

*Appreciating the Invention:
A Proposal to Reform Claim Amendment Practice*

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INTRODUCTION

“What do you mean we infringe their patent? Didn’t we get a clearance opinion before we approved the product design?” Corporate counsel will have a difficult time explaining the situation to this executive. The corporation did what a conscientious competitor is supposed to do. They actively searched for issued and pending patents that their planned product might infringe. When they identified a related patent, they carefully studied the claims which define the patent owner’s rights. They compared the claims to their product and concluded that the product did not infringe. Corporate counsel must now explain that, after the product appeared at a trade show, the patentee added new claims in a continuation application to encompass their product. “Can they do that? What the #%\$& is a continuation application.” Counsel patiently explains that continuation applications are used when a patent applicant and an examiner reach agreement that some claims are allowable but they disagree on others. In that situation, a patent is issued for the agreed upon claims and the applicant files a new application to pursue the disputed claims. The new application, called a continuation, is entitled to the same priority date as the original application. However, the applicant is not limited to the previously filed, disputed claims. “That’s not right! They didn’t invent our product. Why should we have to pay royalties?”

Under U.S. Patent law, amending claims to encompass a competitor’s product is a common practice.¹ As long as an inventor can find ‘support’ in the originally filed application, he or she can broaden the claims as long as the revised claims are not too similar to what was previously disclosed by others (called the prior art). An application ‘supports’ a claim if it describes the claimed subject matter and enables a person of skill in the art to practice the invention.² Un-

¹ Kingsdown Medical Consultants, Ltd. V. Hollister Inc., 863 F.2d 867, 874 (Fed. Cir. 1988).

² *Infra* Section IV.

der the present interpretation, the law does not require an inventor to demonstrate that he or she appreciated the revised claim scope at the time of filing.³ The Federal Circuit, which has appellate authority over all patent infringement lawsuits, has stated that there is “nothing improper, illegal, or inequitable” about amending patent claims to cover a competitor’s known product.⁴ The corporate executive above has good reasons to disagree with the Federal Circuit.

U.S. courts should recognize that invention is a process rather than an event and that the scope appreciated by an inventor varies over time. An inventor should only be allowed to claim the scope of invention that he or she appreciated at the time of filing the application. Contrary to the present interpretation, this appreciation requirement already exists in the statutory text which requires claims that point out “the subject matter *which the applicant regards as his invention.*”⁵ To implement this appreciation requirement, the rules for broadening amendments must be changed.⁶ Specifically, there should be a rebuttable presumption that the initially filed claims represent the full scope appreciated by the inventor at the time of filing. When an applicant broadens claims after filing, he or she must either i) overcome the presumption by proving that he or she appreciated the broader scope at the time of filing or ii) accept the amendment date as the priority date for the expanded scope, subjecting that scope to invalidation based on intervening prior art.

³ State Industries, Inc. v. A.O. Smith Corp., 751 F.2d 1226, 1235 (1985) (“Thus, we see the familiar picture of [a competitor] . . . manipulating its secret pending patent application to cover the functionally competitive structure it did not think of but deems to embody its proprietary ‘inventive concept.’”).

⁴ Kingsdown, 863 F.2d at 874.

⁵ 35 U.S.C. § 112.

⁶ UNITED STATE PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 714, available at <http://www.uspto.gov/web/offices/pac/mpep/> [Hereinafter MPEP].

Section I reviews the literature regarding how patent law currently defines “the invention” and the law should define it. This section concludes that the best definition is based on the inventor’s mental appreciation of his or her invention. Section II discusses the process of invention and how an inventor’s appreciation of the scope of his or her invention varies over time. This section uses the invention of the airplane by the Wright brothers as an illustration. Section III describes a fictional example scenario that will be used throughout the remainder of the paper to illustrate various concepts. Section IV discusses the disclosure doctrines of enablement and written description and explains why these doctrines do not preclude claims to subject matter that the inventor did not appreciate at the time of filing. Section V discusses proposed new rules to enforce an appreciation requirement. Finally, section VI responds to some objections that may be raised to this proposal.

