NOTE

PATENT AT YOUR OWN RISK: LINGUISTIC FENCES AND
ABBOTT LABORATORIES v. SANDOZ, INC.

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INTRODUCTION

What do an eighteenth-century patriot, a nineteenth-century physicist, and a twentieth-century philosopher have in common with United States patent law? All three individuals can help make sense of one of the Federal Circuit's latest en banc patent decisions, Abbott Laboratories v. Sandoz, Inc. Thomas Jefferson's grid system for real estate, Johann Heinrich Wilhelm Geissler's glow-discharge tubes, and Gottlob Frege's philosophical theory of language all aid in debunking the Federal Circuit's central holding that "process terms in product-by-process claims serve as limitations in determining infringement." Patenting is the procedure that protects novel scientific inventions by granting those inventions an intellectual property right. The United States Constitution provides the foundation for patent law and vests in Congress the power and duty of its implementation. Congress fulfilled its constitutional duty by granting inventors an intellectual property right in return for public disclosure of their innovations. Today, an inventor secures his or her intellectual property right by obtaining an issued claim from the United States Patent and Trademark Office (Patent Office). Among other requirements, an inventor must "particularly point[ ] out and distinctly claim[ ] the subject matter which the [inventor] regards as his invention" to obtain a claim from the Patent Office.

One can understand this statutorily mandated feature of claims by analogizing to a fence. Instead of poles and wire, an inventor utilizes language to fence off the "metes and bounds" of what he or she takes to be the invention. This linguistic fence allows the public to know what intellectual "land" they are not allowed to use. Pursuant to modern patent statutes, no one may obtain a patent claim without creating this linguistic fence.

2 Neon signs are a particular form of Geissler tube. See infra Part III.C.3.
3 See Abbott Labs., 566 F.3d at 1293 (quoting Atl. Thermoplastics Co. v. Faytex Corp., 970 F.2d 834, 846–47 (Fed. Cir. 1992)).
4 U.S. CONST. art. I, § 8, cl. 8 (granting Congress the power to pass laws "[t]o promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries").
7 In the nineteenth century, patent laws allowed for "central claiming" where the claims set forth the gist or essence of the invention. Now, Congress requires "peripheral claiming," in which the claims set forth the metes and bounds, or outer limits [as opposed
One particular method of claiming is known as “product-by-process.” Here, the inventor defines his or her invention in terms of the process by which the invention is made. For example, a typical product claim refers directly to the composition of matter: “I claim the substance comprising gaseous water.” Conversely, the equivalent product-by-process claim reads: “I claim the substance obtainable by the process comprising the steps of heating pure water to 100°C at 1 atmosphere of pressure.” Both of these claims refer to precisely the same substance existing in the physical world (water vapor), but the product-by-process claim “fences off” its intellectual landscape in an obviously different and a more indirect manner.

The Federal Circuit’s recent en banc decision in *Abbott* drastically limits the interpretation of product-by-process claims for determining patent infringement.8 The court held that “the recited process steps limit the product-by-process claim[ ]” during its interpretation for determining patent infringement.9 Using the product-by-process claim example above, the court held that gaseous water made by heating water to 85°C at 0.5 atmospheres of pressure10 would not infringe that product-by-process claim. Gaseous water made at 85°C, however, would infringe the normal product claim because the product is still gaseous water. Although the majority in *Abbott* nominally based its decision on the requirement found in of 35 U.S.C. § 112 2 that claims “particularly point[ ] out and distinctly” claim their subject matter,11 both the majority and the dissent focus singularly on case law. The majority pays mere lip service to the patent statutes,12 which derive their power directly from the Constitution.13

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8 See infra Part II (discussing *Abbott Labs.*, 566 F.3d at 1282, and its implications on product-by-process claims).
9 *Abbott Labs.*, 566 F.3d at 1295.
10 Basic principles of thermodynamics show that the boiling point of water will vary with pressure.
12 See supra note 11.
13 See U.S. CONST. art. I, § 8, cl. 8.
By turning a blind eye to the Constitution and to the United States Code, the Federal Circuit's analysis became confused and flawed. In this Note, I will launch a three-part attack on the majority's holding in Abbott and the Federal Circuit's mode of argument as a whole. First, I will show that an analysis of 35 U.S.C. § 112 ¶ 2, when viewed in conjunction with 35 U.S.C. § 101, requires product-by-process claims to be limited only by the products that the described processes produce. Second, I will show that Congress indeed has been a vigilant administrator of its constitutional mandate to "promote the Progress of Science and useful Arts" because the realities of science and physical phenomena justify more robust protection of product-by-process claims. Third, I will rebut the Abbott majority's reliance on the "all-elements rule" by linguistically dissecting the form of product-by-process claims. For the most part, I will ignore the Abbott court's reliance on case law directly relating to product-by-process claims; Judge Pauline Newman painstakingly distinguishes each of these cases in her dissent and cites many contrary cases of her own such that, in my view, the majority and dissent essentially are in equipoise.

Part I of this Note will discuss the origin and early history of product-by-process claims and will examine the intracircuit split in the early 1990s that divided the newly created Federal Circuit regarding the scope of product-by-process claiming. Part II will consider the Abbott decision itself and the best arguments that one can make in its defense. Part III develops the arguments mentioned above using legal, philosophical, and scientific evidence.

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14 Id.
15 Recently, the Supreme Court has been accused of not appreciating scientific realities in their patent jurisprudence. See L. Gordon Crovitz, The Supreme Court v. Patent Absurdity, WALL ST. J., Nov. 16, 2009, at A21 (calling the Supreme Court "Exhibit A for the case that technological change is fast outpacing the ability of government to deal with it"). The Supreme Court Justices themselves candidly admit ignorance of the effects that their rulings will have on technology-driven industries. See Transcript of Oral Argument at 29, Bilski v. Kappos, No. 08-964 (U.S. Nov. 9, 2009) (Justice Sonia Sotomayor stating "I have no idea what the limits of that ruling will impose in the computer world or the biomedical world"); see also Crovitz, supra (discussing Justice Sotomayor's statement during oral arguments in Bilski).
I

PRODUCT-BY-PROCESS CLAIMS AND THE INTRACIRCUIT SPLIT

In 1891, the Patent Office first acknowledged product-by-process claims in Ex parte Painter. Since their inception in Painter, however, product-by-process claims always existed on inexact and uneasy grounds in the Patent Office and in the courts. Painter itself merely allowed product-by-process claims as a necessity—when linguistic limitations forced an inventor to describe an invention in terms of its manufacturing process. In 1974, the Patent Office abolished the necessity rule for product-by-process claims, maintaining that the patent statutes did not support this judicially created doctrine. At first, the Court of Customs and Patent Appeals—the predecessor court to the Federal Circuit—rejected Patent Office policy and retained the necessity rule. Eventually, however, administrative difficulties at the Patent Office and the continued pressure on courts to relax the necessity rule forced a compromise: the Patent Office bore a lower burden of proof in rejecting product-by-process claims, but the courts no longer required a showing of absolute necessity. It was not until the early 1990s that the newly created Federal Circuit decided the fate of product-by-process claims.

In 1991, the Federal Circuit addressed the issue of product-by-process claims head-on. Scripps Clinic & Research Foundation v. Genentech, Inc. dealt with a patent for Factor VIII:C, a blood-coagulating agent expressed by a gene found in all mammals. Scientists previously had discovered a method of concentrating Factor VIII:C that allowed the agent to be used to treat hemophiliacs without whole

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blood transfusions.\textsuperscript{26} Scripps Clinic & Research Foundation (Scripps) improved upon this process through chromatographic separation methods to produce, for the first time, a "[h]ighly purified and concentrated human or porcine VIII:C."\textsuperscript{27} After Scripps obtained a patent on this product, which it claimed using product-by-process,\textsuperscript{28} Genentech began manufacturing highly purified and concentrated Factor VIII:C using recombinant DNA methods.\textsuperscript{29} Scripps sued Genentech, claiming that Genentech’s recombinant DNA method of producing Factor VIII:C created the same highly purified and concentrated product that Scripps’s chromatographic method produced.\textsuperscript{30}

*Scripps* represents the first case in the intracircuit split regarding product-by-process claims. Judge Newman, writing for a unanimous panel, made a simple syllogistic argument. First, Judge Newman cited Federal Circuit precedent for the proposition that product-by-process claims constitute products for validity\textsuperscript{31} purposes (the minor premise of her argument).\textsuperscript{32} Judge Newman then assumed the major premise of her argument—"claims must be construed the same way for validity and for infringement"—without citation.\textsuperscript{33} However, this principle was well accepted by the legal community at the time, and although it is not based in the patent statutes, citation is not necessarily required.\textsuperscript{34} Thus, it logically follows that "the correct reading of product-by-process claims [for infringement] is that they are not limited to product prepared by the process set forth in the claims."\textsuperscript{35} The court must conduct the infringement analysis by comparing the specimens of Factor VIII:C produced by the recombinant DNA process and Scripps’s chromatographic process.\textsuperscript{36} Assuming Genentech’s recombinant DNA method produces the same highly purified product as Scripps’s chromatographic process, Genentech infringed Scripps’s patent.

