanting its seeds.¹⁶

The stakes were extremely high—numerous organizations and individuals filed amicus briefs, emphasizing the potential consequences of the decision.¹⁷ On the one hand, organizations such as the American Seed Trade Association, CropLife America, and the American Intellectual Property Law Association submitted amicus briefs in support of Monsanto's position, arguing that a decision in favor of Bowman would not only contradict traditional patent law principles, but also have a negative impact on the biotechnology industry.¹⁸ On the other hand, organizations such as the American Antitrust Institute and the Public Patent Foundation supported Bowman's position, emphasizing the policy implications of the case and the unfair advantage companies like Monsanto have against small farmers.¹⁹

The Court essentially had two choices.²⁰ If it held in favor of Monsanto, the decision had the potential to significantly restructure the relationship between farmers and companies that sell seeds.²¹ But, if the Court decided to se-

¹² See Holman, *supra* note 3, at 672 (discussing the evolution of self-replicating technologies, their increasing prevalence, and potential implications in the future).

¹³ *Id.* at 667.

¹⁴ *Id.*

¹⁵ *Bowman*, 133 S. Ct. at 1768.

¹⁶ *Id.* at 1764–65; Holman, *supra* note 3, at 667.

¹⁷ Pollack, *supra* note 1.

¹⁸ Brief Amicus Curiae of the American Seed Trade Ass'n in Support of Respondents at 6, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 267021, at *17 (representing 700 members partaking in the production or distribution elements of the seed industry); Brief for the American Intellectual Property Law Ass'n as Amicus Curiae in Support of Affirmance at 1, *Bowman*, 133 S. Ct. 1761 (No. 11-796) 2013 WL 314458, at *1 (representing practicing attorneys and academics involved in intellectual property law); Brief of CropLife America as Amicus Curiae Supporting Affirmance at 1, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 314456, at *1 (representing the companies that advance, make, and disburse biotechnology products).

¹⁹ Brief of Amici Curiae the American Antitrust Institute et al. in Support of Petitioner at 1–3, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6208274, at *1–3 (focusing on advancing and maintaining antitrust law); Brief of the Public Patent Foundation as Amicus Curiae in Support of Petitioner at 1–2, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6219038, at *1–2 (providing legal services pertaining to maintaining flexibility within the patent regime).

²⁰ See Pollack, *supra* note 1.

²¹ See *id.*

verely limit the rights of patent holders in favor of the farmers, a multibillion-dollar industry could be drastically transformed.²² Ultimately, the facts presented in *Bowman* were specific enough to allow the Court to rule narrowly, concluding that the exhaustion doctrine did not apply.²³ The Court explicitly left open the possibility that a more technologically advanced self-replicating invention could warrant a contrary decision in the future.²⁴ As a result, this decision left lingering questions that went beyond *Bowman*.²⁵ Particularly, as little to no human intervention becomes prevalent in advanced self-replicating biotechnology, it is foreseeable that an emphasis on the infringer's conduct to support patent infringement will be erroneous.²⁶ Further, such a phenomenon will call into question the role of strict liability in patent infringement when an accused infringer is unaware.²⁷ Confronting these lingering issues before they come before a court will help ensure clarity and predictability in this area of the law.²⁸

Part I of this Note traces the development of patent law and the exhaustion doctrine.²⁹ Part II looks to the exhaustion doctrine's interpretation of "making" and the way it affects the scope of the rule.³⁰ It also explains how legislation has provided the foundation for the proliferation of agricultural biotechnology.³¹ Part III takes a closer look at the role of "making" in the exhaustion doctrine and recommends a new interpretation that requires intent and knowledge.³²

I. PATENT PROTECTION AND SELF-REPLICATING TECHNOLOGY

A. Historically

Both statutory law and common law have sought to balance the desire to promote innovation through incentives, while prioritizing competition.³³ The

²² See *id.*

²³ See *Bowman*, 133 S. Ct. at 1768 (noting that the holding was limited).

²⁴ See *id.*

²⁵ See Holman, *supra* note 3, at 667–68.

²⁶ See *id.*

²⁷ See *id.* at 700 (noting the patent infringement regime's silence regarding the requisite mental state).

²⁸ See Holman, *supra* note 3, at 668 (recognizing that the decision in *Bowman* left open the applicability of patent law to self-replicating technologies); Daryl Lim, *Living with Monsanto*, 2015 MICH. ST. L. REV. 559, 563–64 (proposing that based on the decision in *Bowman*, examination of companies such as Monsanto under the doctrines of patent misuse and antitrust law should be based on an effect-focused methodology).

²⁹ See *infra* notes 33–179 and accompanying text.

³⁰ See *infra* notes 180–245 and accompanying text.

³¹ See *infra* notes 180–245 and accompanying text.

³² See *infra* notes 246–310 and accompanying text.

³³ See INTELLECTUAL PROPERTY IN THE NEW TECHNOLOGICAL AGE: 2016, VOLUME I: PERSPECTIVES, TRADE SECRETS AND PATENTS, at III-4, III-6 (Mark A. Lemley eds., 2016) [hereinafter IP

enduring history of patent law reflects this challenge in a number of ways.³⁴ For instance, the Republic of Venice's Venetian Act of 1474 allowed new inventions that met a number of requirements to be registered with the General Welfare Board and receive certain privileges.³⁵ It also required that the device be perfected and information on its functionality be made available to the General Welfare Board.³⁶ Once these requirements were met, a patent would be established, and the owner would have exclusive rights to the invention for ten years.³⁷ Initially, many products could only be sold in commerce through specialized guilds.³⁸ As a result, a major purpose underlying this new patent system was to encourage greater competition by allowing those not included in the guilds—typically foreigners—to access the market.³⁹

By the sixteenth century, Great Britain established a patent system similar to the one that existed under the Venetian Act.⁴⁰ They wanted to ensure the exclusive right of any commercial benefits for a set period of time in order to incentivize foreign inventors to introduce new technologies to the country.⁴¹ As this early patent system developed, statutes shifted the decision as to which

IN THE TECH AGE] (tracing the historical roots of the modern law patent doctrine, beginning with the Venetian Act of 1474 to the modern interpretation of the Patent Act, last revised in 1952); *see also* Transcript of Oral Argument at 3, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 1842087, at *3 (questioning the incentives to improve seeds in the absence of patent protection). In *Bowman v. Monsanto Co.*, Chief Justice Roberts' opening question to Bowman's lawyer was: "Why in the world would anybody spend any money to try to improve the seed if as soon as they sold the first one anybody could grow more and have as many of those seeds as they want?" *Id.* The Chief Justice's question demonstrates the enduring rationale behind patent law. *See id.*

³⁴ IP IN THE TECH AGE, *supra* note 33, at III-4 to -5, III-9. The Venetian Act of 1474, followed by Britain's Statute of Monopolies of 1624, specifically set forth the exclusive rights of use and creation for new inventions for limited time periods, while the modern Patent Act of the United States fluctuated between lesser and greater protection, depending on the general perspective at the time. *Id.*

³⁵ *Id.* The Republic of Venice was a state in Italy that existed from the late seventh century until approximately 1797. *Republic of Venice*, NEW WORLD ENCYCLOPEDIA (Feb. 11, 2009), http://www.newworldencyclopedia.org/entry/Republic_of_Venice [<https://perma.cc/RLW6-4LSL>]. Under the Venetian Patent Statute, a patent may be granted for any "new and ingenious device, not previously made." Joanna Kostylo, *Commentary on: Venetian Statute on Industrial Brevets (1474)*, PRIMARY SOURCES ON COPYRIGHT (1450–1900) (2008), http://www.copyrighthistory.org/cam/tools/request/showRecord?id=commentary_i_1474 [<https://perma.cc/GHN9-VH3Y>].

³⁶ IP IN THE TECH AGE, *supra* note 33, at III-4 to -5, III-9.

³⁷ *Id.*

³⁸ *See id.* at III-4 (noting that one of the main reasons patent law was established was to create a path for foreigners and others to enter the market of producing new technologies, controlled by the sophisticated artisan guilds of Venice); Ted Sichelman & Sean O'Connor, *Patents as Promoters of Competition: The Guild Origins of Patent Law in the Venetian Republic*, 49 SAN DIEGO L. REV. 1267, 1268–69 (2012) (noting that guilds had a monopoly on the ability to sell new technologies).

³⁹ *See* Sichelman & O'Connor, *supra* note 38, at 1268–69 (discussing the guild system under the Venetian economy which required that products were exclusively sold through such organizations).

⁴⁰ *Id.*

⁴¹ *Id.*

inventions received patent rights from board members to the English common law courts.⁴²

The adoption of the British legal system in the American colonies included this patent law regime.⁴³ The previous system in the colonies proved to be unmanageable as each colony created its own set of patent laws.⁴⁴ Participants in the Constitutional Convention therefore drafted Clause 8, located within Article I, Section 8.⁴⁵ This provision established the legal protection of various inventions through patent rights and serves as the authority for today's intellectual property regime.⁴⁶

Despite patent law's deep and historical roots, the simplicity underlying the doctrine has endured.⁴⁷ Under a modern patent law framework, an inventor is afforded exclusive rights to the invention for a specific time period, including the right to prevent others from replicating it or using it in a way that undermines the inventor's ability to profit from it.⁴⁸ However, as technology develops, applying this seemingly straightforward doctrine is increasingly difficult.⁴⁹

⁴² See *id.* The conferring of patent rights came to be seen as a "royal favor" by the seventeenth century. *Id.* In direct response to this phenomenon, the British Parliament created a new law, which empowered the common law courts with the ability to review patents. *Id.*

⁴³ See IP IN THE TECH AGE, *supra* note 33, at III-6.

⁴⁴ *Id.*

⁴⁵ U.S. CONST. art. I, § 8, cl. 8. This provision grants Congress the power to "promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." *Id.*

⁴⁶ *Id.*; see IP IN THE TECH AGE, *supra* note 33, at III-6. The constitutional provision authorized Congress to allow for exclusive rights to be awarded for new inventions for a limited time period. IP IN THE TECH AGE, *supra* note 33, at III-6. As a result, Congress passed the Patent Act in 1790, which included few particulars outside of the scope of protection, time period, and solution for when the rights have been infringed. *Id.* As a result, the Patent Act of 1793 was then established, which focused less on the usefulness of inventions and more on the newly created registration system for new discoveries. *Id.* at III-7. After becoming increasingly robust after a revision in 1836, the Patent Act's last major revision in 1952 represented a focus on the original principles of patent law. *Id.* at III-7 to -9.

⁴⁷ IP IN THE TECH AGE, *supra* note 33, at III-6.

⁴⁸ See 35 U.S.C. § 271 (2012) (detailing the conduct that will be considered patent infringement); IP IN THE TECH AGE, *supra* note 33, at III-4 to -5. The Venetian Act of 1474 afforded exclusive rights to an inventor for a term of ten years with the right to sue an infringer in court, while Britain's Statute of Monopolies of 1624 allowed for a monopoly of fourteen years. IP IN THE TECH AGE, *supra* note 33, at III-4 to -5.

⁴⁹ See *Bowman*, 133 S. Ct. at 1768. Because the case dealt with a self-replicating technology, the Court in *Bowman* argued against traditional patent law principles, reasoning that after an authorized sale, a purchaser is allowed to create and supply copies of the product. *Id.* This stands in stark contrast to patent law, which is premised on preventing others from making duplicates of their invention. *Id.*; see *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 133 S. Ct. 2107, 2114 (2013) (determining whether naturally occurring DNA sequences are patentable); *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 72 (2012) (determining whether a diagnostics test that measured metabolites was patentable subject matter).