I. INVENTION REQUIRES APPRECIATION

Several provisions of the U.S. patent statute indicate that patent claims shall not extend beyond the subject matter invented by the applicant. Before the Leahy-Smith America Invents Act (AIA), the patent statute stated “[a] person shall be entitled to a patent unless - he did not himself invent the subject matter sought to be patented.”⁷ When the statutes were revised in 2011, Congress clearly indicated its intent that patents only be granted for subject matter invented by the applicant.⁸ Therefore, interpretation of the statute requires a closer inspection of what it means to ‘invent’ particular subject matter.

For purposes of determining the scope which an applicant is entitled to claim, “the invention” must be defined in terms of a class of potential products rather than a few particular exam-

⁷ 35 U.S.C. § 102(f) (applicable to applications filed before March 16, 2013).

⁸ H.R. REP. NO. 112-98, at 41 (2011).

ples.⁹ Unfortunately, the phrase “the invention” is commonly used in reference to the particular examples described by the inventor, typically called embodiments in patent literature, rather than a class of products. Dictionary definitions of the noun “invention” include “something newly designed or created”¹⁰ and “a device, contrivance, or process originated after study and experiment.”¹¹ The statutory definition of “invention” is “invention or discovery” which is not particularly helpful.¹² Elsewhere, the statute refers to the invention as “any new and useful process, machine, manufacture, or composition of matter, . . .” rather than “any class of processes, machines, . . .”¹³

Professor Cotropia of the University of Richmond School of Law provides two alternative definitions of “the invention.”¹⁴ An “external invention” is the invention as described in the specification.¹⁵ In contrast, a “claim centered invention” is defined by the claims.¹⁶ He concludes that, for purposes of claim construction and evaluation of the written description requirement, the external invention is preferable.¹⁷ Perhaps recognizing the need for a distinction, Congress separately defined the term “claimed invention” in the AIA as “the subject matter defined by a claim in a patent or an application for a patent.”¹⁸

⁹ Jeffrey A. Lefstin, *The Formal Structure of Patent Law and the Limits of Enablement*, 23 BERKELEY TECH. L.J. 1141, 1168 (2008) (pointing out that all patent claims cover an infinite number of embodiments).

¹⁰ <http://dictionary.cambridge.org/dictionary/american-english/invention> (last visited March 25, 2013).

¹¹ <http://www.merriam-webster.com/dictionary/invention> (last visited March 25, 2013).

¹² 35 U.S.C. § 100(a).

¹³ 35 U.S.C. § 101.

¹⁴ Christopher A. Cotropia, *What is the “Invention”?*, 53 WM. & MARY L. REV. 1855 (2012).

¹⁵ *Id.* at 1876.

¹⁶ *Id.* at 1886.

¹⁷ *Id.* at 1913.

¹⁸ 35 U.S.C. § 100(j).

Professor Liivak of Cornell University Law School objects to the common wisdom that the claims define the invention.¹⁹ Instead, he asserts that there is a substantive invention that exists before any claims have been written.²⁰ He defines the invention as the collection of embodiments invented and disclosed, not everything that is enabled and claimed.²¹ Under his definition, the claims serve a subservient role of particularly pointing out which aspects of those embodiments the applicant regards as inventive.²² However, other scholars point out that limiting claim scope to only the embodiments disclosed would allow competitors to copy the inventive features while avoiding infringement of the patent by making small modifications or additions.²³

The U.S. Supreme Court defines “the invention” differently in different contexts. In the context of infringement analysis, the Court insists that “it is the claims of the patent which define the invention.”²⁴ This definition presumes, without inquiry, that applicants have fulfilled the statutory mandate that a patent application “shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.”²⁵ However, in the context of determining the date of invention, the Court stated “[t]he primary meaning of the word ‘invention’ in the Patent Act unquestionably refers to the inventor's conception rather than to a physical embodiment of that idea.”²⁶ Under this definition, an invention exists once it is conceived which may be long before any claims are

¹⁹ Oskar Liivak, *Rescuing the Invention from the Cult of the Claim*, 42 SETON HALL L. REV. 1 (2012).

²⁰ *Id.* at 16.

²¹ *Id.* at 20.