\textsuperscript{26} See id. at 1568–69.

\textsuperscript{27} Id. at 1570 (quoting Scripps’s product-by-process claim 13).

\textsuperscript{28} Id.

\textsuperscript{29} See id. at 1580 n.9 (describing the basic procedure for manufacturing proteins using recombinant DNA).

\textsuperscript{30} See id. at 1583.

\textsuperscript{31} If a claim is construed as a product for validity purposes, then a piece of prior art that teaches the product but not the process of a product-by-process claim would anticipate the claim, rendering it invalid. See *In re* Thorpe, 777 F.2d 695, 697 (Fed. Cir. 1985).

\textsuperscript{32} See Scripps, 927 F.2d at 1583.

\textsuperscript{33} See id.

\textsuperscript{34} See 5A DONALD S. CHISUM, CHISUM ON PATENTS § 18.01, at 18-7 (2007) ("A fundamental tenet of patent law is that a claim must be interpreted consistently for purposes of infringement and validity.").

\textsuperscript{35} Scripps, 927 F.2d at 1583.

\textsuperscript{36} See id. at 1584 (referencing the infringement analysis the court used earlier in its opinion to determine whether Genentech infringed Scripps’s product-by-process claims).
Just one year after the *Scripps* decision, the Federal Circuit denied a petition to rehear *Atlantic Thermoplastics Co. v. Faytex Corp.* Unlike *Scripps*, which involved a chemical patent, *Atlantic* involved a mechanical patent for shock-absorbing innersoles for use in shoes. *Atlantic* Thermoplastics alleged that Faytex sold innersoles manufactured by Surge, Inc. and Sorbothane, Inc. that infringed the product-by-process claim in its patent. The parties agreed that the Surge innersoles infringed the patent held by Atlantic Thermoplastics because Surge made those innersoles by the same process described in the patented product-by-process claim. The parties disagreed, however, on whether the patented product-by-process claim covered the Sorbothane innersoles because of the different manufacturing process. The Sorbothane process used a “two-pour” method of molding the elastomeric innersoles that differed materially from the Surge process and the processes described in the patent held by Atlantic Thermoplastics. Despite the holding in *Scripps*, the Federal Circuit held that the Sorbothane innersoles did not infringe the patent.

Judge Randall Rader wrote for the majority in *Atlantic*, treating the precedents dealing with product-by-process claims in much greater detail than did the majority in *Scripps*. Judge Rader focused primarily on Supreme Court precedent from the nineteenth century to support his conclusion that product-by-process claims are limited to their processes in determining infringement. The merits of these arguments are given adequate treatment in *Atlantic’s* majority opinion, and when nearly identical arguments were again used in *Abbott*, Judge Newman closely scrutinized and intensely distinguished these arguments in her dissent.

Judge Rader puts his own spin on the history and evolution of product-by-process claims that seems to support the holding in *Atlantic*. Judge Rader explained that after first in *Painter* granting product-by-process claims upon a showing of necessity, the Court of Customs and Patent Appeals relaxed the necessity requirement provided the

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37 970 F.2d 834 (Fed. Cir. 1992).
38 Id. at 835.
39 Id. at 836.
40 Id.
41 See id. at 837–38.
42 Id. at 838, 847.
43 Compare id. at 838–47 (examining numerous court precedents concerning product-by-process claims), with *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1583 (Fed. Cir. 1991) (discussing comparatively fewer cases concerning product-by-process claims).
44 *Atlantic Thermoplastics*, 970 F.2d at 838–42; *see also* Passler, *supra* note 20, at 247–50 (discussing the *Atlantic* panel’s analysis of nineteenth-century Supreme Court precedents).
45 See *Atlantic Thermoplastics*, 970 F.2d at 838–42.
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claims could meet the statutorily defined standards for patenting. Relying partly on In re Pilkington, the Patent Office in 1974 took initiative by amending the Manual of Patent Examining Procedure to allow product-by-process claiming as long as 35 U.S.C. § 112 was satisfied, rejecting any necessity or inconvenience requirement. Soon thereafter, this newfound liberality left the Patent Office inundated with product-by-process claims that claimed old products. A recurring question soon surfaced: how can the Patent Office determine if a product claimed by the process of its manufacture is the same as those previously invented? In theory, the Patent Office could perform the process prescribed by the claim and compare the resulting product with the prior art. This comparison, however, would constitute a "daunting administrative task"—one whose light might not be worth the candle. Thus, Judge Rader appeared to urge his colleagues to learn from mistakes of the Patent Office in giving liberal treatment to product-by-process claims.

After considering the tortured history of product-by-process claims, the court in Atlantic held that "process terms in product-by-process claims serve as limitations in determining infringement." In doing so, the court recognized that it held out product-by-process claims as "exceptional"—the only patent entity that "will receive different treatment for administrative patentability determinations than for judicial infringement determinations." It would be seventeen years before the Federal Circuit addressed and resolved the intracircuit split that the Atlantic and Scripps decisions created.

II
ABBOTT LABORATORIES V. SANDOZ, INC. AND ITS BEST SUPPORT

Abbott Laboratories was the exclusive licensee of U.S. Patent No. 4,935,507 ('507 Patent) owned by Astellas Pharma Inc. (Astellas), dealing with a pharmaceutical patent for a particular form of crystal-

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47 See Atl. Thermoplastics, 970 F.2d at 844 (citing In re Pilkington, 411 F.2d 1345 (C.C.P.A. 1969)).
48 411 F.2d 1345.
49 Passler, supra note 20, at 241–42 (citing PATENT & TRADEMARK OFFICE, U.S. DEP’T OF COMMERCE, MANUAL OF PATENT EXAMINING PROCEDURE § 706.03(e), at 700-16 (5th ed., 6th rev. 1987)).
50 See Atl. Thermoplastics, 970 F.2d at 844.
51 Cf. id. (discussing the task the courts face in weighing patentability).
52 Id.
53 Id. at 846–47.
54 Id. at 847.
55 Crystalline 7-(2-(2-aminothiazol-4-yl)-2-hydroxyiminoacetamido)-3-vinyl-3-cephem-4-carboxylic acid (syn isomer), U.S. Patent No. 4,935,507 (filed Aug. 8, 1988).
line cefdinir.\textsuperscript{56} Abbott Laboratories marketed Crystal A cefdinir under the trade name Omnicef, while the defendants Lupin and Sandoz wanted to market the Crystal B form of cefdinir.\textsuperscript{57} The only difference between Crystal A and Crystal B cefdinir is that Crystal B cefdinir contains one molecule of water for every drug molecule within the crystal lattice while Crystal A is anhydrous.\textsuperscript{58}

Lupin and Sandoz sought declaratory relief of noninfringement against Abbott Laboratories on all five claims of the '507 Patent—three of which were independent claims.\textsuperscript{59} The first independent claim defined the drug in terms of its X-ray diffraction pattern, which is the result of a technique that measures distances and angles between atoms in crystals.\textsuperscript{60} The diffraction pattern that the patent claim describes, however, only corresponded with the Crystal A form of cefdinir.\textsuperscript{61}