B. Exhaustion Doctrine

The exhaustion doctrine is a judicially created legal principle that continues to develop.⁵⁰ It rests on the belief that, although the law should provide incentives for technological developments, any subsequent rewards should be limited in order to achieve further innovation.⁵¹ The Court first defined the exhaustion doctrine in *Adams v. Burke*, establishing that there is a limit to a patentee's reward.⁵² Courts later modified the doctrine's scope, as restrictions on the use of patent holders's inventions became acceptable.⁵³ As it became more complex to apply the rule, courts began to clarify the exhaustion doctrine's limits while reexamining patent holders's rights.⁵⁴

The exhaustion doctrine states that an initial approved sale of a patented item exhausts any further rights the patent holder has to that item.⁵⁵ In other words, after a sale, the buyers have the right to use or sell the item in any way they wish.⁵⁶ Beginning in the early nineteenth century, a series of court decisions defined and expanded the exhaustion doctrine.⁵⁷ Still, the scope of the exhaustion doctrine is limited, as it does not allow the buyer to reconstruct or

⁵⁰ Holman, *supra* note 3, at 667; see Lim, *supra* note 28, at 561, 571–73 (discussing the ongoing development of the exhaustion doctrine under *Bowman*); see also Ronald Mann, *Argument Preview: Justices to Consider Limits on “Exhaustion” of Patent Rights*, SCOTUSBLOG (Mar. 14, 2017), <http://www.scotusblog.com/2017/03/argument-preview-justices-consider-limits-exhaustion-patent-rights/> [<https://perma.cc/7HGB-UDUT>] (discussing the upcoming opportunity for the U.S. Supreme Court to expand or limit the exhaustion doctrine). Recently, in *Impressions Products v. Lexmark International, Inc.*, the U.S. Supreme Court was presented with two issues. 137 S. Ct. 1523, 1529 (2017). First, whether Lexmark's decision to sell its product under an agreement that restricts a purchaser's rights still exhausted its patent rights, and second, whether its patent rights were exhausted when the product was sold overseas. *Id.* The Court concluded that, on both issues, Lexmark's patent rights were exhausted once the product was sold, regardless of any post-sale restrictions. *Id.*

⁵¹ See U.S. CONST. art. I, § 8, cl. 8 (emphasizing the promotion of innovative and technological endeavors); Lim, *supra* note 28, at 561–63, 638 (demonstrating the application through *Bowman*).

⁵² 84 U.S. (17 Wall.) 453, 456 (1873).

⁵³ See *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 709–10 (Fed. Cir. 1992) (finding that licensing restrictions did not exceed the scope of patent rights).

⁵⁴ See *Quanta Computer, Inc. v. LG Electronics*, 553 U.S. 617, 621 (2008) (finding that where the sale of a patented article encompasses the patent, rights of the patentee are exhausted); *United States v. Univis Lens Co.*, 316 U.S. 241, 248–49 (1942) (finding that downstream restrictions within a licensing scheme exceed the scope of patent rights).

⁵⁵ *Quanta Computer, Inc.*, 553 U.S. at 625; Jeremy N. Sheff, *Self-Replicating Technologies*, 16 STAN. TECH. L. REV. 229, 233 (2013). The exhaustion doctrine is also known as the “first sale doctrine.” Sheff, *supra*, at 233.

⁵⁶ *Quanta Computer, Inc.*, 553 U.S. at 626; *Motion Picture Patents Co. v. Universal Film Mfg.*, 243 U.S. 502, 516 (1917).

⁵⁷ See *Quanta Computer, Inc.*, 553 U.S. at 621 (expanding the exhaustion doctrine to include downstream purchasers of patents that encompass most of the patent); *Univis Lens Co.*, 316 U.S. at 250–51 (clarifying the exhaustion doctrine as not applicable to particular licensing schemes); *Adams*, 84 U.S. at 456 (defining the exhaustion doctrine as a restriction on the patent holders's rights after an authorized sale).

make a copy of the item regardless of whether there has been a bona fide sale.⁵⁸

The exhaustion doctrine closely tracks the underlying policy goals of patent law: to encourage future innovation and advancement through new inventions.⁵⁹ Further, by limiting the period an inventor can take advantage of certain privileges, the law still allows for competition.⁶⁰ Therefore, once the inventor has been rightfully rewarded, such as with monetary compensation, the public should have access to the information needed to replicate the invention and innovate further.⁶¹ This doctrine has continued to evolve, as the courts have tried to keep up with modernization.⁶²

1. Defining the Exhaustion Doctrine

The exhaustion doctrine was established in *Adams v. Burke*, when the U.S. Supreme Court first addressed the question of how far a patent holder's privilege extends.⁶³ Adams was assigned a patent for coffin lids and was licensed to sell them exclusively within a ten-mile radius of Boston.⁶⁴ After discovering that Burke, an undertaker, was using the coffin lids outside of the designated area, Adams brought a patent infringement case against him.⁶⁵ The Court made clear that the rights of a patent holder and the purchaser's rights after a sale were distinct.⁶⁶ The Court emphasized that once a sale was achieved and the patent holders receive the full value of their invention, the purchaser could use the product without restriction.⁶⁷

Although the *Adams* decision defined the exhaustion doctrine, the Court continued to rely on the idea that patent holders receive "all the royalty" once a sale was achieved.⁶⁸ Twenty years after *Adams*, the Court again grappled with post-sale restrictions in *Hobbie v. Jennison*.⁶⁹ Owners of a patent that improved

⁵⁸ See *Jazz Photo Corp. v. Int'l Trade Comm'n*, 264 F.3d 1094, 1102 (Fed. Cir. 2001) (concluding that the exhaustion doctrine does not extend to reconstructing a patented article).

⁵⁹ U.S. CONST. art. I, § 8, cl. 8; *Quanta Computer, Inc.*, 553 U.S. at 626.

⁶⁰ See U.S. CONST. art. I, § 8, cl. 8 (explicitly stating that rights are for a limited period of time); Sheff, *supra* note 55, at 233 (noting that the time limitation was intended to promote innovation).

⁶¹ IP IN THE TECH AGE, *supra* note 33, at III-4.

⁶² See *Quanta Computer, Inc.*, 553 U.S. at 621 (focusing on whether the exhaustion doctrine applied to method patents).

⁶³ *Adams*, 84 U.S. at 456.

⁶⁴ *Id.* at 454. The initial owner of the patent was a company called Merrill & Homer. *Id.* It assigned its rights to Lockhart & Seelye, which subsequently assigned those rights to Adams. *Id.*

⁶⁵ *Id.*

⁶⁶ *Id.* at 455.

⁶⁷ *Id.* at 456.

⁶⁸ Lim, *supra* note 3, at 164.

⁶⁹ See 149 U.S. 355, 355–56, 360–61 (1893) (concluding that the restrictions imposed on the defendants exceeded the scope of patent privileges). Here, the plaintiffs owned patents for the enhancements of pipes in relation to gas and water, among other things. *Id.* They sued Jennison, who was found using the technology in the Connecticut area. *Id.*

piping for gas and water sued for patent infringement, alleging that the defendant was using their patented technology within the geographic area where they held exclusive rights.⁷⁰ Ultimately, the Court relied on the reasoning used in *Adams*—that a sale affords the patent holder certain rewards and the holder should not receive benefits beyond that.⁷¹

2. Contracting Around the Exhaustion Doctrine

As the courts consistently articulated the exhaustion of patent privileges after a sale, patent holders found ways to circumvent this principle through licensing structures.⁷² *General Talking Pictures Corp. v. Western Electric Co.* demonstrates the way in which patent holders adopted licensing schemes to control the use of their patented inventions by manufacturers.⁷³ General Talking Pictures Corporation had a patent for amplifiers used in theatres that it licensed to the Transformer Company, allowing the Transformer Company to make and sell the amplifiers for noncommercial uses.⁷⁴ The alleged patent infringers, Western Electric Company, bought the amplifiers from the Transformer Company and used them for commercial purposes, despite notice of the license and its restricted uses.⁷⁵ Resultantly, General Talking Corporation's rights were not exhausted.⁷⁶ The Court found that licensing agreements did not amount to an impermissible extension of patent privileges, despite the fact that the patent holder was exerting control over end users of the product.⁷⁷

In *Mallinckrodt, Inc. v. Medipart, Inc.*, the Court again extended the ability to contract around the exhaustion doctrine through licensing arrangements made directly with the users of patented inventions.⁷⁸ Mallinckrodt manufactured a patented device that assisted in the diagnosis and treatment of pulmonary disease.⁷⁹ Despite the fact that the device was supposed to be used only once, hospitals sent the used and contaminated apparatuses to Medipart, which then sterilized the apparatuses and returned them.⁸⁰

⁷⁰ *Id.* at 355.

⁷¹ *Id.* at 363.

⁷² See *Gen. Talking Pictures Corp. v. W. Elec. Co.*, 304 U.S. 175, 180–81 (1938).

⁷³ See *id.* at 180 (describing the licensing notice scheme of the sale of amplifiers which restricted the subsequent sale and use by purchasers); Sheff, *supra* note 55, at 233–34 (detailing the general licensing schemes that allow patent holders to contract around the exhaustion doctrine).

⁷⁴ *Gen. Talking Pictures Corp.*, 304 U.S. at 179–80.

⁷⁵ See *id.* at 180 (noting that the defendants were aware of the Transformer Company's licensing restrictions).

⁷⁶ *Id.* at 181.

⁷⁷ *Id.*

⁷⁸ See 976 F.2d at 709 (concluding that a patent sold under a valid license, within the scope of the patent, is valid); Sheff, *supra* note 55, at 234 (describing the significance of the Court's conclusion in *Mallinckrodt*, which created contract and patent infringement liability).

⁷⁹ *Mallinckrodt*, 976 F.2d at 701.

⁸⁰ *Id.* at 702.

The Court held that Medipart's disregard of Mallinckrodt's single use requirement constituted patent infringement.⁸¹ In reaching the holding, the Court distinguished other cases that had comparable requirements and were found to be price-fixing schemes.⁸² Price-fixing schemes were ways in which patent holders tried to reap a greater reward than they were entitled to.⁸³ These schemes were at odds with the exhaustion doctrine's principle because the requirements were found to be too restrictive.⁸⁴ Drawing on *Adams*, the Court characterized the conditional sale of Mallinckrodt's device to hospitals as one in which the company did not actually receive its full reward at the point of sale.⁸⁵ The Court reasoned that *Adams* never actually stated that restrictions or conditions could not be placed on sales.⁸⁶ Rather, the Court emphasized the rights of patent holders and users where a sale with conditions took place.⁸⁷ As a result, Mallinckrodt's restrictions on the use of the device were within the scope of its patent rights.⁸⁸

3. Clarifying the Exhaustion Doctrine

Increasingly complex patents and licensing structures forced courts to further clarify the exhaustion doctrine.⁸⁹ For instance, in *United States v. Univis Lens Co.*, Univis Lens Company ("Univis") was the patent holder of multifocal

⁸¹ *Id.*

⁸² *Id.* at 708; see *Straus v. Victor Talking Mach. Co.*, 243 U.S. 490, 500 (1917) (finding that a notice requiring a minimum transfer price could not be considered a license or a restriction on the use of the product, which would have been within the scope of their patent, but rather, a price-fixing scheme); *Bauer & Cie v. O'Donnell*, 229 U.S. 1, 16 (1913) (concluding that a notice requiring that any subsequent sale of the article cost less than a dollar exceeded the scope of patent rights).

⁸³ *Motion Picture Patents Co.*, 243 U.S. at 507, 514–15 (concluding that guidelines requiring purchasers to use the movie projectors solely with films leased by the patentee was a price-fixing restriction outside the scope of patent rights).

⁸⁴ See *Straus*, 243 U.S. at 499 (concluding that the scheme was clearly for price-fixing purposes and not to protect the patent holder's rights); *Motion Picture Patents Co.*, 243 U.S. at 515 (finding that the license restrictions were inconsistent with the actual rights of a patent holder); *Bauer & Cie*, 229 U.S. at 16 (finding that denoting the sale as a license was fraudulent).

⁸⁵ *Mallinckrodt*, 976 F.2d at 708. The lens blank did not embody the patent because the patent was only for the finished product—glasses. *Id.* As a result of restricting the device to a single use, the price of the invention did not equate to what it would have been if a bona fide sale had taken place. *Id.* As such, the conditional sale could be seen as a discount and not the full reward Mallinckrodt was entitled to as the patent holder. *Id.*; see *Adams*, 84 U.S. at 456 (emphasizing that a patent holder should receive nothing more or less of their full reward); Lim, *supra* note 3, at 164 (describing the Court's determination that liability for patent infringement was warranted as long as the patent holder did not receive full consideration for their product).