²² *Id.* at 19.

²³ Lefstin, *supra* note 9. Copiers would need to make sufficient changes to avoid infringement under the Doctrine of Equivalents. However, exclusive reliance on the Doctrine of Equivalents to define the scope of claims would essentially be a reversion to a system of central claiming in violation of the mandate of 35 U.S.C. § 112(b). JANICE M. MUELLER, AN INTRODUCTION TO PATENT LAW, 288-89 (2d ed. 2006).

²⁴ *Altoona Publix Theatres, Inc. v. Am. Tri-Ergon Corp.*, 294 U.S. 477, 487 (1935).

²⁵ 35 U.S.C. § 112(b). The pre-AIA version does not refer to joint inventors but is otherwise identical.

²⁶ *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 60 (1998).

written. Until the invention is disclosed, it exists only within the inventor's mind.²⁷ Since an invention exists before it is patented, the scope of the invention must be defined by something other than patent claims.

Throughout the remainder of this paper, a definition suggested by Professor Risch of the West Virginia University College of Law is adopted.²⁸ Specifically, the scope of an invention includes i) the specific embodiments envisioned by the inventor and ii) any other embodiments for which the inventor can mentally identify a linking principle by which he or she would expect those other embodiments to also solve the problem.²⁹ This defines the outer boundary of what the inventor has invented and is, therefore, defines the subject matter for which § 101 entitles him or her to a patent.³⁰ Although embodiments outside of this scope may also solve the problem, the inventor does not appreciate those embodiments as part of his invention.

Of course, an invention that exists only in the inventor's mind provides no benefit to society, so patent law seeks to encourage disclosure.³¹ Therefore, § 112(a) requires the patentee to describe and enable at least the portion of the mental invention for which protection is sought.³² Cotropia's external invention and Liivak's substantive invention refer to the portion of the invention that the inventor chooses to make available to others in the patent disclosure.

²⁷ Michael Risch, *A Brief Defense of the Written Description Requirement*, 119 YALE L.J. ONLINE 127, 133-36 (2010).

²⁸ *Id.* at 139-40.

²⁹ *Id.*

³⁰ "Whoever invents or discovers any [patent eligible subject matter] may obtain a patent *therefor*, subject to the conditions and requirements of this title." 35 U.S.C. § 101.

³¹ MUELLER, *supra* note 23 at 28-29.

³² 35 U.S.C. § 112(a). Section 112(b) permits a patentee to seek patent protection for a narrower class of embodiments within the mental invention. 35 U.S.C. § 112(b).

II. INVENTION IS A PROCESS

While Section I is concerned with defining the noun “invention,” the patent statute also uses the word “invent” as a verb.³³ Therefore, interpretation of the statute requires consideration of the act of inventing. U.S. patent law has historically relied on the date of invention to determine priority between independent inventors, implicitly presuming that conception of an invention is an event that occurs at a particular point in time (or at least is completed at a particular point in time). However, invention is not necessarily a single event, but is often a process which occurs over a period of time. When an inventor first finds a solution to a problem, he or she may have little idea how it works or what else would work. In other words, the inventor has not conceived a linking principle. Over time, as the inventor finds additional examples that work or improves his or her understanding of the mechanism by which the first example works, the scope appreciated by the inventor grows. This section explores the temporal aspect of the scope of an invention by considering the different types of activities involved in inventing.

Invention includes both purely mental activity and experimentation.³⁴ Dictionary definitions of the verb “invent” include “to produce (as something useful) for the first time through the use of the imagination or of ingenious thinking and experiment”³⁵ and “to originate or create as a product of one's own ingenuity, experimentation, or contrivance.”³⁶ Courts struggled for years to distinguish between products that were the result of invention and products that, although new,

³³ “Whoever *invents* or discovers any [patent eligible subject matter] may obtain a patent therefor, subject to the conditions and requirements of this title.” 35 U.S.C. § 101. “A person shall be entitled to a patent unless - he did not himself *invent* the subject matter sought to be patented.” 35 U.S.C. § 102(f) (pre-AIA).