The main issue in the case concerned the other two independent claims (Claim 2 and Claim 5) of the '507 Patent, which defined the cefdinir crystal by the process by which it was made.\textsuperscript{62} Claim 2 claimed crystalline cefdinir “obtainable by acidifying a solution containing 7–[2–(2–aminothiazol–4–yl)–2–hydroxyiminoacetamido] –3–vinyl –3–cephem–4–carboxylic acid (syn isomer) at room temperature or under warming.”\textsuperscript{63} Claim 5 claimed crystalline cefdinir “obtainable by dissolving 7–[2–(2–aminothiazol–4–yl)–2–hydroxyiminoacetamido]–3–vinyl–3–cephem–4–carboxylic acid (syn isomer) in an alcohol, continuing to stir the solution slowly under warming, then cooling the solution to room temperature and allowing the solution to stand.”\textsuperscript{64} Crystal B is obtainable by the process set forth in claim 2 because the solvent is water, and only Crystal A is obtainable by the process set forth in claim 5 because of the alcohol solvent.\textsuperscript{65} Thus, for the purposes of this Note, Abbott Laboratories

\begin{itemize}
\item \textsuperscript{56} Abbott Labs. v. Sandoz, Inc., 566 F.3d 1282, 1285 (Fed. Cir. 2009) (en banc), cert. denied, 130 S. Ct. 1052 (2010).
\item \textsuperscript{57} Id.
\item \textsuperscript{58} Id.
\item \textsuperscript{59} See id. at 1285–86. A dependent claim is a patent claim that incorporates all of the elements of an independent claim but goes on to add one or more elements. See 35 U.S.C. § 112 (2006). If a product does not infringe the independent claim, it is impossible to infringe the dependent claim. Thus, to fully escape liability under the '507 Patent, Lupin and Sandoz needed only to prove that their product did not infringe the three independent claims.
\item \textsuperscript{60} See Abbott Labs., 566 F.3d at 1286–87.
\item \textsuperscript{61} See id. at 1289.
\item \textsuperscript{62} See id. at 1286.
\item \textsuperscript{63} Id.
\item \textsuperscript{64} Id.
\item \textsuperscript{65} See Brief of Defendants-Appellants Abbott Laboratories and Astellas Pharma Inc. at 14, Abbott Labs. v. Sandoz, Inc., 566 F.3d 1282 (Fed. Cir. 2009) (No. 3:06-CV-400), 2007 WL 3021468, at *14 (explaining that “both Crystal A and Crystal B are ‘obtainable by’ the
relied on claim 2—the claim concerning the Crystal B form of cefdinir—to show infringement. Lupin and Sandoz, however, manufactured their Crystal B cefdinir through a different process than that described by claim 2 by acidifying the same drug precursor under cold temperatures rather than under room or warm temperatures.\textsuperscript{66}

Thus, the facts of the case required the Federal Circuit to determine the scope of product-by-process claims.\textsuperscript{67} To summarize, the patent held by Abbott Laboratories claimed product X obtainable by process \textit{Y}, and Lupin and Sandoz's allegedly infringing product is \textit{X} obtainable by process \textit{Z}.\textsuperscript{68} If the recited process steps merely serve to define the product without limiting the product's scope, then Abbott Laboratories could overcome the summary judgment motion under \textit{Scripps}. But, if "process terms in product-by-process claims serve as limitations in determining infringement,"\textsuperscript{69} then Lupin and Sandoz could win summary judgment under \textit{Atlantic}. The en banc Federal Circuit chose the latter route.\textsuperscript{70}

The \textit{Abbott} court devoted only five pages in its opinion to explaining and rationalizing its holding, which limited product-by-process claims to its recited process steps.\textsuperscript{71} It first acknowledged the inconsistency between the Federal Circuit's holding in \textit{Scripps} and its holding in \textit{Atlantic}.\textsuperscript{72} Second, the court cited and explained seven separate century-old Supreme Court precedents dealing directly with product-by-process claiming.\textsuperscript{73} (Once again, I believe that Judge Newman's dissent adequately distinguishes these cases\textsuperscript{74} and at least proves that these cases are not dispositive on the issue.) Third, the court stated that the Supreme Court's landmark decision in \textit{Warner-Jenkinson Co. v. Hilton Davis Chemical Co.},\textsuperscript{75} clarifying the all-elements rule, required...
this result. Fourth, the court cited cases from the Court of Customs and Patent Appeals that it says support its holding. Finally, the court made several policy arguments in favor of its holding.

For the reasons previously stated, I take the majority’s policy arguments and its citation of Warner-Jenkinson to be the primary obstacles to rebutting Abbott’s holding. Warner-Jenkinson defined the all-elements rule as requiring that “[e]ach element contained in a patent claim is deemed material to defining the scope of the patented invention.” Adopting this rule, the Abbott court further reasoned that “[b]ecause the inventor chose to claim the product in terms of its process . . . , that definition also governs the enforcement of the bounds of the patent right.” The process steps are certainly elements of the claim, and the “court cannot simply ignore as verbiage the only definition supplied by the inventor.”

The majority’s policy arguments connect to this idea. If an inventor defines his invention only in terms of the process by which it was made, how can courts or the public determine if a certain product will infringe a patent unless they perform the process elements of the claim? It is simply unfair to the public that they will not know the exact bounds of a patent’s protection. Consequently, the public might be deterred from pursuing legitimate scientific research for fear of inadvertently infringing another’s product-by-process claim. Without defining the invention in terms of its structure or properties, the inventor has not adequately “fenced off” his invention and put the public on notice as to what he or she owns.

III
ANALYSIS: ARGUMENTS IN FAVOR OF ROBUST PRODUCT-BY-PROCESS PROTECTION

Abbott was decided incorrectly for three reasons. First, a proper linguistic interpretation of product-by-process claims will completely avoid any violation of the Supreme Court’s all-elements rule. Sec-

76 See Abbott Labs., 566 F.3d at 1293.
77 See id. at 1293–94. As I will be relying heavily on the Court of Customs and Patent Appeals in the following section, I believe the marginally relevant argument the majority makes here will become moot.
78 See id. at 1294–95.
79 See Warner-Jenkinson, 520 U.S. at 29, quoted in Abbott Labs., 566 F.3d at 1293.
80 Abbott Labs., 566 F.3d at 1294.
81 Id.
82 See id.
83 Although I believe that the second argument is the most persuasive (even dispositive) on the issue, I begin by rebutting what I take to be the majority’s most persuasive argument because “responding advocates [should] rebut forcefully in their opening words.” See Antonin Scalia & Bryan A. Garner, Making Your Case: The Art of Persuading Judges 17 (2008) (attributing the statement to Aristotle); see also Aristotle, The Art
ond, a simple and indisputable interpretation of the patent statutes mandates that product-by-process claims not be limited by their process steps, thus rendering the Federal Circuit’s policy concerns irrelevant. And third, the inherent protections of civil procedure blunt the persuasiveness of the Federal Circuit’s policy concerns, and other public policies, informed by scientific realities, greatly outweigh them.

A. A Linguistic Analysis of Product-by-Process Claims: Frege’s Applicability to Warner-Jenkinson

The Abbott majority’s argument may make some intuitive sense. After all, the process steps are certainly included in the claim as the definition chosen by the applicant.84 Indeed, in another case, Judge Rader extols the power of applicants to be their own lexicographers by defining claim terms in whatever manner they see fit.85 This power to define, however, must come at the cost of giving force and effect to the applicant’s definition and not ignoring the applicant’s definition as mere “verbiage.”86 Warner-Jenkinson commands that the court find every element of a claim in an infringing product to establish liability.87


But, what is a claim “element?” The Abbott majority’s argument is patently circular because it assumes that the process steps are elements of the claim to come to the conclusion that “process terms in product-by-process claims serve as limitations in determining infringement.”88 (It is important to note here that a claim “limitation” is the same as a claim “element.” The Federal Circuit often rephrases the all-elements rule as the “all-limitations” rule.)89 Thus, the majority’s argument is circular because it assumes that the process steps of a product-by-pro-

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84 See Abbott Labs., 566 F.3d at 1294.
86 See Abbott Labs., 566 F.3d at 1294.
89 See Dawn Equip. Co. v. Ky. Farms Inc., 140 F.3d 1009, 1014 n.1 (Fed. Cir. 1998) (“The statute refers to a claim ‘element,’ but this court has moved towards the custom of referring to claim ‘limitations,’ reserving the word ‘elements’ for describing the parts of the accused device, though the court on occasion continues to use the words interchangeably.”).
cess claim are elements in order to conclude that the process steps are elements. The citation to Warner-Jenkinson merely disguises the ultimate issue.

Although this showing of circularity should be sufficient to dispel the argument, I will go on to show that, in fact, the majority's argument in Abbott is a red herring. Whatever the definition of "claim element" may be, no argument involving claim elements can show that product-by-process claims are limited to their process steps. To this end, we first must understand the nature of definitions and develop a theory of language that is adapted particularly to scientific terminology.