⁸⁶ *Mallinckrodt*, 976 F.2d at 708.

⁸⁷ *Id.*; see *Adams*, 84 U.S. at 455.

⁸⁸ *Mallinckrodt*, 976 F.2d at 709.

⁸⁹ See *Quanta Computer, Inc.*, 553 U.S. at 622–24 (describing the multiple patents encompassed within the licensing scheme); *Univis Lens Co.*, 316 U.S. at 243–44 (detailing the multi-step licensing scheme for a patent on eyeglasses).

lenses.⁹⁰ To create the lenses, Univis only manufactured the lens blanks and licensed the subsequent steps to third parties, but continued to hold the patent for the completed version of the lenses.⁹¹ These steps included grinding and polishing the lenses and adding the prescription.⁹² At every step of the process, Univis determined the price of the transaction and licensees were unable to deviate from them.⁹³

Univis reasoned that the exhaustion doctrine did not apply to its licensing scheme because the sales of the lens blanks to finishing and prescription retailers were not completed versions of the patent and, resultantly, did not trigger a sale.⁹⁴ Ultimately, the Court concluded that, although the lens blanks did not completely embody the patent, the blanks embodied the most important aspects.⁹⁵ Therefore, once the blanks were sold to the wholesaler, retailer, or prescription retailer for completion, Univis's rights were exhausted.⁹⁶

The courts have continued to define licensing structures as a means of extending patent privileges.⁹⁷ In *Quanta Computer, Inc. v. LG Electronics, Inc.*, LG Electronics ("LGE") licensed to Intel Corporation, Inc. ("Intel") the ability to build computer microprocessors and chipsets.⁹⁸ Intel later sold the microprocessors and chipsets to Quanta Computer, Inc. ("Quanta").⁹⁹ Quanta then combined the items with non-Intel products in violation of the licensing agreement with LGE.¹⁰⁰

The Court followed *Univis Lens Co.* and held in favor of Quanta on the grounds that the only feasible purpose of the microprocessors and chipsets was to be used within a computer system.¹⁰¹ As a result, microprocessors and chipsets completely embodied the most important aspects of the patent, which made the exhaustion doctrine applicable to sales to third parties such as Quanta.¹⁰²

⁹⁰ 316 U.S. at 243–44.

⁹¹ *Id.* at 244.

⁹² *Id.*

⁹³ *Id.* at 245.

⁹⁴ *Id.* at 250–51 (rejecting Univis Lens Co.'s argument that because the licenses were for incomplete articles, a sale has not occurred).

⁹⁵ *Id.*

⁹⁶ *Univis Lens Co.*, 316 U.S. at 250.

⁹⁷ See *Quanta Computer, Inc.*, 553 U.S. at 621 (concluding that, because the licenses allowed the sale of the most essential elements of the patents, the exhaustion doctrine was applicable).

⁹⁸ *Id.* at 623. Generally, computers operate through the use of microprocessors, which communicate information to a chipset. *Id.* at 621. The chipset is connected to the microprocessor through a group of wires, also known as a "bus," and transfers data from the microprocessor to computer support accessories. *Id.*

⁹⁹ *Id.* at 623.

¹⁰⁰ *Id.* at 624.

¹⁰¹ *Id.* at 633–34.

¹⁰² *Id.* at 638.

Courts are repeatedly tasked with determining where the rights of patent holders begin and end due to the increased use of licensing schemes.¹⁰³ As a result, the courts willingly tweak the scope of the exhaustion doctrine in a way that continues to track overall patent goals and reward innovation while simultaneously limiting how far the privileges can extend.¹⁰⁴

C. Statutory Analysis: Historical Interpretation of the Patent Act

The Patent Act gives patent holders the exclusive right to “make, use or sell” their invention.¹⁰⁵ The legislature did not explicitly define these terms anywhere in the statute.¹⁰⁶ Therefore, the door is still open for judicial interpretation of terms such as “make.”¹⁰⁷

Judicial interpretation of the term “use” exemplifies the manner in which courts have tackled the challenge of interpreting the statute.¹⁰⁸ For example, in *Roche Products, Inc. v. Bolar Pharmaceuticals*, the U.S. Court of Appeals for the Federal Circuit noted that the lack of a statutory definition of “use” allowed for a particularly broad interpretation.¹⁰⁹ As a result, the court reasoned that it could expand the definition as it saw fit.¹¹⁰ Another example of a court broadly interpreting the Patent Act was in *City of Elizabeth v. American Nicholson Pavement Co.*, where the U.S. Supreme Court had to define “public use” in determining whether an invention met the statutory requirements for patent protection.¹¹¹ The Court found that minimal utilization by the public did not

¹⁰³ See *id.* (emphasizing that a sale of products that practice a patent in its entirety, or close enough to it, will be considered a sale and exhaust patent privileges).

¹⁰⁴ See *id.* at 628–29 (emphasizing that method patents are not shielded from the application of the exhaustion doctrine); *Adams*, 84 U.S. at 456 (concluding that, when the appropriate reward is received for a patent holder’s invention, any rights regarding use or sale are exhausted).

¹⁰⁵ See 35 U.S.C. § 271(a) (2012).

¹⁰⁶ *Id.*; see *Holman*, *supra* note 3, at 698. After a legitimate sale has been made, the exhaustion doctrine prevents patent holders from controlling the use or subsequent sale of an invention. *Bowman*, 133 S. Ct. at 1768. It does not, however, give a purchaser of the invention the right to make a copy of the invention. *Id.*; see *Adams*, 84 U.S. at 456 (defining the exhaustion doctrine for the first time).

¹⁰⁷ See *Bowman*, 133 S. Ct. at 1768 (concluding that the Court’s decision, which found that *Bowman* had made another article, was narrow and could be subject to change in the future).

¹⁰⁸ 35 U.S.C. § 271(a); *Paper Converting Mach. Co. v. Magna-Graphics, Corp.*, 745 F.2d 11, 16 (Fed. Cir. 1984); *Holman*, *supra* note 3, at 698.

¹⁰⁹ *Roche Prods., Inc. v. Bolar Pharm.*, 733 F.2d 858, 861 (Fed. Cir. 1984); see *Holman*, *supra* note 3, at 698 (noting that case law with respect to the definition of use, making, or selling with respect to the patent statute).

¹¹⁰ *Roche Prods., Inc.*, 733 F.2d at 861.

¹¹¹ 35 U.S.C. § 271(a); see *City of Elizabeth v. Am. Nicholson Pavement Co.*, 97 U.S. 126, 135 (1877) (finding that as long as the inventor was genuinely testing their invention the Court would not find public use). Public use is defined as the ability of the general population to utilize the invention. *City of Elizabeth*, 97 U.S. at 134; *Holman*, *supra* note 3, at 699.

satisfy the “use” requirement, resulting in a judicially-created exception for experimentation.¹¹²

D. Self-Replicating Agricultural Biotechnology and Legal Protection

1. Self-Replicating Technology

Patented inventions that self-replicate pose a significant difficulty for patent law.¹¹³ As emphasized in *Adams v. Burke*, the goal of patent law is to allow inventors to obtain their rightful reward, which is traditionally some monetary benefit.¹¹⁴ This goal is based on the rationale that an immense amount of research and development is invested into patented inventions.¹¹⁵ Accordingly, the compensation and privileges that accompany a patent incentivizes innovation.¹¹⁶

It is debatable whether a patent holder of a self-replicating technology is deprived of their reward when there are subsequent copies of their product, creating a tension between patent holders and the users of their products.¹¹⁷ Specifically, if a patent holder sells a product that has the ability to create another copy of itself with little to no human intervention, then every purchaser becomes a new challenger in their market.¹¹⁸ Patent holders may therefore be incentivized to control the use of their products beyond a sale, potentially violating the exhaustion doctrine.¹¹⁹

An article is self-replicating if it is an invention that can be reproduced through its own processes.¹²⁰ This phenomenon is almost exclusively seen in agricultural biotechnology due to the natural duplicating features of living or-

¹¹² 35 U.S.C. § 271(a); see *City of Elizabeth*, 97 U.S. at 135; Holman, *supra* note 3, at 699.

¹¹³ See Lim, *supra* note 3, at 168–69 (describing the inherent issues of aligning the abilities of self-replicating technologies with traditional patent law).

¹¹⁴ *Id.*

¹¹⁵ IP IN THE TECH AGE, *supra* note 33, at III-17.

¹¹⁶ Holman, *supra* note 3, at 668; Jason Savich, *Monsanto v. Scruggs: The Negative Impact of Patent Exhaustion on Self-Replicating Technology*, 22 BERKELEY TECH. L.J. 115, 119–20 (2007).

¹¹⁷ See Lim, *supra* note 3, at 131 (noting that the prevalence of self-replicating technologies creates a conflict between creators and their consumers); Savich, *supra* note 116, at 115 (describing the issue of deprivation of reward as applied to farming).

¹¹⁸ See Savich, *supra* note 116, at 115. Every purchaser of a self-replicating product has the ability to become a competitor because the purchaser will now have unfiltered access to multiple versions of that product without liability. *Id.*

¹¹⁹ See *id.* at 122 (describing the use of licensing restrictions by patent holders to avoid the exhaustion doctrine).

¹²⁰ See Holman, *supra* note 3, at 670 (describing how plants self-replicate naturally). The idea of self-replicating technology reproducing without intervention is up for debate, as one could argue that human labor, such as harvesting, as well as “sun, soil, water and nutrients” are inextricable aspects of the process. *Id.*

ganisms.¹²¹ Self-replicating biotechnology is created using genetic material such as deoxyribonucleic acid (DNA), which is encrypted with its own replication instructions.¹²² A crop is “genetically modified” when the composition of the genetic material is altered to combine genes with specific traits.¹²³ These traits are typically selected to serve a specific purpose.¹²⁴

These genetically modified organisms (“GMOs”) have significantly revolutionized certain areas such as farming.¹²⁵ For instance, advances in seed technology—particularly soybean crops—have significantly increased crop yields.¹²⁶ They have also lessened the detrimental effects of farming, particularly in relation to decreasing soil erosion and chemical usage.¹²⁷

2. Legal Protection for Agricultural Biotechnology

Although agricultural biotechnology has advanced quickly and dramatically, patent protection for seeds has evolved slowly over time.¹²⁸ The privatization of the seed industry can be traced back to 1885, when lobbyists first urged the government to legally protect the discoveries acquired by exploring plant varieties.¹²⁹ Initially, the government distributed seed varieties for free,

¹²¹ See Brief of Amicus Curiae Law Professor Christopher M. Holman in Support of Respondents at 5, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 314459, at *5 (noting that self-replicating technologies are not neatly analogous to other inventions).

¹²² See Holman, *supra* note 3, at 670. Professor Holman suggests the useful comparison of agricultural biotechnology to computer software to further understand how self-replication works. *Id.* Computer software is encrypted with code that facilitates its replication by serving as blueprints for subsequent copies. *Id.* Similarly, DNA in genetically modified organisms (“GMOs”) are comparable to a “code” that, with some outside help, creates exact duplicates. *Id.*

¹²³ See *Genetically Modified Foods and Organisms*, HUMAN GENOME PROJECT (Nov. 5, 2008), <http://theliteratesims.net/eng1bM/Readings/gmfoodsandorganisms.pdf> [<https://perma.cc/WPK6-4XGJ>].

¹²⁴ David Daniel, Note, *Seeds of Hope: How New Genetic Technologies May Increase Value to Farmers, Seed Companies, and the Developing World*, 36 RUTGERS COMPUTER & TECH. L.J. 250, 251 (2010).

¹²⁵ See Lim, *supra* note 28, at 566 (describing the benefits of GMOs as well as the innovation of seed varieties, their early predecessors). Early development in agricultural biotechnology spearheaded by companies such as Pioneer Hi-Bred led to a six-fold increase in crop yields within a century. Holman, *supra* note 3, at 676.