2. Frege's Theory of Language: A Rose by Any Other Name

Consider the original example of product-by-process claims. The phrase "I claim the substance comprising gaseous water" contains an easily understood subject and predicate ("I claim") followed by the direct object ("the substance") of the verb. The remainder of the claim ("comprising gaseous water") defines the substance that is the object of the claim in a particular manner—by giving the substance a name. Conversely, the phrase "I claim the substance obtainable by the process comprising the steps of heating pure water to 100°C at 1 atmosphere of pressure" uses the same subject, predicate, and direct object as the previous phrase; it varies only in its mode of definition. Instead of naming the substance, the latter product-by-process claim describes how to make the substance. The claim is effectively saying, "I claim whatever that thing is in the physical world that comes about when I perform these steps." The process itself is no more part of the object that is claimed than the letters, syllables, or sounds that make up the words "gaseous water" in the normal product claim. Furthermore, a pure process or method claim is entirely different; the phrase "I claim the process comprising the steps of putting water in a container at 1 atmosphere of pressure and heating the water to 100°C" does not have as its object any physical entity in the world. The objects of such pure process claims are acts. The Abbott majority, however, fails to understand that names and definitions refer to entities in the world. Product claims and product-by-process claims define and refer to the same objects, but they do so by using a different "sense."

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90 See supra notes 76–77, 80–82 and accompanying text. In order to preclude an obvious objection to my showing of circularity, I add that not every word in a claim is a claim "element" under the all-elements rule. See Kustom Signals, Inc. v. Applied Concepts, Inc., 264 F.3d 1326, 1333 (Fed. Cir. 2001) ("The word ‘or’ is not itself an ‘element’ of an apparatus or a step of a method, and its presence to signify alternative elements does not convert ‘or’ into an element.").

91 See supra text accompanying note 7.
To make this point, I will rely on the long-established tradition in analytical philosophy, founded by Gottlob Frege, of distinguishing an expression’s linguistically expressed “sense” from the object in the world the languages points out (its tangible “referent”):

It is natural, now, to think of there being connected with a sign (name, combination of words, letter), besides that to which [in the physical world] the sign refers, which may be called the referent of the sign, also what I would like to call the sense of the sign, wherein the mode of presentation is contained.

As an example, consider “water” and “H\textsubscript{2}O.” Both have the same referent but have used different senses, different modes of expressing the designation of the substance. “Water” has the more colloquial sense, and “H\textsubscript{2}O” is generally a scientific sense. Thus, for a given sense there is a defined referent, but for a given referent there can be multiple senses. That stuff you see fuming out of your beaker is gaseous water and it is gaseous H\textsubscript{2}O. And for those with less scientific acumen, it is the substance obtainable by the process comprised of heating pure water to 100\textdegree C at 1 atmosphere of pressure. Language is arbitrary in sense (multiples senses for one referent) but scientific in referent (only one referent per sense, assuming no ambiguity), and “[n]obody can be forbidden to use any arbitrarily producible event or object as a sign for something.”


Science and, in particular, patent law appear to have adopted Frege’s theory of language. Courts have accepted the scientific reality of Frege’s theory of language that chemical formulae are senses whose referent compounds exist in the physical world:

The graphic formulae, the chemical nomenclature, the systems of classification and study such as the concepts of homology, isomerism, etc., are mere symbols by which compounds can be identified,

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92 Heretofore, Frege’s theory of language seems only to have been invoked rarely and only in the literature for constitutional issues. See, e.g., Christopher Birch, The Connotation/Denotation Distinction in Constitutional Interpretation, 5 J. App. Prac. & Process 445, 448 (2003); Christopher R. Green, “This Constitution”: Constitutional Indexicals as a Basis for Textualist Semi-Originalism, 84 Notre Dame L. Rev. 1607, 1624–25 (2009). It is unfortunate that Frege’s ideas have not made their way into the intersections of law and science where, as I will show, they are most adaptable to application.

93 Gottlob Frege, Sense and Reference, 57 Phil. Rev. 209, 210 (1948) (emphasis omitted).

94 It is possible, however, for a sense to exist without a referent. Frege gives the example of Odysseus. See id. at 215 ("The sentence 'Odysseus was set ashore at Ithaca while sound asleep' obviously has a sense. But ... it is doubtful whether the name 'Odysseus,' occurring therein, has a referent ... .").

95 See id. at 211.

96 See id. at 209.
classified, and compared. But a formula is not a compound and while it may serve in a claim to identify what is being patented, as the metes and bounds of a deed identify a plot of land, the thing that is patented is not the formula but the compound identified by it. And the patentability of the thing does not depend on the similarity of its formula to that of another compound but of the similarity of the former compound to the latter.97

Congress implicitly recognizes this fundamental purpose of language, at least in the scientific fields.98 Finally, the famous contract case of Raffles v. Wichelhaus99 is thought to incorporate implicitly Frege’s theory of sense and reference, at least based on Justice Oliver Wendell Holmes’s interpretation of the case.100 Thus, given the law’s general blessing101 to utilize this linguistic theory, all that remains is to apply these concepts to product-by-process claiming.

The various methods of claiming differ only in sense, not in reference. Consider, first, the easy example of “I claim the substance comprising gaseous water” compared with “I claim the substance comprising gaseous H₂O.” These claims refer to precisely the same substances in the physical world and therefore have the same referents. Under Frege’s theory, these claims differ only in the sense of expression. Importantly, however, unless the reader of the two claims possesses rudimentary chemical knowledge, the fact that the two claims refer to the same physical substance might not be obvious.102 Likewise, the only difference between the preceding two claims and the phrase “I claim the substance obtainable by the process comprising the steps of heating pure water to 100°C at 1 atmosphere of pressure” is one of sense. The referent of each claim—though there are infinite variations on the pressure and temperature conditions that

97 In re Papesch, 315 F.2d 381, 391 (C.C.P.A. 1963) (emphases omitted).
98 See 35 U.S.C. § 112 (2006) (recognizing that patent claims are (and must be) used for “pointing out . . . the subject matter which the applicant regards as his invention” (emphasis added)). “Pointing out” is the relation between sense and reference. See David Woodruff Smith, What’s the Meaning of ‘This’?, 16 NOLI 181, 195 (1982) (“[S]ense points out that [referent] . . . . The ‘determination’ of the referent consists, then, in the relation that obtains . . . between the acquainting sense . . . and the referent.”).
99 (1864) 159 Eng. Rep. 375 (Exch.).
101 The standard procedure for determining patent infringement also reflects this theory. The claim must first be constructed before the court may determine infringement. Claim construction should be thought of as translating a claim’s sense into its referent. See infra Part III.C.1.
102 See Paul Needham, The Discovery that Water Is H₂O, 16 INT’L STUD. PHILOS. SCI. 205, 211 (2002) (noting that the consensus that water is H₂O did not come about until the 1861 Karlsruhe conference and required the skills of some of history’s most notable chemists and physicists, including Cannizzaro, Lussac, Avogadro, and Berzelius).
one can employ to define it\textsuperscript{103}—is the same in every way. Furthermore, the experimentation necessary to determine that the product-by-process substance is the same as gaseous water or gaseous H$_2$O is the same as the experimentation necessary to determine that water is H$_2$O. An experimenter must obtain the objects that are referenced and compare them with some form of analysis. Thus, the only difference between product-by-process claims and conventional product claims is one of sense.

Now, what does Frege's sense-and-reference distinction have to do with Warner-Jenkinson elements? Absolutely nothing. But it is this lack of correlation that enables the \textit{reductio ad absurdum}—substitution argument I make below. I do not have to define what a claim element is to show that product-by-process claims have the same elements as conventional product claims.\textsuperscript{104} First, a \textit{reductio} argument can prove this lack of correlation. The only difference between "gaseous water" and "gaseous H$_2$O" is one of Fregean sense. If a difference in sense can constitute a difference in claim elements, then under the all-elements test, an individual using what he or she calls gaseous H$_2$O would not infringe a valid patent that claims "gaseous water."\textsuperscript{105} This result is absolutely absurd; it is similar to saying that letters comprising the word "gaseous water" constitute elements of the claim. Second, I exploit the lack of correlation between "senses" and claim elements. Product-by-process claims only differ from conventional claims in terms of Fregean sense. Thus, the absurdity of thinking that gaseous water and gaseous H$_2$O have different elements logically must be imported into the case of product-by-process claims. It is then absurd to think that corresponding product and product-by-process claims comprise different elements. Warner-Jenkinson, therefore, is irrelevant to the holding of Abbott because, whatever a claim "element" is, product claims and product-by-process claims have the same elements if they refer to the same physical entity.

One final objection may be that the patent system simply could forbid certain "senses" of defining inventions. But here, Judge Rader already has given the argument away. Judge Rader and the Federal Circuit not only recognize the power of applicants to be their own lexicographers (which is, in essence, the freedom to choose any

\textsuperscript{103} See \textit{supra} Introduction.