¹²⁶ See Daniel, *supra* note 124, at 251. Soybeans are the second most planted crop in the United States, encompassing over 200,000 farms and nearly 80 million acres. Lim, *supra* note 3, at 138. They are used as feed for livestock and are an ingredient in a number of food products. *Id.*

¹²⁷ See Lim, *supra* note 28, at 566. Through advancing agricultural biotechnology, crops including wheat, rice, corn, and others have benefited while simultaneously reducing harm to the land and the environment, such as through decreased insecticide usage. See *id.*

¹²⁸ See *id.* (noting that legal protection for seed varieties began in 1930); *infra* notes 161–179 (describing the superiority of patent protection for plant varieties).

¹²⁹ See Lim, *supra* note 3, at 141. The potential of commercializing the seed industry began to be realized in the late nineteenth century as companies increasingly invested in developing new plant varieties, such as hybrid crops. *Id.* This development was a result of two forces at work. *Id.* The first was that the plant varieties created high yielding crops. *Id.* Second, since these high yields could not

which caused a lack of incentive on the part of plant breeders to invest in the industry.¹³⁰ In an effort to encourage agricultural research investments, the Department of Agriculture ended the government-mandated seed program in the early twentieth century.¹³¹

In 1906, legislation was introduced to bring plant variety innovations under the trademark regime.¹³² The theory was that plant breeders did not have the requisite incentive to create new varieties because purchasers could not identify any given seed's breeder.¹³³ Legislators believed that trademark protection was the solution because it would grant breeders the opportunity to register the name of novel plant varieties.¹³⁴ In actuality, trademark protection was not an adequate solution to incentivizing breeders to spend the requisite time, energy, and funds to invest in further innovation.¹³⁵

3. The Plant Patent Act and the Plant Variety Protection Act

Eventually, legislation was enacted to encourage investments in the plant variety industry.¹³⁶ The first statute was the Plant Patent Act ("PPA"), which was enacted in 1930.¹³⁷ The PPA created a patent regime that was limited to asexually reproducing plants.¹³⁸ Consequently, the PPA was narrow in scope

be replicated through traditional seed saving techniques, it created a reliable customer base of farmers year after year. *Id.* at 140–41.

¹³⁰ See Lim, *supra* note 28, at 566. Early pioneers within the seed industry tried to protect their products as trade secrets, another regime within patent law. Lim, *supra* note 3, at 141. Ultimately, this tactic proved unsuccessful because sexually produced plants naturally create distinguishing characteristics. *Id.*

¹³¹ See Lim, *supra* note 3, at 141. The government wanted to encourage private investment in the agricultural industry believing that privatization spurs innovation because of the available commercial incentive of selling that product. *See id.*

¹³² See Mark D. Janis & Jay P. Kesan, *U.S. Plant Variety Protection: Sound and Fury . . . ?*, 39 HOUS. L. REV. 727, 731 (2002) (recognizing that, because seeds were distributed freely, it created no commercial incentive for potential inventors to devote the necessary research and money to discover new plant varieties).

¹³³ *See id.*

¹³⁴ *See id.*

¹³⁵ *See id.* at 732.

¹³⁶ Lim, *supra* note 28, at 566; see Michelle Ma, Comment, *Anticipating and Reducing the Unfairness of Monsanto's Inadvertent Infringement Lawsuits: A Proposal to Import Copyright Law's Notice-and-Takedown Regime into the Seed Patent Context*, 100 CAL. L. REV. 691, 696–97 (2012) (discussing the evolution of the Plant Patent Act ("PPA") and the Plant Variety Protection Act ("PVPA") and their inherent issues).

¹³⁷ Plant Patent Act of 1930, ch. 497, 46 Stat. 703 (1930) (codified as amended at 35 U.S.C. §§ 161–164 (2012)); Janis & Kesan, *supra* note 132, at 735.

¹³⁸ See Lim, *supra* note 28, at 566. Asexual reproduction involves only one parent and results in one offspring that is a clone of the parent. Ma, *supra* note 136, at 696–97. Because GMOs typically involve sexual reproduction by two parents, the PPA was not particularly helpful in encouraging innovation in that area. *Id.* at 697.

because much of the plant variety industry involved sexually reproducing plants.¹³⁹

The primary issue was that the legislature wanted to incentivize breeders to create new varieties, but did not intend to provide any patent-like protections to new varieties of particular seeds.¹⁴⁰ Ultimately, the PPA did not provide effective protections needed for contemporary agricultural biotechnology.¹⁴¹ Modern-day seed products focus on traits by combining two plants to create a progeny that contains features of both parents.¹⁴² Despite this, the PPA's adoption was still significant because it established that plant life was patentable subject matter.¹⁴³

In 1970, the Plant Variety Protection Act ("PVPA") established the legal protection that modern agricultural biotechnology inventors sought.¹⁴⁴ Similar to the PPA, the PVPA allowed inventors to obtain a plant variety protection certificate ("PVP certificate"), which was easier to obtain than a patent.¹⁴⁵ The most significant difference between a PPA and PVP certificate was that a PVP certificate gave protection to sexually reproduced plant varieties.¹⁴⁶ Also, the PVP certificate allowed its holder to prevent others from commercializing the protected plant variety in any manner.¹⁴⁷

¹³⁹ Janis & Kesan, *supra* note 132, at 735; Ma, *supra* note 136, at 697. Congress placed an emphasis on the human effort it took to create new asexual plant varieties and wanted to encourage this kind of activity. See Janis & Kesan, *supra* note 132, at 735. The focus on the creation of asexual varieties rather than sexually producing varieties meant that the seed industry did not significantly benefit from the PPA in comparison to areas such as the nursery industry. See *id.*; see also *Imazio Nursery, Inc. v. Dania Greenhouses*, 69 F.3d. 1560, 1568 (Fed. Cir. 1995) (distinguishing patent protection as applicable only to asexually produced plants, while sexually produced plants received only PVPA protection).

¹⁴⁰ Janis & Kesan, *supra* note 132, at 735.

¹⁴¹ See Ma, *supra* note 136, at 696. The PPA is still in effect. 35 U.S.C. §§ 161–164 (2012).

¹⁴² See Ma, *supra* note 136, at 696.

¹⁴³ See Lim, *supra* note 3, at 141.

¹⁴⁴ Plant Variety Protection Act, Pub. L. No. 91-577, 84 Stat. 1542 (1970) (codified as amended at 7 U.S.C. §§ 2321–2582 (2012)); see Lim, *supra* note 3, at 141–42 (discussing how the PVPA provided protection for sexually reproduced plant varieties, in contrast to the PPA); Ma, *supra* note 136, at 697 (detailing how the PVPA's patent-like protections, including the ability to exclude others from selling or using the material in any manner, were beneficial to the seed industry).

¹⁴⁵ See 7 U.S.C. § 2402 (requiring only that breeders file an application for protection and follow subsequent procedures of approval); 35 U.S.C. §§ 101–103 (2012) (requiring that a patent meet subject matter standards, in addition to novelty and non-obviousness criteria, pursuant to the Patent Act); *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 142 (2001) (discussing the rationale for more stringent patent requirements, which affords patent holders greater protections). Additionally, to be granted a patent, the inventor must include a written explanation of the article that allows others to replicate the product. *J.E.M. Ag Supply, Inc.*, 534 U.S. at 142. In contrast, to acquire a plant variety protection certificate, the inventor does not have to meet the same requirements as a patent. *Id.*

¹⁴⁶ Ma, *supra* note 136, at 697.

¹⁴⁷ *Id.*

Although a PVP certificate gave certificate holders exclusive rights, it stopped short of granting the broad privileges afforded to patent holders in two ways.¹⁴⁸ First, farmers who legally bought seeds protected under a PVP certificate were allowed to save the seeds for replanting in subsequent harvests, significantly reducing the commercial potential for certificate holders.¹⁴⁹ Second, in an effort to promote further innovation, researchers were allowed to use protected seeds without compensating the inventors.¹⁵⁰ The rationale for these two exemptions was the desire to further advance the plant variety industry while recognizing inventors's desire to profit from their products.¹⁵¹

The courts quickly recognized that the PVPA's exceptions were undesirable.¹⁵² In *Delta & Pine Land Co. v. Peoples Gin Co.*, the U.S. Court of Appeals for the Fifth Circuit struck down the PVPA exception that allowed for seed saving, concluding that it did not align with the law's goals.¹⁵³ The court highlighted that allowing farmers to save seeds significantly reduced the breeder's incentive to invest further in plant varieties.¹⁵⁴ Rather, the farmers began investing in hybrid crops, which were not as easy to replicate in subsequent harvesting seasons.¹⁵⁵

After the court's decision in *Delta & Pine Land Co.*, Congress amended the PVPA to prohibit farmers who bought protected seed from selling it to other farmers.¹⁵⁶ *Asgrow Seed Co. v. Winterboer*, a U.S. Supreme Court case, went further in limiting the PVPA's exceptions by allowing farmers to only save the seeds they intended to personally use.¹⁵⁷

The PPA and PVPA were a significant step in providing legal protections to self-replicating technology such as plant varieties, but were largely unsuccessful.¹⁵⁸ Although the courts stepped in and the legislature amended the PVPA to increase the commercial viability of innovation in the breeding indus-

¹⁴⁸ Lim, *supra* note 3, at 142.

¹⁴⁹ See *id.*; Ma, *supra* note 136, at 697. Farmers's ability to save seeds was also known as "bin run" or "brown bag sales," which ultimately created a competitor for plant breeders with each sale. Lim, *supra* note 3, at 142.

¹⁵⁰ Ma, *supra* note 136, at 697.

¹⁵¹ See Lim, *supra* note 3, at 143.

¹⁵² See *Asgrow Seed Co. v. Winterboer*, 513 U.S. 179, 192 (1995) (limiting PVPA exceptions relating to personal use); Lim, *supra* note 3, at 144 (noting the changes to the PVPA resulting from the Fifth Circuit's interpretation and congressional amendments).

¹⁵³ *Delta & Pine Land Co. v. Peoples Gin Co.*, 694 F.2d 1012, 1016 (5th Cir. 1983).

¹⁵⁴ *Id.*

¹⁵⁵ Lim, *supra* note 3, at 143.

¹⁵⁶ *Id.* at 144.

¹⁵⁷ See *Asgrow Seed Co.*, 513 U.S. at 192 (concluding that "brown bag" saving was limited to harvests designated for a farmer's personal use).

¹⁵⁸ See Jim Chen, *The Parable of the Seeds: Interpreting the Plant Variety Protection Act in Furtherance of Innovation Policy*, 81 NOTRE DAME L. REV. 105, 155 (2005) (describing the limited success of early legal protection for plant varieties).

try, it seemingly did not go far enough.¹⁵⁹ Eventually, the achievement of full patent protection for seeds caused these plant protection regimes to fall to the wayside.¹⁶⁰

E. Patent Protection

The Patent Act, enacted in 1952, provides the statutory requirements inventors must satisfy in order to be conferred the exclusive rights to “make, use . . . or sell” their invention.¹⁶¹ Specifically, section 101 sets out the types of subject matter that can be patented, including processes also known as utility patents.¹⁶² The subsequent sections set forth detailed requirements, including that the invention be useful, original, and non-obvious, and that the patentee adhere to certain disclosure requirements that will allow others to use the invention once the patent term expires.¹⁶³ Once these requirements are met, patentees are given privileges that allow them to reap the full commercial reward from their innovation, subject to limitations such as the exhaustion doctrine.¹⁶⁴

Given the extensive rights available under patent law, the U.S. Supreme Court’s inclusion of seed technology within this regime was a game-changer.¹⁶⁵ The Court first took on this issue in *Diamond v. Chakrabarty*.¹⁶⁶ There, the Court was tasked with determining whether a patent could be granted to a genetically engineered bacterium that had the ability to separate crude oil and could be used to clear oil spills.¹⁶⁷ The patent application included a claim for bacteria, which was initially rejected.¹⁶⁸ The rationale was that bacteria, as creations of nature, were living things and therefore not within the scope of patentable subject matter.¹⁶⁹ Relying on statutory interpretation techniques

¹⁵⁹ See Lim, *supra* note 3, at 143–44.

¹⁶⁰ See Janis & Kesan, *supra* note 132, at 776 (finding that the statutory regimes created for plant protection has been outpaced by the more broad, far-reaching rights allowed under patent law).

¹⁶¹ 35 U.S.C. §§ 101, 271(a) (2012).

¹⁶² *Id.* § 101.