Fregean sense an applicant desires), but also extol it as necessary for the patent system. Product-by-process claiming is certainly not forbidden as a Fregean sense in patenting; therefore, the all-elements rule of Warner-Jenkinson has no bearing on differentiating product-by-process claiming for the purposes of determining infringement.

B. Adherence to the Patent Law, Democratic Values, and the Jeffersonian Grid System

In Abbott, the court should have applied the patent statutes instead of uncertain precedents. The Federal Circuit devotes five and one-half columns of discussion in the Federal Reporter to reviewing century-old Supreme Court precedent and cases that deal directly with product-by-process claims. On the other hand, without any meaningful analysis of the terms of the statute whatsoever, the court alludes to 35 U.S.C. § 112 in only one sentence in support of its holding. The court's cursory reference to the statute is troubling because Congress passed 35 U.S.C. § 112, along with most other relevant patent statutes, in 1952, fourteen years after the most recent Supreme Court cases cited by the majority. I will show that these cases count for nothing because statutes, not the Supreme Court, control patenting. I will then show that, based on (1) the statutes’ plain

106 See Merck & Co. v. Teva Pharms. USA, Inc., 395 F.3d 1364, 1378 (Fed. Cir. 2005) (Rader, J., dissenting) (going so far as to say that an applicant can define “black” as “white” for the purposes of a patent application); see also Patent & Trademark Office, U.S. Dep’t of Commerce, Manual of Patent Examination Procedure § 2173.05(a)(II), at 2100-221 (8th ed., 7th rev. 2008) [hereinafter MPEP] (finding that applicant lexicography “is not only permissible, but often desirable”).


108 See id. at 1294-95.

109 See Patent Act of 1952, ch. 11, 66 Stat. 798 (codified as amended in scattered sections of 35 U.S.C.). Congress has enacted patent statutes since 1790, but the Patent Act of 1952 created the modern requirements for patent applications, including 35 U.S.C. § 112 (2006). It is a testament to the Abbott court’s slavish reliance on ancient precedent that its reasoning echoes the old patent act. Cf. Abbott Labs., 566 F.3d at 1293 (holding that an applicant must “distinguish his product from what is old” (quoting Gen. Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 373 (1938))). The modern patent statutes simply require a product to be new as an objective matter of fact; there is no requirement that the applicant show that his invention is new. See In re Epstein, 32 F.3d 1559, 1570 (Fed. Cir. 1994) (Plager, J., concurring) (“Logic would dictate that when an applicant seeks a grant of property from the government the applicant bears the burden of establishing entitlement to that grant. That, however, is not the rule in patent law; the rule is that the burden of persuasion is on the PTO to show why the applicant is not entitled to a patent.” (footnote omitted)).

110 The most recent case the court cited was General Electric Co. v. Wabash Appliance Corp., 304 U.S. 364 (1938). See also Abbott Labs., 566 F.3d at 1291 (citing Supreme Court cases where the most recent case cited was General Electric).

111 See Pennock v. Dialogue, 27 U.S. 1, 16 (1829):

In the case at bar; it is unnecessary to consider whether the facts stated in the charge of the court would, upon general principles, warrant the conclu-
language, (2) the precedent of the Court of Customs and Patent Appeals and the Federal Circuit, and (3) an analogy to the Jeffersonian grid system, the patent statutes require that product-by-process claims not be limited to their process steps for determining infringement.

1. The Federal Circuit Ignores the Plain Language of Congress’s Statutes

The patent statutes do not represent part of Congress’s vague and ubiquitous Commerce Clause112 powers; the Constitution explicitly grants Congress the power to grant exclusive patent protection to inventors.113 Congress, therefore, to the exclusion of Federal courts,114 must retain the right to “implement the stated purpose of the Framers by selecting the policy which in its judgment best effectuates the constitutional aim.”115 Furthermore, the Supreme Court recently stressed “that it is generally for Congress, not the courts, to decide how best to pursue the Copyright Clause’s objectives”116 and that the Court may only inquire into whether the legislation is “a rational exercise” of Congress’s constitutional authority.117 Thus, strict adherence to the will of Congress must pervade any patent case;118 century-old Supreme Court precedent is useless if the language of Congress’s patent statutes requires a different result.

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112 See U.S. Const. art. I, § 8, cl. 3.
113 See U.S. Const. art. I, § 8, cl. 8 (authorizing Congress to “secur[e] for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries” (emphasis added)).
114 See Diamond v. Diehr, 450 U.S. 175, 182 (1981) (“[I]n dealing with the patent laws, we have more than once cautioned that ‘courts should not read into the patent laws limitations and conditions which the legislature has not expressed.’” (quoting Diamond v. Chakrabarty, 447 U.S. 303, 308 (1980) (internal quotations omitted))). The Federal Circuit seems prone to such errors. Recently, the Supreme Court overruled the Federal Circuit’s rigid “teaching, suggestion, or motivation” test in favor of the Graham analysis, which much more closely tracks the language of the relevant statute. See KSR Int’l Co. v. Teleflex, Inc., 550 U.S. 398, 406–07, 419–22 (2007).
116 Eldred v. Ashcroft, 537 U.S. 186, 212 (2003); see also Stewart v. Abend, 495 U.S. 207, 230 (1990) (“[I]t is not [the Supreme Court’s] role to alter the delicate balance Congress has labored to achieve.”).
117 See Eldred, 537 U.S. at 204–05.
118 See Monaco v. Hoffman, 189 F. Supp. 474, 482 (D.D.C. 1960) (rejecting a charge of “unfair and unjust discrimination” as irrelevant by holding that the patent law is “entirely statutory and, unlike the common law, may not be molded and adjusted by judicial decisions to meet shifting needs and changing conditions”).
Before beginning a tour of the modern patent statutes, assume the following: (1) John Abbott has invented a novel chemical compound never before synthesized, described, or used by man; (2) the compound is useful for curing disease; (3) it is nonobvious to create the compound based on the state of science at the time of the invention; (4) Abbott does not abandon his invention; (5) Abbott submits a proper patent application containing a written description of his invention that enables someone skilled in the art to practice the invention and discloses the best mode known to him for practicing the invention; and (6) Abbott claims the compound in product-by-process form.

Congress creates a presumption that an inventor of a new compound earns patent protection for that compound and not simply for the process of making the compound. Under 35 U.S.C. § 101, "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." The plain language of the statute clearly distinguishes between new and useful processes and compositions of matter. Someone that invents such a composition of matter is entitled to a patent for the composition of matter, not just for the process of making the composition of matter, as long as the applicant complies with the conditions and requirements of the patent statutes. There is no judicial discretion in the matter. Thus, since in the hypothetical above, Abbott invented a new and useful chemical composition, he must earn patent protection on the chemi-

119 35 U.S.C. § 101 (2006); see also supra note 114.

120 One might argue that an inventor cannot invent a composition of matter unless he knows the actual chemical structure. The law, however, holds otherwise. See Amgen, Inc. v. Chugai Pharm. Co., 927 F.2d 1200, 1206 (Fed. Cir. 1991):

[C]onception of a chemical compound requires that the inventor be able to define it so as to distinguish it from other materials, and to describe how to obtain it. Conception does not occur unless one has a mental picture of the structure of the chemical, or is able to define it by its method of preparation, its physical or chemical properties, or whatever characteristics sufficiently distinguish it.

Id. (emphases added) (citation omitted). Thus, an inventor who invents through product-by-process invents a composition of matter as defined by 35 U.S.C. § 101.


122 See Bowser, Inc. v. United States, 388 F.2d 346, 349 (Ct. Cl. 1967) (holding that the patent statutes provide "the sole tests of patentability in all cases"); see also State St. Bank & Trust Co. v. Signature Fin. Group, 149 F.3d 1368, 1372 (Fed. Cir. 1998) ("The plain and unambiguous meaning of § 101 is that any invention falling within one of the four stated categories of statutory subject matter may be patented, provided it meets the other requirements for patentability set forth in [35 U.S.C.] . . . ."); supra notes 112–18 and accompanying text (demonstrating the burden placed on the Patent Office to prove that an applicant was not entitled to a patent).
cal composition itself unless he fails to meet one of the conditions or requirements for patents enumerated in the U.S. Code.\textsuperscript{128}

Abbott clearly has met all of the conditions and requirements for patentability except, perhaps, the requirement in of 35 U.S.C. § 112 ¶ 2 to particularly point out and distinctly claim the invention.\textsuperscript{124} Abbott's invention is entirely novel, and he has not abandoned it; therefore, he has satisfied 35 U.S.C. § 102.\textsuperscript{125} The subject matter is "nonobvious," thereby satisfying 35 U.S.C. § 103.\textsuperscript{126} He told the public, in a written description, exactly how to make the composition of matter\textsuperscript{127} in the best mode that he was aware of, satisfying of 35 U.S.C. § 112 ¶ 1.\textsuperscript{128} Thus, putting aside any other menial requirements, Abbott is entitled to a patent covering the composition of matter if the product-by-process claim satisfies of 35 U.S.C. § 112 ¶ 2 as applied to products.