¹⁶³ *Id.* §§ 101–103, 112; IP IN THE TECH AGE, *supra* note 33, at III-10 to -11 (detailing the statutory requirements for a patent).

¹⁶⁴ 35 U.S.C. § 271; see Adams, 84 U.S. at 456 (establishing that the exclusive rights given to patent holders are subject to limitations under the exhaustion doctrine); IP IN THE TECH AGE, *supra* note 33, at III-12 (noting the privileges bestowed on a patent holder).

¹⁶⁵ See *Diamond v. Chakrabarty*, 447 U.S. 303, 308, 318 (1980) (finding that living organisms were patentable subject matter); Holman, *supra* note 3, at 674 (noting that, prior to the decision in *Chakrabarty*, it was unclear whether plants and seeds could receive patent protection, but resulted in increased investment). There are conflicting views of the role of patent law in spurring innovation. See William Hubbard, *The Competitive Advantage of Weak Patents*, 54 B.C. L. REV. 1909, 1912 (2013) (arguing that the U.S. policy towards a strong patent regime creates a disadvantage against foreign rivals).

¹⁶⁶ *Chakrabarty*, 447 U.S. at 308.

¹⁶⁷ See *id.* at 305–06.

¹⁶⁸ See *id.* at 306.

¹⁶⁹ *Id.*

and legislative history, the Court concluded that Congress intended for patentable subject matter to be broad under the Patent Act.¹⁷⁰ The inclusion of bacteria within the scope of protected subject matter marked the beginning of a new industry.¹⁷¹

Almost twenty years after *Chakrabarty*, the Court reaffirmed its broad interpretation of the Patent Act in *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*¹⁷² Pioneer Hi-Bred International, Inc. brought suit against J.E.M. Ag Supply, Inc. for patent infringement after discovering that its hybrid seeds were resold in violation of a licensing agreement.¹⁷³ Relying on *Chakrabarty*, the Court rejected J.E.M. Ag Supply, Inc.'s argument that the PPA and PVPA served as an exception to the broad interpretation of section 101.¹⁷⁴ It explicitly concluded that sexually reproducing plants were patentable subject matter under the Patent Act.¹⁷⁵

In enacting the PPA and PVPA, the legislature made notable progress towards protecting new agricultural biotechnology.¹⁷⁶ However, the lack of protection for sexually produced plants, in conjunction with exceptions for personal replanting of seeds and research, denied inventors the incentives available through patent protection.¹⁷⁷ The Court's decisions had a profound effect on the agricultural biotechnology industry as a whole and on seed development in particular.¹⁷⁸ In fact, the Court's decision in *Chakrabarty* led to the approval of 1,800 utility patent applications and *J.E.M. Ag Supply, Inc.* incentivized development of GMOs.¹⁷⁹

¹⁷⁰ See *id.* at 309. The Court concluded that the use of terminology such as “manufacture” or “composition of matter” under 35 U.S.C. § 101 could be interpreted to mean that Congress wanted the statute to be far-reaching. *Id.* at 308.

¹⁷¹ See *J.E.M. Ag Supply, Inc.*, 534 U.S. at 145 (noting that the decision in *Chakrabarty* led to nearly 2000 patents for plants); Ma, *supra* note 136, at 698 (noting that the broad interpretation of the statute led to innovation in the biotechnology industry).

¹⁷² See 534 U.S. at 145 (concluding that hybrid corn seeds are patentable subject matter); Ma, *supra* note 136, at 698 (noting that the decision in *J.E.M. Ag Supply, Inc.* made clear that sexually reproduced plants were covered within the scope of 35 U.S.C. § 101).

¹⁷³ *J.E.M. Ag Supply, Inc.*, 534 U.S. at 128.

¹⁷⁴ *Id.* at 129, 145–46.

¹⁷⁵ *Id.* at 145.

¹⁷⁶ *Id.*

¹⁷⁷ *Id.* at 534 U.S. at 141; see Lim, *supra* note 3, at 141–42 (noting that the PPA gave patent protection to asexually produced seeds, endorsing it as patentable subject matter, while the PVPA gave legal protection to sexually produced plants).

¹⁷⁸ See Lim, *supra* note 28, at 567–68 (noting the increased benefits and yields of plants, such as corn, in addition to the decreasing use of pesticides).

¹⁷⁹ See *J.E.M. Ag Supply, Inc.*, 534 U.S. at 145–46 (noting that the Court was following precedent set forth in *Chakrabarty*); Ma, *supra* note 136, at 698 (noting the effects of the Court's decision in *Chakrabarty*).

II. MONSANTO

A. *The Emergence of Agricultural Biotechnology*

Following the U.S. Supreme Court's decisions in *Diamond v. Chakrabarty* and *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred International, Inc.*, research within the field of plant varieties shifted from the public to the private sector due to the availability of utility patents for different varieties of genetic modification.¹⁸⁰ By the mid-1990s, the private sector dominated research and investment in development for patents related to plant breeding.¹⁸¹ In fact, private spending on research and development began to increase by more than ten times between 1960 and the 1980 *Chakrabarty* decision.¹⁸² The shift from protection under the PPA and the PVPA to patent protection also resulted in the increased use of licensing products, rather than sales.¹⁸³

Initially, numerous private companies seized the opportunity to capitalize on the Court's decision in *Chakrabarty*.¹⁸⁴ Due to the high costs of investing in research, however, many of these companies began to consolidate by the early 1990s, resulting in frequent mergers.¹⁸⁵ A handful of companies that specialized in developing seed varieties began to dominate the industry—including Monsanto.¹⁸⁶

By 1997, Monsanto became one of the four largest firms specializing in researching and developing seed varieties.¹⁸⁷ Less than a decade later, Monsanto owned 647 biotechnology patents.¹⁸⁸ Despite concerns regarding the company's dominance, many have welcomed its technology.¹⁸⁹ For example, Mon-

¹⁸⁰ *J.E.M. Ag Supply, Inc. v. Pioneer Hi-Bred Int'l, Inc.*, 534 U.S. 124, 145–46 (2001); *Diamond v. Chakrabarty*, 447 U.S. 303, 318 (1980); Lim, *supra* note 3, at 146; see U.S. DEP'T OF AGRIC., EIB-11, THE FIRST DECADE OF GENETICALLY ENGINEERED CROPS IN THE UNITED STATES 2 (2006) [hereinafter U.S.D.A. REPORT] (noting the increased investment in research and development within the seed industry).

¹⁸¹ See U.S.D.A. REPORT, *supra* note 180, at 2 (noting that private companies and individuals owned three quarters of all patents relating to plant breeds).

¹⁸² See *id.*

¹⁸³ See Lim, *supra* note 3, at 147. This shift is notable because it began normalizing the idea that seed saving, which was once common in the agricultural industry, could be considered patent infringement. *Id.* at 147–48; Ma, *supra* note 136, at 694–95.

¹⁸⁴ U.S.D.A. REPORT, *supra* note 180, at 2.

¹⁸⁵ *Id.*

¹⁸⁶ *Id.* at 2–3; Ma, *supra* note 136, at 694. Private research and development firms also began to consolidate due to advancements in the biological sciences. U.S.D.A. REPORT, *supra* note 180, at 2–3. For example, by combining firms that develop products that complement one another, they can be sold under one umbrella, thereby reducing costs. *Id.*

¹⁸⁷ U.S.D.A. REPORT, *supra* note 180, at 3.

¹⁸⁸ Ma, *supra* note 136, at 700.

¹⁸⁹ See Brief of American Soybean Ass'n et al. as Amici Curiae in Support of Respondents at 18, *Bowman v. Monsanto Co.*, 133 S. Ct. 1761 (2013) (No. 11-796), 2013 WL 315223, at *18 [hereinafter American Soybean Association Amicus Brief]; Lim, *supra* note 3, at 134–35 (noting that Monsanto's dominance has led to antitrust issues). In its amicus brief, the American Soybean Association detailed

santo's Roundup Ready soybeans became commercially available in 1996 and remain one of the company's most successful products.¹⁹⁰

B. Roundup Ready

Roundup Ready is an herbicide that includes the chemical glyphosate.¹⁹¹ The chemical prevents vegetation such as weeds from growing without interfering with crops.¹⁹² It facilitates farming because it can be used at all stages of growth and does not interfere with farming techniques.¹⁹³ Monsanto encourages farmers to pair Roundup Ready herbicide with Roundup Ready seeds in order to create glyphosate-resistant crops.¹⁹⁴ This allows the plant to grow without interruption from the chemical.¹⁹⁵

The intersection between technological advancement and the right to control the use of intellectual property has been a point of contention.¹⁹⁶ To use Roundup Ready or Roundup Ready seeds, purchasers must agree to the "Monsanto Technology/Stewardship Agreement."¹⁹⁷ The most controversial clause within the agreement pertains to single-season planting, which prohibits farmers from saving the Roundup Ready seeds for future crops.¹⁹⁸ Farmers who violate

the immense growth of the soybean industry. American Soybean Association Amicus Brief, *supra*, at 6. Further, between 1998 and 2012, the amount of farmers taking advantage of the glyphosate-resistant soybeans increased from thirty-eight percent to ninety-three percent. *Id.* at 18; Lim, *supra* note 3, at 570. Specifically hoping to counter the theory that farmers would oppose companies such as Monsanto, the organization stressed the adverse effects that weak patent law protection could have on soybean farmers, such as complex licensing and contract agreements that would likely proliferate without the protection. American Soybean Association Amicus Brief, *supra*, at 7.

¹⁹⁰ See American Soybean Association Amicus Brief, *supra* note 189, at 18 (describing the growth of Monsanto's seed technology); Lim, *supra* note 3, at 134–35 (noting allegations against Monsanto relating to antitrust violations and illegal licensing schemes); Ma, *supra* note 136, at 700 (noting Monsanto's aggressive litigation strategies involving hundreds of suits against farmers).

¹⁹¹ Lim, *supra* note 28, at 569.

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ See *id.* (summarizing the process and benefits of Roundup Ready technology); Ma, *supra* note 136, at 701 (noting the benefits of using both Roundup and Roundup Ready seeds in conjunction).

¹⁹⁵ Lim, *supra* note 28, at 569. Because a resistance to glyphosate does not affect the gene sequence, the seed can maintain the requisite sugar-conversion processes necessary for the cell's development. *Id.*

¹⁹⁶ See American Soybean Association Amicus Brief, *supra* note 189, at 18 (noting that nearly all farmers have taken advantage of Monsanto's plant technology related to soybeans); Ma, *supra* note 136, at 700 (detailing the controversial tactics employed by Monsanto against allegedly patent-infringing farmers who have saved seeds in violation of licensing agreements). By 2007, Monsanto obtained judgments in its favor totaling twenty million dollars. Ma, *supra* note 136, at 700.

¹⁹⁷ Lim, *supra* note 28, at 570; Ma, *supra* note 136, at 701.

¹⁹⁸ See Lim, *supra* note 28, at 570 (noting that whether Monsanto licensed its technology or sold it, use of its product required adherence to its restrictions); Ma, *supra* note 136, at 700–01 (noting that many of Monsanto's lawsuits are based on violations of its restrictions).

this restriction are considered patent infringers.¹⁹⁹ Pursuant to this clause, Monsanto has brought over a hundred lawsuits against individual farmers.²⁰⁰

C. Patent Infringement and “Innocent Infringers”

Parker v. Hulme was one of the earliest cases to directly address the issue of intent in patent infringement.²⁰¹ In *Parker*, the U.S. District Court for the Eastern District of Pennsylvania considered an infringement claim brought by the inventors of an advanced method that used hydraulic power.²⁰² The court characterized the defendant’s knowledge and intent as irrelevant, thereby establishing that patent infringers were subject to strict liability.²⁰³ The current statutory language on patent infringement supports this standard because it does not make any reference to the necessary mental state to find that infringement has occurred.²⁰⁴ Other courts followed *Parker* and applied the strict liability standard in patent infringement cases.²⁰⁵

The idea of “innocent infringers” stems from the historical idea that patent infringement does not require intent or knowledge.²⁰⁶ Sometimes charac-

¹⁹⁹ Ma, *supra* note 136, at 700.