Paragraph 2 of § 112 requires applicants to "particularly point[ ] out and distinctly claim[ ] the subject matter which the applicant regards as his invention."\textsuperscript{129} The Oxford English Dictionary defines "point out," in part, as "to indicate, direct attention to, [or to] show."\textsuperscript{130} The American Heritage College Dictionary defines the term as "to bring (something) to notice."\textsuperscript{131} Likewise, when used to modify verbs, the Oxford English Dictionary defines "distinctly" as "[i]n a distinct or clear manner; without confusion or obscurity; so as to be clearly perceived or understood; with clear perception or understanding; clearly, plainly."\textsuperscript{132} Pointing out seems to be a rule of in\textit{clusion}, requiring the applicant to draw the public's attention to precisely

\textsuperscript{123} \textit{See} \textit{In re} Bridgeford, 357 F.2d 679, 682 (C.C.P.A. 1966):

Whether the invention be defined in terms of the structure of the compound, or its novel physical characteristics, or by defining it in terms of the process by which it is produced or in a proper case, by employing more than one of these methods of defining the invention, the right to a patent on the invention is the ultimate consideration, subject to the conditions set forth in 35 U.S.C. § 112.

\textsuperscript{124} \textit{See} 35 U.S.C. § 112.

\textsuperscript{125} \textit{See id.} § 102(a)-(g) (describing situations that would deprive an applicant of a patent).

\textsuperscript{126} \textit{See id.} § 103(a) (requiring that an applicant not be issued a patent if the "differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains").

\textsuperscript{127} In fact, a product-by-process claim is itself enabling, assuming the process definition of the product is precise and detailed enough to allow someone of ordinary skill in the art to make the compound.

\textsuperscript{128} \textit{See} 35 U.S.C. § 112 (containing the written-description, enablement, and best-mode requirements).

\textsuperscript{129} \textit{Id.} § 112.

\textsuperscript{130} \textit{See} 4 \textsc{The Oxford English Dictionary} 135 (2d ed. 1989) (stating that "point" used in this sense is "[n]ow almost always [used as] point out").

\textsuperscript{131} \textit{See} \textit{The American Heritage College Dictionary} 1056 (3d ed. 2000).

\textsuperscript{132} \textit{Id}.
what is included in the claim. Distinctness, on the other hand, is a rule of exclusion, requiring the applicant to be clear as to what is not part of the claim. A closed-circuit fence performs both of these functions simultaneously by demarcating what is inside and what is outside. Thus, these two requirements in paragraph 2 of § 112 are linked; the more clearly inclusive a claim is, the more distinctly exclusive it is.

Product-by-process claims, assuming that the process steps are adequately defined, perfectly demarcate the metes and bounds of what the claim includes and excludes. A product-by-process claim should be understood as pointing to whatever exists in the world as a result of performing the process steps. Assuming the described process controls for all scientifically relevant variables in its process, a product-by-process claim fences off precisely one substance and excludes everything that does not result from the process. Thus, product-by-process claims meet the plain language of paragraph 2 of § 112, and Abbott is entitled to patent protection for the composition of matter that he invented.


Federal Circuit precedent and the policies of the Patent Office show that Abbott satisfies paragraph 2 of § 112 and bolsters the interpretation of the statute as given above. The Federal Circuit repeatedly has held that under paragraph 2 of § 112, "the claim is indefinite only if the claim is insolubly ambiguous [ ] and no narrowing construction can properly be adopted." Likewise, under its interpretation of paragraph 2 of § 112, the Patent Office will accept "any style of expression or format of claim which makes clear the boundaries of the subject matter for which protection is sought.... [A] claim may not be rejected solely because of the type of language used to define the subject matter for which patent protection is sought."

133 The referent of a product-by-process claim is the substance that exists in the physical world. The process steps are only the sense by which this referent is pointed out. See supra Part III.A.3.

134 See Microprocessor Enhancement Corp. v. Tex. Instruments Inc., 520 F.3d 1367, 1374 (Fed. Cir. 2008) (quoting Honeywell Int'l, Inc. v. Int'l Trade Comm'n, 341 F.3d 1332, 1338-39 (Fed. Cir. 2003) (internal quotations omitted)); see also Metabolite Labs., Inc. v. Lab. Corp. of Am. Holdings, 370 F.3d 1354, 1366 (Fed. Cir. 2004) ("Only when a claim remains insolubly ambiguous without a discernible meaning after all reasonable attempts at construction must a court declare it indefinite." (citing Exxon Research & Eng'g Co. v. United States, 265 F.3d 1371, 1375 (Fed. Cir. 2001))).

135 See MPEP, supra note 106, § 2173.01, at 2100-218 (emphases added). The MPEP cites to In re Swinehart, 439 F.2d 210 (C.C.P.A. 1971), to support its position on claim terminology. See MPEP, supra note 106, § 2173.01, at 2100-218.
Product-by-process claims are not necessarily ambiguous. They have the potential to point precisely to one substance in the physical world and exclude everything else. In fact, a product-by-process claim often can be clearer and more precise than an ordinary product claim. The phrase "I claim the substance comprising gasoline" is ambiguous because there are a variety of grades of gasoline and because the claim can refer to many substances in the physical world. The phrase "I claim the substance obtainable by the process comprising the steps of distilling crude oil, collecting the fraction at X temperature and Y pressure, and adding cracking catalyst Z" refers only to one substance, assuming crude oil is uniform. Abbott should be able to choose any claim format and to define his invention with any type of unambiguous language, including processes. Considering its consistent interpretation, it is clear that Judge Rader ignored § 112 in his extraordinarily conclusory treatment of the statute in Abbott.

The Court of Customs and Patent Appeals specifically applied paragraph 2 of § 112 to product-by-process claims and found that such claims satisfy the statute's requirements. First, the court in In re Steppan stated that it "seems to be the Patent Office view that [a product-by-process claim] particularly points out and distinctly claims [the] invention." Two years later, the court reversed a § 112 ¶ 2 challenge to a product-by-process claim. Later, the Court of Customs and Patent Appeals in In re Brown held that product-by-process claims do "not inherently conflict with the second paragraph of 35 U.S.C § 112." Finally, the court removed any remaining doubt in In re Hughes, holding, in emphatic terms:

We cannot agree with the solicitor that defining a product in terms of process makes the language of the claims imprecise or indefinite. Their scope, if anything, is more definite in reciting a novel product made by a specific process, assuming, of course, that the process is clearly defined. It does not create a definiteness problem under § 112.

The court in Hughes goes on to limit the use of product-by-process claims to necessity based on "sound policy" and "public conve-

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138 See 394 F.2d 1013, 1019 (C.C.P.A. 1967).
139 See In re Pilkinson, 411 F.2d 1345, 1349-50 (C.C.P.A. 1969) (explaining that Congress has placed no limitations on how an applicant claims his invention, so long as the specification concludes with claims which particularly point out and distinctly claim that invention" (quoting Steppan, 394 F.2d at 1019)).
140 See 459 F.2d 531, 535 (C.C.P.A. 1972).
141 496 F.2d 1216, 1218 (C.C.P.A. 1974) (emphasis added).
nience,” but, as the above arguments show, courts are statutorily prohibited to exercise such equitable discretion in patent law. The jurisprudence of the Court of Customs and Patent Appeals over at least a seven-year period supports the plain-language interpretation of patent statutes.


An analogy to real estate deeds will illustrate further the legitimacy of product-by-process claims.

Thomas Jefferson famously utilized a gridiron method of surveying land and planning developments that the Continental Congress adopted in 1785. This method surveyed tracts of land by establishing grid systems. Each tract was divided into thirty-six-square-mile townships. Number and compass directions in relation to the principal meridian and base line (the axes of the grid system) identified the townships. Then, each thirty-six-square-mile township was subdivided into thirty-six numbered one-square-mile sections. If needed, these sections could be further subdivided. A typical deed using the Jeffersonian grid system might read as follows: “[a] 11 of that part of the East One-Half of the Northeast Quarter (E1/2NE1/4) of Section 30, Township 14 South, Range 25 West.” Thus, small but discrete tracts of land could be particularly identified and distinctly claimed by name. The Jeffersonian grid system is analogous to a conventional product claim because it creates an arbitrary linguistic system to identify boundaries in the physical world.

The other, more traditional method of describing land in deeds is called metes and bounds. In fact, the Federal Circuit often references this technique when referring to 35 U.S.C. § 112 2. Black's Law Dictionary defines metes and bounds as “[t]he territorial limits of real property as measured by distances and angles from designated landmarks and in relation to adjoining properties.” A metes-and-bounds description starts at an established “point of commencement”
and utilizes compass directions, angles, and lengths to form a closed circuit encapsulating the plot of land.\textsuperscript{153} “A typical [metes-and-bounds] description might start: Begin at the southernmost end of the old rock wall. Head due north to the covered bridge. Head east 100 feet to the stream.”\textsuperscript{154}

One could think of metes and bounds as the analog of product-by-process claiming. The land is not named. A process is described by which a member of the public can physically go to the site, perform the instructions, and determine the exact boundaries of the deeded land. Deeds identifying land with the Jeffersonian grid system can be compared directly for overlap without the need to survey the site physically, assuming that a uniform grid system is used.\textsuperscript{155} One cannot compare directly deeds identifying land by metes and bounds, however, unless the identical process is described in both deeds. Instead, a land surveyor must go to the site, perform the process steps enumerated in the two deeds being compared, and determine overlap. If the \textit{Abbott} holding is applied to land deeds, however, members of the public could claim land using a different process than that enumerated in the original metes-and-bounds deed and they would not be excluded under the original metes-and-bounds deed because it would be limited to the process steps. This result would be absurd in the real-property context. Why would it not be absurd for intellectual property? A metes-and-bounds description is able to particularly point out and distinctively claim real estate regardless of the minor inconveniences it causes for surveyors; its analog should be available for inventions.

4. \textit{Counterarguments: Infringement Versus Validity and “Design Arounds”}

One possible objection to the arguments provided above is that the Federal Circuit granted \textit{Astellas}\textsuperscript{156} a patent on a composition of matter but equitably limited its interpretation for infringement in \textit{Abbott}. Judge Rader stated that “[t]his court’s en banc decision in no way abridges an inventor’s right to stake [product] claims in product-by-process terms. . . . The issue here is only whether such a claim is infringed by products made by processes other than the one claimed.”\textsuperscript{157} This result is absurd.

\textsuperscript{153} See \textit{Florida Real Property Sales Transactions} § 8.13 (Fla. Bar CLE 5th ed. 2008).
\textsuperscript{155} Using a different grid system is analogous to using a different chemical name in the patenting context. It is, for example, the difference between the names water and $H_2O$.
\textsuperscript{156} \textit{Astellas} owned the patent at issue in \textit{Abbott}. Abbott was the licensee. See supra text accompanying notes 55–56.
Once again, the court ignores congressional statutes. Congress defines patent infringement as the making, using, selling, or offering for sale, without authority, of any "patented invention."158 "[T]he claims of a patent measure the invention at issue . . . [and] must be interpreted and given the same meaning for purposes of both validity and infringement analyses."159 The holding in Abbott clearly would deprive the patentee of legal protection on the composition of matter itself. As the real estate analogy demonstrates, this holding allows a member of the public to enter onto another person’s land as long as they describe it by a different metes and bounds process.160 Would it be any comfort to the original deed holder that his or her right to stake his or her claim in metes and bounds terms was not “abridged?”

The facts of Abbott demonstrate the injustice of the holding. Claim 2 of the patent at issue claimed crystalline cefdinir “obtainable by acidifying a solution containing 7-[2-(2-aminothiazol-4-yl)-2-hydroxyiminoacetamido]-3-vinyl-3-cephem-4-carboxylic acid (syn isomer) at room temperature or under warming.”161 Lupin and San
doiz, however, manufactured their Crystal B cefdinir by acidifying the same drug precursor under cold temperatures rather than under room or warm temperatures.162 All the allegedly infringing parties did was change the temperature. It is a well-known chemical principle that decreasing the temperature in an acidification reaction probably will just slow the reaction, resulting in essentially the same product.163 Astellas probably described the temperature in the claim because the reaction will perform optimally under warm temperatures and the patent statutes show an explicit affinity for the inventor to describe the “best mode” of performing the invention.164 Almost any person with some chemical knowledge with the Astellas patent in hand could have imagined this “design around.” Thus, despite the promises of


159 Amazon.com, Inc. v. Barnesandnoble.com, Inc., 239 F.3d 1343, 1351 (Fed. Cir. 2001); see also Abbott Labs., 566 F.3d at 1317–18 (Newman, J, dissenting) (identifying seven similar Federal Circuit holdings and citing Chisum, supra note 34, for this proposition).

160 Judge Rader would worry that it is too much work for a potential trespasser to perform the steps enumerated in the original deed and compare the resulting area of land with the area he or she claims a right to possess. However, surveyors perform these duties regularly.

161 Abbott Labs., 566 F.3d at 1286 (citing Crystalline 7-[(2-(2-aminothiazol-4-yl)-2-hydroxyiminoacetamido)-9-vinyl-3-cephem-4-carboxylic acid (syn isomer), U.S. Patent No. 4,935,507 col.16 ll.29–34, 43–50 (filed Aug. 8, 1988)). This process creates Crystal B cefdinir.

162 See supra note 66.

163 Steven S. Zumdahl, Chemical Principles 736 (5th ed. 2005) (“[C]hemical reactions speed up when the temperature is increased. Experiments have shown that virtually all rate constants show exponential increase with absolute temperature . . . .” (emphasis omitted)).

the patent statutes, Astellas did not receive patent protection on the composition of matter it invented as a result of the court’s reasoning in Abbott.

C. Geissler Tubes: Scientific Realities and Civil Procedure
Support Robust Product-by-Process Protection

The Federal Circuit used rhetorical questions to advance several policy concerns justifying its holding. First, if product-by-process claims were not limited to their processes, “how would the courts ascertain that the alleged infringer’s compound is really the same as the patented compound?” Specifically, “what analytical tools can confirm that the alleged infringer’s compound is in fact infringing, other than a comparison of the claimed and accused infringing processes?” Second, “[w]hy . . . would the courts deny others the right to freely practice [their different process] that may produce a better product in a better way?”

Third, modern chemistry enables inventors to analyze their new compounds with sophisticated analytical techniques, such as powder X-ray diffraction (PXRD), so there is no longer as great of a need for product-by-process claims. In this section, I will respond separately to each of these concerns. First, civil procedure moots Judge Rader’s first concern. Second, the exclusive-only nature of patents shows Judge Rader’s second concern to be misguided. Third, although the arguments above moot Judge Rader’s third concern, I will show that scientific realities often do require product-by-process claiming.

1. The Civil Procedure of Demonstrating Patent Infringement

Patent infringement of product-by-process claims is not a comparison of processes. “An issue of infringement raises two fundamental questions: (1) what is patented—this requires interpretation of the scope and meaning of the claim language; and (2) whether the patent, so interpreted, is infringed—whether what is claimed has been made, used[,] or sold by another.” Thus, the procedural determination of patent infringement reflects a Fregean understanding of patent claims. Step one translates the patent claim’s sense into its referent—what is patented (i.e. its scope and meaning). Step two

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165 Abbott Labs., 566 F.3d at 1294.
166 Id.
167 Id.
168 See id.
169 The patent statutes do not contemplate the feasibility or even the convenience of other claiming formats. The applicant is free to choose while conforming to Congress’s specific requirements. See supra notes 142–43 and accompanying text.
171 See supra Part III.A.
PATENT AT YOUR OWN RISK

...
uct patent that excludes all holders of process patents that create the same product from practicing their invention without a license.¹⁷⁹ Sandoz and Lupin will be able to prevent Astellas and Abbott from practicing their superior process to make the product, but they cannot manufacture Astellas’s product with any process. These results constitute the very essence of a patent right.¹⁸⁰ Judge Rader’s worry is entirely unremarkable if the product-by-process claim is recognized as a product claim. Thus, Judge Rader’s “policy” concern does not really support his conclusion; rather, it assumes it. It simply rephrases the following question: should Astellas be entitled to a product patent?

3. Scientific Realities Require Product-by-Process

The final argument of this Note is that the realities of physical science require the availability of product-by-process claims. If scientific realities are to blame, it seems unfair to discriminate against unfortunate inventors who are forced to claim product-by-process by giving them substantially inferior patent protection. Such inventors have given the public the same enabling disclosure and received less compensation than inventors whose inventions have the luxury of names. Geissler’s glow-discharge tube will provide a concrete example, though there are many others.