²⁰⁰ *Id.* The opposition to the agreements Monsanto requires farmers to sign is partially based on the fact that the restrictions run directly counter to historical agricultural techniques of seed saving, which allows Monsanto to dominate the industry. *Id.* at 701–02; see Pollack, *supra* note 1 (noting that a victory for Bowman would loosen Monsanto’s grip on farmers and the overall industry).

²⁰¹ 18 F.Cas. 1138, 1143 (C.C.E.D. Pa. 1849); see Saurabh Vishnubhakat, *An Intentional Tort Theory of Patents*, 68 FLA. L. REV. 571, 578 (2016) (tracing the lack of knowledge or intent requirements in patent infringement to *Parker v. Hulme*).

²⁰² *Parker*, 18 F.Cas. at 1140.

²⁰³ See *id.* at 1143. The defendant argued that he was not aware of Parker’s invention. *Id.* at 1142. The court rejected this argument and set forth what it considered to be the only important questions when determining whether there is patent infringement: (1) whether the patented invention was actually produced and used, and (2) whether the use of the invention was in accordance with the patent’s characteristics. *Id.* at 1143; see *Lee v. Accessories by Peak*, 705 F. Supp. 2d 249, 254 (W.D.N.Y. 2010) (finding that patent infringement is a two-step process requiring the courts to establish what the scope of the patent is, depending on the construction of the patentee’s claims, and then compare the claims to the infringing use or invention in question).

²⁰⁴ 35 U.S.C. § 271(a) (2012); see Holman, *supra* note 3, at 700 (explaining that the statute’s silence on whether intent or knowledge is required to be held liable for patent infringement leaves open the door for the courts to interpret as such, at least with respect to self-replicating technologies).

²⁰⁵ See Vishnubhakat, *supra* note 201, at 578. Albert Walker published one of the first treatises on patent law in 1883 and described the theory that patent infringement does not require intent or knowledge as one that is firmly established. *Id.*; see *Potter Voice Techs., LLC v. Apple Inc.*, 24 F. Supp. 3d 882, 885 (N.D. Cal. 2014) (finding that intent is not necessary for patent infringement, it is only relevant to the calculation of damages which can be multiplied threefold if there is a finding of willfulness).

²⁰⁶ See 35 U.S.C. § 271(a) (providing for the conduct that constitutes patent infringement but not the requisite mental state); Holman, *supra* note 3, at 700 (noting the statute’s silence on what constitutes intent or knowledge); Shené Mitchell, *Organic Crops, Genetic Drift, and Commingling: Theories of Remedy and Defense*, 18 DRAKE J. AGRIC. L. 313, 317–18 (2013) (noting that a patent infringer’s intent is immaterial to liability).

terized as a myth, an innocent infringement is one that occurs without the knowledge of the alleged infringer.²⁰⁷ One of the primary ways innocent infringement may occur is through “genetic drift.”²⁰⁸ Genetic drift is when the genetic material of Roundup Ready seeds migrates through pollination and subsequently contaminates other crops.²⁰⁹ Another way innocent infringement can occur is through cross-fertilization.²¹⁰ This occurs when a non-patented plant breed pollinates a patented breed.²¹¹ Ultimately, the patent regime is incentive-based and designed to protect the inventor’s creation even if, like Roundup Ready, it has the ability to drift and contaminate other crops.²¹² This leaves unwitting infringers vulnerable because a defense setting forth a lack of intent or knowledge would likely fail in court.²¹³

The issue of genetic drift can be traced to an incident in 1998 where a Texas organic farmer’s crops were contaminated through cross-pollination from a nearby field of genetically modified corn.²¹⁴ Similarly, in 2004, a Canadian farmer alleged that he was a victim of innocent infringement because a Monsanto truck carrying genetically modified seeds spilled onto his farm and contaminated canola crops.²¹⁵ Others argue that innocent infringement is just a

²⁰⁷ See Holman, *supra* note 3, at 681 (finding that the popular theory that Monsanto is suing farmers on the basis of innocent infringement is not supported by evidence); Ma, *supra* note 136, at 703 (defining an inadvertent infringer in the context of Monsanto as someone who saves and replants seeds contaminated by Monsanto’s technology through environmental processes).

²⁰⁸ See Mitchell, *supra* note 206, at 317 (noting the risk of genetic drift to organic farmers who need to ensure that their crops do not contain GMOs); Richard A. Repp, Comment, *Biotech Pollution: Assessing Liability for Genetically Modified Crop Production and Genetic Drift*, 36 IDAHO L. REV. 585, 585–86 (2000) (describing early warnings from farm groups of the potential threat of genetic drift and how it could affect farmers in the future).

²⁰⁹ See Ma, *supra* note 136, at 703 (noting that genetic drift can occur without a farmer’s knowledge through environmental processes such as gusts of air, creatures, and other plants); Mitchell, *supra* note 206, at 317 (noting that genetic drift through natural processes poses a significant threat to organic farmers); Repp, *supra* note 208, at 585–86 (describing the greatest threat of infringement liability and other far reaching consequences as the potential for genetically modified crops commingling with non-genetically modified crops).

²¹⁰ Mitchell, *supra* note 206, at 317.

²¹¹ *Id.*

²¹² See *id.* (describing the patent regime as one that is inherently designed to protect the patent holder and ill-equipped to handle issues such as genetic drift); Repp, *supra* note 208, at 598 (describing how the qualities of genetically modified plant varieties create uncertainty in the courts).

²¹³ Mitchell, *supra* note 206, at 317.

²¹⁴ Repp, *supra* note 208, at 591.

²¹⁵ See *Monsanto Canada, Inc. v. Schmeiser*, [2004] 1 S.C.R. 902, 904 (Can.) (finding that Schmeiser was liable for patent infringement because he should have been aware of the contamination and by saving the seed he used Monsanto’s seed technology without authority); Holman, *supra* note 3, at 681–82 (noting that a close look at Schmeiser’s case proves that he was likely not a genuine innocent infringer); Mitchell, *supra* note 206, at 319 (discussing the Court’s conclusion that Schmeiser should have known that the seeds included Monsanto’s technology). Canola crops are plants that produce small yellow flowers and belong to the same family as mustard, broccoli, brussel sprouts, and cauliflower. *What Is Canola?*, U.S. CANOLA ASS’N, <http://www.uscanola.com/what-is-canola/> [<https://perma.cc/37F6-YQPX>].

myth.²¹⁶ In fact, the Supreme Court of Canada expressed doubt that genetic drift occurred in the 2004 case.²¹⁷

Despite this, the issue of innocent infringement has become more apparent, particularly when the OSGA and numerous organizations brought suit against Monsanto based on the theory of genetic drift in 2012.²¹⁸ OSGA sought to bar Monsanto from bringing any patent infringement claims due to the increasing probability that genetic drift would occur.²¹⁹ Ultimately, the U.S. Court of Appeals for the Federal Circuit found that the organizations did not have standing to bring suit because it was not certain that innocent infringement would occur due to genetic drift.²²⁰ Underlying the court's decision was Monsanto's assurance that it would not sue farmers with traces of less than one percent of Roundup Ready technology in their crops.²²¹

Despite the U.S. Court of Appeals for the Federal Circuit's conclusion in *Organic Seed Growers Association & Trade Ass'n v. Monsanto Co.* and Monsanto's commitment, the issue remains unresolved.²²² Ultimately, Monsanto's

²¹⁶ See Holman, *supra* note 3, at 681 (finding that the popular theory that Monsanto is suing farmers on the basis of innocent infringement is not supported by evidence); Ma, *supra* note 136, at 703 (defining an inadvertent infringer in the context of Monsanto as someone who saves and replants seeds contaminated by Monsanto's technology through environmental processes).

²¹⁷ See Holman, *supra* note 3, at 681–82. According to Professor Holman, the Supreme Court of Canada found Schmeiser's accusations against Monsanto meritless because he took affirmative steps to engage in activity that infringed on Monsanto's patent. *Id.*

²¹⁸ *Organic Seed Growers & Trade Ass'n v. Monsanto Co.*, 718 F.3d 1350, 1352 (Fed. Cir. 2013); see Holman, *supra* note 3, at 681 (noting that the idea of innocent infringers may be based on a falsehood). The plaintiffs sought declaratory judgment from the court asking Monsanto to promise to not hold farmers liable for patent infringement where there was a lack of knowledge or intent of the violation. *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1353. The Federal Circuit ultimately ruled that the plaintiffs did not have standing since they failed to allege concrete harm. *Id.* at 1361.

²¹⁹ *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1354. Monsanto has been well-documented as preferring to use the courts as a way to hold farmers accountable for patent infringement. Ma, *supra* note 136, at 700. As of 2007, there were 112 lawsuits filed against farmers, resulting in damages of more than twenty million dollars for Monsanto. *Id.* This number is likely greater as an estimated 700 potential suits were settled out of court. *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1353; Ma, *supra* note 136, at 700. As of 2016, according to the Monsanto website, the company has filed 147 lawsuits. See *Why Does Monsanto Sue Farmers Who Save Seeds?*, MONSANTO (Apr. 11, 2017), <https://monsanto.com/company/media/statements/saving-seeds/> [<https://perma.cc/6X59-VG2Y>]. In response to the suit brought by the Organic Seed Grower's Association, Monsanto directed the plaintiffs to its commitment on its website. *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1354. Monsanto's commitment explicitly promises that it will not sue farmers based on trace amounts of its technology in contaminated crops. *Monsanto's Commitment: Farmers and Patents*, MONSANTO (Apr. 5, 2017), <http://www.monsanto.com/newsviews/pages/commitment-farmers-patents.aspx> [<https://perma.cc/C4HQ-CTZ6>] [hereinafter *Monsanto's Commitment*].

²²⁰ *Organic Seed Growers & Trade Ass'n*, 718 F.3d at 1360 (finding that where the plaintiffs could not show that inadvertent infringement had actually occurred through genetic drift or was certain to happen, there was no case or controversy for the court to resolve).

²²¹ *Id.* at 1358; *Monsanto's Commitment*, *supra* note 219.

²²² See Lim, *supra* note 28, at 597 (discussing the threats farmers still face in being held liable for patent infringement despite Monsanto's agreement).

control over the seed industry drastically increases the probability that innocent infringers will be held liable.²²³ Further, Monsanto's commitment is limited and did not directly address whether it would waive liability for crop contamination above the one percent trace levels.²²⁴

*D. The Supreme Court Revisits the Exhaustion Doctrine in
Bowman v. Monsanto Co.*

Bowman v. Monsanto Co. represents the peak of the exhaustion doctrine's development.²²⁵ Vernon Hugh Bowman was a small-scale farmer from Indiana.²²⁶ Beginning in 1999, he procured seeds that contained the Roundup Ready technology for his first crop.²²⁷ He also bought seeds from a grain elevator for second-crop planting, which occurred later in the season.²²⁸ Seeds from grain elevators, also known as commodity seeds, served as a way to mitigate the costs of what Bowman considered a riskier late-season crop.²²⁹

Rather than paying more money to purchase another set of Roundup Ready seeds, Bowman combined the saved seeds from the first crop and the commodity seeds from the grain elevators and later replanted them.²³⁰ Bowman knew that many of the commodity seeds from the grain elevator could contain the resistant technology found in Roundup Ready seeds.²³¹ He therefore sprayed the Roundup Ready herbicide on his crops to eliminate the seeds without the technology.²³²

²²³ See *id.* (recognizing the possibility of innocent infringement, which even Monsanto acknowledged).

²²⁴ See Holman, *supra* note 3, at 687 (discussing the Federal Circuit's mention of Monsanto's cautious statements that did not completely eliminate the potential of lawsuits against farmers who contained crop contamination).

²²⁵ See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1761 (2013) (emphasizing the enduring role of the exhaustion doctrine); *J.E.M. Ag Supply, Inc.*, 534 U.S. at 145 (concluding that hybrid corn seeds are patentable subject matter under 35 U.S.C. § 101); *Chakrabarty*, 447 U.S. at 318 (concluding that a broad interpretation of 35 U.S.C. § 101 was appropriate given the statute's language and legislative intent); U.S.D.A REPORT, *supra* note 208, at 2 (summarizing the exponential growth of the biotechnology agricultural sector in the time period after the decisions in *Chakrabarty* and *J.E.M. Ag Supply, Inc.* and the resulting domination by a few companies).