Metal plating by glow discharge began in the mid-nineteenth century, pioneered by famous physicists of the time such as Michael Faraday¹⁸¹ and Johann Heinrich Wilhelm Geissler, who greatly advanced the technology in 1855 with the invention of improved vacuum tubes.¹⁸² A glow discharge results when an electric potential is created between two electrodes that are immersed in a low-pressure gas.¹⁸³ The nature of the glow discharge depends heavily on the distance between the electrodes, the gas pressure, and the type of gas used (i.e., the process by which the glow discharge is made).¹⁸⁴

Thomas Alva Edison first used glow-discharge technology to create metal coatings from plasma.¹⁸⁵ The basic technology can be un-

¹⁷⁹ See id. at 330–31 (describing the precise hypothetical situation imagined by Judge Rader in the pharmaceutical context).
¹⁸⁰ These results are also mandated by statute. See 35 U.S.C. § 154(a)(1) (2006): Every patent shall contain ... a grant to the patentee ... of the right to exclude others from making, using, offering for sale, or selling ... products made by that process...
¹⁸² See id. at 5.
¹⁸⁴ See id.
¹⁸⁵ See Anders, supra note 181, at 5.
understood by examining Edison’s original patent. A glow discharge is created by running an electrical current between two electrodes separated by a distance in a low-pressure chamber. A glowing arc of electricity creates an intense amount of heat and will vaporize the metal to be plated. The vaporized metal travels through the low-pressure gas and deposits onto the object to be plated, creating a dense, homogenous, and adherent coating. This process creates a similar metal coating as a chemically driven deposition, which was well known at the time. Thus the product, a metallic coating, was already known, and Edison simply patented the new process for creating such a coating. However, later inventors would adapt and modify Edison’s process to create novel coatings, and these inventors could not describe their modifications without reference to their process.

Geraud Fustier patented one such coating useful for making decorative ribbons. This invention used the metallization process in conjunction with stretching and thermally stabilizing a thin plastic substrate to create an iridescent coating that resembles the pattern of colors seen in puddles with a thin coating of oil. The theory behind the invention was that the elongation and stabilization steps created “microscopic surface unevenness” in the metallic coating that promoted diffraction in incident white light creating a color pattern. Unlike the Edison invention, the metallic coating itself—having these colorful characteristics—was novel. Therefore, in addition to claiming the novel process, Fustier included a product-by-process claim. As a practical matter, the microscopic unevenness in the metallic coating would be difficult to describe in physical terms. Thus, having used a novel process to create a novel product, Fustier chose to use a product-by-process claim.

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186 See Art of Plating One Material with Another, U.S. Patent No. 526,147 (filed Jan. 28, 1884).
187 See id. col.1 ll.19–21. The glow discharge occurs between a and a in the chamber. See id. fig.3, item a (providing an illustration of the chamber).
188 See id. col.1 ll.17–18.
189 See id. col.1 ll.21–25.
190 See id. col.1 ll.44–48 (noting that “electro-deposition” is chemically driven).
191 See id. col.4 ll.89–127 (illustrating that all of Edison’s claims are pure-process claims).
193 See id. col.1 ll.27–38.
194 See id. col.1 ll.39–44. The phenomenon is akin to the colors seen when a small amount of oil is spilled onto a puddle of water.
195 See id. col.2 ll.44–53.
196 See id. col.2 ll.54–56 (“Sheet material having an iridescent ornamental appearance made in accordance with the method defined in claim 1.”).
In another invention involving novel glow-discharge electrodes, the inventors had to appeal their case to the Patent Office Board of Appeals (Board).\textsuperscript{197} The Board upheld the inventors' claim, stating that “[t]he article is . . . new”; that there appeared to be no way “to define the article in any other way except by referring to the steps of the process of making it”; that analysis cannot determine the composition of the claim; and that, in the present case, it was proper to define the article by reference to the process of making it.\textsuperscript{198}

Another example of applications involving glow discharge shows that it is possible for a different process to create the patented effect without being able to describe the product specifically enough to claim it in a pure product claim. Instead of creating metallic coatings like Edison and Fustier, Takezo Sano and Masao Sasaki used glow discharge to create a superior organic-surfactant coating.\textsuperscript{199} Many molecular layers of surfactants (a type of organic molecule that modifies the surface of materials) will adsorb onto a surface, forming a thick, built-up film.\textsuperscript{200} The individual molecules, however, bind together with relatively weak forces, and if one tries to wash off some of the layers in hopes of creating a thin unimolecular adherent film, all of the surfactant will wash away.\textsuperscript{201} Sano and Sasaki discovered that when surfactant films are treated with the plasma created by glow discharge, only a single layer of surfactant will “crosslink” together, and the rest can be washed away.\textsuperscript{202} The surfactant layer thus produced is as strong as an ordinary plastic film.\textsuperscript{203}

These films, however, are not capable of precise description for a product claim. The crosslinking is describable as bonding, but the crux of the invention is the geometric arrangement of the bonds and the molecules themselves. Sano and Sasaki cannot show this aspect of the invention without describing the location and bonding angles of every individual molecule in the film. Thus, they claimed the novel thin film they created in a product-by-process claim.\textsuperscript{204} Moreover, their invention shows how a competitor could have used a different process to create the same product; the patent itself predicts that “the same result . . . can be obtained even when the plasma is replaced by

\begin{footnotes}
\item[198] See id.
\item[200] See id. col.1 ll.7–11.
\item[201] See id. col.1 ll.11–16.
\item[202] See id. col.2 ll.36–42.
\item[203] Id. col.1 ll.31–37; see id. col.4 ll.26–42 (claiming the process for preparing the novel thin film).
\item[204] Id. col.6 ll.8–9 (claiming “[t]hin films obtained according to the process of claim 1”).
\end{footnotes}
radiation such as electron beams or the like.” Sano and Sasaki needed—and claimed—product-by-process patent protection.

Lastly, the plasma that glow discharge creates is highly dependent on the process used to create it and impossible to describe without reference to this process. The characteristics of the plasma produced depend on the gas (which is the matter that transitions into the plasma), the gas pressure, the geometry of the electrodes, and the electric voltage used. In fact, in his article, R.A. Dugdale examined cutting-edge improvements to glow-discharge technology (for the time) and predicted that “[a] process based on these principles would allow the manufacture of graded structures having novel mechanical and other properties.” For example, “[d]epending on the geometry and process parameters such as pressure, temperature[,] and glow-discharge current,” two entirely different plasma states of the same mixture of gases can be produced. Plasma is a mysterious state of matter, and—looking beyond observing differences in physical properties between the two states—the two states of plasma are known by the process of creating them.

Case law also exhibits myriad examples of product-by-process claims being used out of necessity in a wide variety of scientific fields other than glow-discharge technology. Three such examples are complex organic extracts, activated catalysts, and products created with heat or pressure treatments.

Thus, a careful examination of procedure, the exclusive nature of patents, and scientific realities either moot or rebut each of Judge Rader’s policy arguments.

CONCLUSION

Patents represent a busy intersection of science, language, and the law, and product-by-process claiming is their inevitable collision.
The Federal Circuit has limited the protection of these claims to their process steps. But, in doing so, it ignored the Constitution, congressional policy as articulated by statutes, the nature of scientific language, and scientific realities. The court relied primarily on precedent that is well over one hundred years old and from a time when both patent law and the state of science were fundamentally different.

Science evolves, and the law should evolve with it. I have shown that under Frege’s theory of language, there is no conflict between robust product-by-process protection and the Supreme Court’s modern patent jurisprudence. I have explained with a thorough analysis of today’s patent statutes how the Federal Circuit’s decision usurped an Article I power of Congress. I have reasoned that, due to the civil procedure of patent litigation and the nature of the property right conferred by patents, stronger product-by-process protection will not have the adverse consequences envisioned by the Federal Circuit. Finally, I have demonstrated that the complexity of modern science requires product-by-process claims.

Samuel Morse’s famous criticism of the immense difficulty of enforcing patent rights in the United States—"[i]t is not the way to encourage the Arts . . . to drive the Artists into exile or to the insane hospital or to the grave"—could apply to the Federal Circuit’s draconian holding in *Abbott*. In the end, inventors’ competitors should not be allowed to sell inventors’ novel products by making meaningless adjustments to the processes the inventors disclose in the claims out of scientific necessity. The law must not penalize scientists and inventors by eliciting full public disclosure of their useful and novel ideas in exchange for emaciated and hollow protection.


214 Consider Lupin and Sandoz’s minor temperature adjustment. See supra Part II.