²²⁶ *Bowman*, 133 S. Ct. at 1768.

²²⁷ *Monsanto Co. v. Bowman*, 657 F.3d 1341, 1345 (Fed. Cir. 2011), *aff'd*, 133 S. Ct. 1761 (2013).

²²⁸ *Id.* Grain elevators are facilities that sell soybean seeds to large groups for the utilization of individuals or animals. Brief of CropLife America as Amicus Curiae Supporting Affirmance at 3, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 314456, at *3. Grain elevators generally do not sell seeds to farmers for cultivation purposes. *Id.*

²²⁹ *Monsanto Co.*, 657 F.3d at 1345.

²³⁰ *Id.*

²³¹ *Id.*

²³² *Id.* at 1345–46.

Starting in 2000, Bowman continued this practice openly until Monsanto sued him for patent infringement in 2007.²³³ The Federal Circuit's decision in Monsanto's favor was twofold.²³⁴ First, building upon the U.S. Supreme Court's decision in *Mallinckrodt, Inc. v. Medipart, Inc.*, the court characterized the sale of the Roundup Ready seeds as a "conditional sale."²³⁵ The condition was that Bowman was to only use the seeds for the current season.²³⁶ Also, Monsanto reserved control over what Bowman did with the seed, including replication of its properties.²³⁷ Second, even if the exhaustion doctrine could apply to Bowman's conduct, the resultant crops from the replanted seeds created a newly infringing article.²³⁸

On appeal to the U.S. Supreme Court, the case centered on how far the exhaustion doctrine extended.²³⁹ The Court emphasized that, though an authorized sale exhausts the patent holder's rights, the doctrine does not give users the ability to make a new article.²⁴⁰ Nevertheless, Bowman argued that, in replanting Roundup Ready seeds, he was merely farming.²⁴¹ He stressed that the general purpose of seeds is to use them in planting.²⁴² He therefore claimed that his conduct was a permissible use rather than a reproduction, or making, of a new article.²⁴³ Bowman also argued that, because soybeans were self-replicating, it was the beans themselves that created the infringing article—not Bowman.²⁴⁴ Ultimately, the Court rejected these arguments as an attempt to impermissibly extend the exhaustion doctrine and held in Monsanto's favor.²⁴⁵

²³³ *Id.*

²³⁴ *Id.* at 1347–48 (concluding that the sale of Roundup Ready seeds to Bowman was a conditional sale and that even if Monsanto's patent rights were exhausted, Bowman's conduct created a newly infringing article); Lim, *supra* note 28, at 571.

²³⁵ *Monsanto Co.*, 657 F.3d at 1347; Lim, *supra* note 28, at 571; see *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700, 709 (Fed. Cir. 1992) (finding that the sale of the patented apparatuses was a conditional sale requiring purchasers to dispose of the product after a single use).

²³⁶ *Monsanto Co.*, 657 F.3d at 1347.

²³⁷ *Bowman*, 133 S. Ct. at 1764–65; Lim, *supra* note 28, at 570–71.

²³⁸ *Monsanto Co.*, 657 F.3d at 1348 (finding that crops from replanted seed are analogous to copies of the initial seed); Lim, *supra* note 28, at 571 (noting that the lack of an authorized sale contributed to the exhaustion doctrine's inapplicability).

²³⁹ Lim, *supra* note 28, at 571; see *Bowman*, 133 S. Ct. at 1766 (concluding that the exhaustion doctrine would not apply to the additional soybeans grown without Monsanto's consent).

²⁴⁰ *Bowman*, 133 S. Ct. at 1766.

²⁴¹ *Id.* at 1768; see *Wilbur-Ellis Co. v. Kuther*, 377 U.S. 422, 424 (1964) (concluding that the exclusive right of "making" requires that the invention's users are not allowed to copy it).

²⁴² *Bowman*, 133 S. Ct. at 1766.

²⁴³ *Id.* at 1768–69.

²⁴⁴ *Id.* at 1768.

²⁴⁵ *Id.*

III. REDEFINING MAKING

The exhaustion doctrine's significance lies in its ability to restrict the control patent holders have over their inventions after they are sold.²⁴⁶ From *Adams v. Burke* to *Bowman v. Monsanto Co.*, courts have attempted to balance patent holders's interests against those of subsequent purchasers or users.²⁴⁷ Patent protection is designed to incentivize inventors with a temporary monopoly.²⁴⁸ Courts, however, have consistently held that, once full compensation is received, further protection in the form of exclusive rights is unnecessary.²⁴⁹ Ultimately, the invention of self-replicating technologies forced the courts to reexamine these longstanding principles.²⁵⁰

A. The Court in Bowman Left the Relationship Between the Exhaustion Doctrine and the Definition of "Making" Unresolved

To find that Bowman made another article, the U.S. Supreme Court in *Bowman* focused heavily on the amount of labor that Bowman put into harvesting the Roundup Ready seeds he obtained from the grain elevator.²⁵¹ Although the Court was presented with a naturally self-replicating product, it highlighted the various steps Bowman took to reconstruct Monsanto's technology.²⁵² Rejecting Bowman's attempt to shift culpability to the seeds, the Court detailed his purchase of the seeds, use of the Roundup Ready herbicide, seed saving, replanting, and harvesting.²⁵³

Recognizing self-replicating technologies as new territory under the patent regime and the unique facts presented in *Bowman*, the Court left the door open as to what "making" could be defined as.²⁵⁴ The Court narrowed its conclusion to the specific facts of the case, acknowledging that there may be in-

²⁴⁶ See *Bowman v. Monsanto Co.*, 133 S. Ct. 1761, 1766 (2013) (emphasizing the standard of the exhaustion doctrine); *Quanta Computer, Inc. v. LG Elecs.*, 553 U.S. 617, 638 (2008) (finding that the sale of the microprocessors and chipsets served as an authorized sale to which the exhaustion doctrine was applicable); *United States v. Univis Lens Co.*, 316 U.S. 241, 250–51 (1942) (emphasizing that, where a sale of an article encompasses the fundamental elements, the patent holder's rights are exhausted).

²⁴⁷ See *Bowman*, 133 S. Ct. at 1766 (establishing that the exhaustion doctrine limits the patent holder's rights); *Adams v. Burke*, 84 U.S. (17 Wall.) 453, 456 (1873) (noting that, despite the privileges afforded to patent holders, their rights are limited once an adequate reward is given).

²⁴⁸ *Bowman*, 133 S. Ct. at 1766.

²⁴⁹ See *id.* (describing the exhaustion doctrine's rationale); *Adams*, 84 U.S. at 456 (noting that, despite the privileges afforded to patent holders, their rights are limited once an adequate reward is given).

²⁵⁰ See *Bowman*, 133 S. Ct. at 1769 (noting that the increasingly complex nature of self-replicating technologies may lead the Court to rule differently in subsequent cases).

²⁵¹ See *id.* at 1765 (describing Bowman's conduct step-by-step).

²⁵² *Id.*

²⁵³ *Id.* at 1769.

²⁵⁴ *Id.*

stances in the future when an alleged infringer does not undertake labor or conduct that is significant enough to scrutinize.²⁵⁵ The Court further recognized that self-replication of an article outside an unsuspecting user's control might be beyond the exhaustion doctrine's scope.²⁵⁶

Bowman left the relationship between the exhaustion doctrine, self-replicating technologies, and the definition of "making" in limbo.²⁵⁷ This is significant for two reasons.²⁵⁸ First, it allows "making" to be defined in a way that will be unified and concrete.²⁵⁹ Second, it sets the stage for the protection of innocent infringers accused of making an article.²⁶⁰

B. Proposed Resolutions and Why They Are Flawed

There have been a number of proposed solutions to the problem of self-replicating technologies and the threat to innocent infringers.²⁶¹ These solutions include expanding the use of contract law or property law in the seed industry or applying copyright regimes.²⁶² Ultimately, these solutions are inadequate because they undercut the incentives that are essential to patent law.²⁶³

Bowman set forth a number of arguments to avoid liability.²⁶⁴ One argument was that contract law could be an alternative to the licensing schemes that Monsanto already had in place.²⁶⁵ He argued that, through a contract provision, companies like Monsanto could require farmers to sell resulting seeds to grain elevator operators who have agreed not to harvest them in subsequent

²⁵⁵ *See id.*

²⁵⁶ *See id.*

²⁵⁷ *See id.*

²⁵⁸ *See id.*; *infra* notes 332–344 and accompanying text.

²⁵⁹ *See* Brief for Amici Curiae Center for Food Safety and Save Our Seeds in Support of Petitioner at 29, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6591149, at *29 (setting forth a statutory loophole argument); *infra* notes 327–344 and accompanying text (discussing a new way to define making and its benefits with respect to patent law and the exhaustion doctrine).

²⁶⁰ *See* Holman, *supra* note 3, at 700 (noting that the patent infringement statute is a strict liability violation); *infra* notes 327–344 and accompanying text.

²⁶¹ *See* Holman, *supra* note 3, at 692 (discussing the numerous arguments and proposing an alternative).

²⁶² *See* Brief for Petitioner at 24, 55–56, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6063892, at *24, 55–56 [hereinafter *Bowman's* Brief, *Bowman v. Monsanto Co.*]; Ma, *supra* note 136, at 716. Contract law as an alternative to patent protection has been set forth as a fair way to resolve the issue because the agreements would be subject to legal scrutiny. *Bowman's* Brief, *Bowman v. Monsanto Co.*, *supra*, at 55–56. Copyright's notice-and-takedown scheme is described as analogous to requiring farmers with crops containing Monsanto's technology to remove them as soon as they are aware. Ma, *supra* note 136, at 716.

²⁶³ *See infra* notes 264–288 and accompanying text.

²⁶⁴ *See* *Bowman's* Brief, *Bowman v. Monsanto Co.*, *supra* note 262, at 11 (summarizing *Bowman's* arguments to the U.S. Supreme Court, including expanding the exhaustion doctrine and applying contract principles).

²⁶⁵ *Id.* at 55–56.

seasons.²⁶⁶ This provision would prevent Monsanto's technology from mixing with other crops since the seeds would need to remain distinctly identifiable.²⁶⁷

Administrative issues ultimately make such contractual methods an unworkable solution to self-replicating technologies.²⁶⁸ The most significant issue is that, although Monsanto would have a contractual agreement with the farmer-purchaser, it would not have contractual privity with subsequent progeny seed-purchasers.²⁶⁹ Consequently, grain elevator operators would be free to use the seeds in any manner they deem fit.²⁷⁰ Monsanto and other seed companies would therefore have to enter into a contract with each subsequent purchaser.²⁷¹ Additionally, contract law poses a threat to the incentives afforded by patent law.²⁷² That is, patentees would only be able to profit from first generation seeds.²⁷³

Another suggestion is to apply property law principles to the exhaustion doctrine for self-replicating technologies, but similar problems arise.²⁷⁴ In *Bowman*, the farmer argued that the exhaustion doctrine should be extended to second-generation seeds due to the inherent nature of self-replicating technology.²⁷⁵ Bowman likened the ability of Monsanto to prevent farmers from replanting second-generation seeds for subsequent harvests as a restraint on personal property.²⁷⁶ By restraining use of the article, courts allowed companies to exert control after the authorized sale.²⁷⁷ The U.S. Supreme Court was swift in rejecting this expansion of the exhaustion doctrine.²⁷⁸ The Court ultimately concluded in *Bowman* that any interpretation that modified the exhaustion doctrine would threaten incentives to innovate.²⁷⁹

²⁶⁶ *Id.*

²⁶⁷ *Id.*

²⁶⁸ Lim, *supra* note 3, at 180–81.

²⁶⁹ *Id.*

²⁷⁰ *See id.* (describing the complex process that would be required for Monsanto to establish privity with the entities).

²⁷¹ *Id.*

²⁷² *Id.*

²⁷³ *Id.*

²⁷⁴ *See* Bowman's Brief, *Bowman v. Monsanto Co.*, *supra* note 262, at 44–45 (proposing the argument that applying the exhaustion doctrine to seeds and resulting crops contradicts settled theories on personal property).

²⁷⁵ *See id.* (recognizing that the application of property law to the making of new articles of a patented invention would prevent from controlling the use or subsequent sale of soybeans that are the result of replanting the seeds initially sold).

²⁷⁶ *Id.* In his brief, Bowman compared Monsanto's prohibition on second-generation seeds to historical servitudes, which bound successive owners even when property was subsequently sold. *Id.* at 45–49. He also noted that servitudes, in relation to personal property, have fallen out of judicial favor primarily because the courts are less willing to allow for restraints on personal property. *Id.*

²⁷⁷ *Id.* at 49–51.

²⁷⁸ *Bowman*, 133 S. Ct. at 1768.

²⁷⁹ *Id.*; *see* 35 U.S.C. §§ 161–164 (2012).

Copyright law's notice-and-takedown regime has also been suggested, although it would likely pose the same administrative issues as contract law.²⁸⁰ When Congress enacted the Digital Millennium Copyright Act, it sought to resolve the liability that occurred through innocent infringement of copyrighted work, acknowledging that new technologies were incompatible with the traditional copyright regime.²⁸¹ For example, Internet service providers ("ISPs") can host copyrightable material through user-uploaded content.²⁸² Consequently, such ISPs faced potential copyright infringement liability as they became increasingly popular.²⁸³ To combat this issue, the notice-and-takedown regime requires ISPs to remove any infringing work from their website once notified.²⁸⁴

This same notice-and-takedown regime could be applied to farmers who have inadvertently infringed on Monsanto's technology.²⁸⁵ While this regime would likely preserve the incentives to continue developing different seed varieties, it would be difficult to implement.²⁸⁶ Biotechnology companies would have to invest a significant amount of time and money in discovering infringing crops and notifying the farmers.²⁸⁷ Further, it is uncertain how the infringing articles would be removed from a crop.²⁸⁸

C. How Redefining "Making" with a Focus on Knowledge Can Help Innocent Infringers

Simply put, "making" should be redefined and interpreted in a way that will shield innocent infringers from patent infringement liability.²⁸⁹ Although *Bowman* serves as the seminal case that brought the issue of innocent infringement to the forefront, *Bowman*'s conduct differs from the kind of activity

²⁸⁰ 17 U.S.C. § 512(g) (2012); see *Ma*, *supra* note 136, at 720 (noting that the application of the notice-and-takedown regime would require both farmers and the biotechnology industry to constantly work together to be effective).

²⁸¹ Digital Millennium Copyright Act, 112 Stat. 2860 (1998) (codified as amended at 17 U.S.C. §§ 101, 104, 104A, 108, 112, 114, 117, 512, 701, 1201–1205, 1301–1332 (2012)); 28 U.S.C. § 4001 (2012)); 17 U.S.C. § 512(g); *Ma*, *supra* note 136, at 717.

²⁸² *Ma*, *supra* note 136, at 717.

²⁸³ See *id.*

²⁸⁴ *Id.*

²⁸⁵ *Id.* at 718.

²⁸⁶ *Id.* at 720.

²⁸⁷ See *id.* at 717 (describing the steps of the notice-and-takedown provision of the Digital Millennium Copyright Act which, as applied to the seed industry, would require Monsanto to notify an infringer, receive notification that the infringing material was removed, in addition to independently ensuring that an infringer has actually removed the seeds).

²⁸⁸ *Id.* at 720.

²⁸⁹ *Bowman*, 133 S. Ct. at 1766 (noting that replicating the article was enough to constitute making). It should be noted that redefining "making" could arise either through a new interpretation set forth by the courts or statutorily by the legislature. See *id.*

a new definition of making would protect.²⁹⁰ Bowman was fully aware that he was replanting seeds with the Roundup Ready technology and his intentions to usurp Monsanto's restrictions were deliberate over a seven-year period.²⁹¹ In contrast, innocent infringers are not knowingly or intentionally engaging in activity that they know to be infringing but rather, they are virtually unaware that their conduct is creating infringement liability.²⁹² The key issue is that, under the current legal framework, both Bowman and an innocent infringer will be held liable for patent infringement despite the stark differences in their actions.²⁹³

By redefining "making" to ensure that only deliberate conduct such as Bowman's will be considered patent infringement, it resolves two major issues: first, innocent infringers will not be held liable for conduct they are unaware of, and second, both the exhaustion doctrine and patent policy goals will remain intact.²⁹⁴

D. A New Definition of Making

Under 35 U.S.C. § 271, an individual who makes any patented invention infringes upon the patent.²⁹⁵ In *Bowman*, one of the key issues was whether Bowman's act of reproducing a second generation of seeds could constitute "making."²⁹⁶ One problem was that it was possible to argue that the replication of soybeans was a natural and independent process.²⁹⁷ If so, Bowman did not actually make the soybeans and, therefore, did not infringe on Monsanto's patent.²⁹⁸ Although the Court did not explicitly define what making means under the statute, it referenced the dictionary definition and took care to detail all of Bowman's steps in replicating the soybeans to find that this activity constituted making.²⁹⁹ This undertaking, however, still leaves a number of issues unre-

²⁹⁰ See *id.* (detailing the various steps it took to make a second generation of seeds and Bowman's own admission that he replicated the patented seeds).

²⁹¹ See *Monsanto Co.*, 657 F.3d at 1346 (noting that Bowman openly shared replanting seeds he received from grain elevators).

²⁹² Mitchell, *supra* note 206, at 317.

²⁹³ *Id.*

²⁹⁴ See *Monsanto Co.*, 657 F.3d at 1346 (summarizing Bowman's scheme as deliberate); IP IN THE TECH AGE, *supra* note 33, at III-4; *infra* notes 295–310 and accompanying text (setting forth a new definition of making).

²⁹⁵ 35 U.S.C. § 271 (2012).

²⁹⁶ *Bowman*, 133 S. Ct. at 1766.

²⁹⁷ See Brief for Amici Curiae Center for Food Safety and Save Our Seeds in Support of Petitioner at 29, 31–32, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6591149, at *29, 31–32 (arguing that the reproduction of a product through farming should not be considered making).

²⁹⁸ See *id.*

²⁹⁹ *Bowman*, 133 S. Ct. at 1766.

solved.³⁰⁰ Specifically, it is unclear whether “making” requires only that the infringer engaged in some sort of conduct involving labor in the process of reproducing the article in question, or only that the article was actually reproduced.³⁰¹

A new definition of making would require evidence that the alleged infringer engaged in a level of willful conduct.³⁰² This distinction is particularly relevant when it comes to self-replicating technologies because of their unique ability to reproduce on their own.³⁰³ Generally, in most patent infringement cases, whether the product in question was made is not an issue.³⁰⁴ As self-replicating technologies become increasingly advanced, this distinction will become important with respect to patent infringement.³⁰⁵

Further, this new definition of making will successfully integrate self-replicating technologies into the exhaustion doctrine without having to create an exception.³⁰⁶ Under the exhaustion doctrine, the patent holder no longer has any rights to the product once a valid sale is made.³⁰⁷ However, under the proposed definition of making, willful conduct would fall within the infringement statute and would therefore be outside the scope of the exhaustion doctrine.³⁰⁸ Because innocent infringers would not have the requisite knowledge to be held liable for patent infringement under this clarified definition of making, the exhaustion doctrine would remain intact.³⁰⁹ Preserving the exhaustion doctrine

³⁰⁰ See *id.* at 1769 (noting that its holding is limited due to the advancing nature of self-replicating technologies).

³⁰¹ While the Court emphasized all the steps it took to reproduce the seed in order to counter Bowman’s “blame-the-bean defense” it is not entirely clear how much weight the Court would be on such labor in a subsequent case. See *id.* at 1766, 1769.

³⁰² See 35 U.S.C. § 271(a) (2012) (the patent infringement statute does not speak directly to whether intention or knowledge of the alleged infringer).

³⁰³ See *Bowman*, 133 S. Ct. at 1766 (recognizing the inherent issue that a similar case may present facts where the reproduction of the patented article was done independently). Brief for Amici Curiae Center for Food Safety and Save Our Seeds in Support of Petitioner at 29, 31–32 *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6591149 at *29, 31–32 (noting that reproducing a seed by planting cannot be defined as making because such conduct is the historical traditional of farming).

³⁰⁴ Recently, the Court expressly addressed the issue of the exhaustion doctrine. See *Impressions Prods. v. Lexmark Int’l, Inc.*, 137 S. Ct. 1523, 1530 (2017). The case and similar cases it cited to, however, dealt with products that cannot be reproduced independently. *Id.* at 1532–33. Here, the Court dealt with ink cartridges that were being illegally refurbished. *Id.*

³⁰⁵ See *Holman*, *supra* note 3, at 688–92 (describing the advancement in self-replicating technologies where the labor of the alleged infringer is not clearly discernable or present); *Lim*, *supra* note 3, at 187 (describing innocent infringers as infringement that occurs involuntarily).

³⁰⁶ See *Bowman*, 133 S. Ct. at 1768 (concluding that Bowman’s argument that he is not liable for patent infringement would require the Court to create an exception to the exhaustion doctrine).

³⁰⁷ See Brief for Amici Curiae Center for Food Safety and Save Our Seeds in Support of Petitioner at 29, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2012 WL 6591149, at *29 (noting that “making” violations fall outside the scope of the exhaustion doctrine).

³⁰⁸ See *id.*

³⁰⁹ *Lim*, *supra* note 3, at 187 (describing innocent infringers as infringement that occurs involuntarily).

will also mean that the goals of patent law will be sustained.³¹⁰ By ensuring that those who knowingly infringe on a patent cannot escape liability through the exhaustion doctrine, patent holders will continue to be incentivized to innovate.³¹¹

CONCLUSION

The exhaustion doctrine establishes the right to use or resell a patented article after an authorized sale. Despite the principle's historical roots, it has contracted and expanded as courts have tried to maintain the goals of patent law: to allow patent holders to receive their full reward and encourage innovation. Self-replicating technologies, specifically in the context of plant varieties, posed a challenge as to what legal protection these technologies should receive. Slowly, through various legislative acts and judicial intervention, the agricultural biotechnology industry saw increased legal protection and, ultimately, patent protection.

Patent protection encouraged significant investment in research and development by industry giants such as Monsanto. Given the substantial amount of money that is required to develop seed technology, patent protection gave companies the necessary incentive to engage in this endeavor. As Monsanto's technology achieved widespread use, the company's litigation against patent infringers became an increasing concern. The ability of Roundup Ready seeds to easily contaminate crops led to the belief that farmers may be held liable as innocent infringers. This rationale was rooted in the strict liability interpretation courts gave to the patent infringement statute, which did not require infringers to have any knowledge or intent to be held accountable.

Bowman v. Monsanto exemplified how courts deal with patent infringement and the exhaustion doctrine in the context of self-replicating technologies. Ultimately, the U.S. Supreme Court was correct in deciding not to extend the exhaustion doctrine to the act of making another article. However, the narrower question remained: whether Bowman's knowledge of his actions determined whether he made the article. If not, a decision concluding that his knowledge was irrelevant had the potential to leave innocent infringers vulnerable.

³¹⁰ See Transcript of Oral Argument at 3, *Bowman*, 133 S. Ct. 1761 (No. 11-796), 2013 WL 1842087, at *3. In *Bowman v. Monsanto Co.*, Chief Justice Roberts' opening question to Bowman's lawyer was: "Why in the world would anybody spend any money to try to improve the seed if as soon as they sold the first one anybody could grow more and have as many of those seeds as they want?" See *id.* The Chief Justice's question demonstrates, in laymen's terms, the enduring rationale behind patent law. See *id.*

³¹¹ See *Bowman*, 133 S. Ct. at 1768 (balancing the importance of the exhaustion doctrine with the rights and incentives of patent holders).

Ultimately, redefining “making” to require the infringer to have knowledge will protect those who have crops that were inadvertently contaminated with patented technology. Infringers such as Bowman, who knowingly circumvent patent law, will still be held responsible. This will ensure that patent holders remain incentivized and receive the appropriate compensation for their inventions and the courts can avoid expanding or creating exceptions to the exhaustion doctrine. Further, the proposed definition of “making” would provide increasing clarity and predictability in the law.

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