³⁴ Jacob S. Skerkow, *Negating Invention*, 2011 B.Y.U. L. REV. 1091, 1120-21.

³⁵ <http://www.merriam-webster.com/dictionary/invent> (last visited March 25, 2013).

³⁶ <http://dictionary.reference.com/browse/invent> (last visited March 25, 2013).

were merely the result of ordinary skill.³⁷ At one point, the Supreme Court seemed to discount experimentation and required that a new device “reveal the flash of creative genius” of the inventor.³⁸ In the 1952 Patent Act, Congress responded to this trend to ensure that “long toil and experiment” would not be treated as an inferior form of invention.³⁹

Although the manner in which an invention is made does not impact eligibility for a patent, it may impact the scope of the inventor’s appreciation and therefore the scope of protection. As discussed above, invention of a broad invention requires: i) conception of one or more embodiments, and ii) conception of some linking principle that connects those embodiments to the remainder of the scope of invention. An inventor that finds a solution to a problem by pure experimentation may know that the embodiment works but not know how the embodiment works. Although patentability does not require an explanation of the mechanism by which the invention solves the problem,⁴⁰ such an inventor is severely handicapped in conceiving a linking principle that will allow broad coverage. After identifying one embodiment that works, the pure experimenter must perform many more experiments to determine which characteristics other embodiments must share with his first functioning embodiment in order to also solve the problem. By contrast, an inventor that finds a solution to a problem by thinking often conceives the linking principle first and the embodiments soon thereafter.

The sections that follow discuss different types of problem solving processes used by inventors. These problem solving processes contribute in different ways to the appreciation re-

³⁷ Hotchkiss v. Greenwood, 52 U.S. 248 (1850).

³⁸ Cuno Engineering Corp. v. Automatic Devices Corp., 314 U.S. 84, 91 (1941).

³⁹ H.R. REP. NO. 7794, at 18 (1952). “Patentability shall not be negated by the manner in which the invention was made.” 35 U.S.C. § 103(a).

⁴⁰ See *supra* section IV.

quired for a broad invention. These processes are illustrated by the various stages the Wright Brothers encountered during their invention of the first powered heavier than air flying machine.

A. Researching the State of the Art

Although finding a working embodiment in the prior art is not inventive, familiarity with the work of others enhances the likelihood that other types of inventive activity will result in discovery and broad appreciation of an invention. Without context, an inventor that finds a single working embodiment will not appreciate how that embodiment fits with the state of the art. It is prudent for an inventor to begin by familiarizing himself or herself with the published work of previous researchers so that he or she knows which problems have already been solved, which problems remain, and what potential solutions others have tried unsuccessfully. Although this activity is best performed early in the inventive process, an inventor may become aware of the work of others at any time, including after filing a patent application.

Soon after the Wrights developed an interest in flight, they researched the state of the art as published by others in the field.⁴¹ The Wrights discovered Otto Lillienthal's writings about his glider experiments as well as the writing of Samuel Langley, Octave Chanute, and other early experimenters.⁴² Upon reviewing this information, they concluded that the technology was available to generate enough thrust to propel an airplane and enough lift to sustain flight. However, others did not appear to be addressing the question of how a pilot would control an aircraft once in flight.⁴³ The Wrights selected that problem as their research focus.⁴⁴

⁴¹ Letter from Wilbur Wright to The Smithsonian Institution (May 30, 1899) in FRED C. KELLY, ED., *MIRACLE AT KITTY HAWK* 15 (2003).

⁴² VALERIE MOOLMAN, *THE ROAD TO KITTY HAWK* 111 (1980).

⁴³ *Id.* Although Otto Lillienthal had been able to control his gliders by shifting his weight, the Wrights did not consider this method scalable to a larger powered aircraft. *Id.*

⁴⁴ Letter from Wilbur Wright to his father (September 23, 1900) in KELLY *supra* note 41 at 30.

B. Adapting Solutions from Analogous Art

If the prior art does not directly reveal the solution to a problem, an inventor may look for solutions to related problems that can be adapted to solve the problem. Such adaptation is considered inventive only when it requires more than ordinary skill, such as combining concepts that most people wouldn't think to combine.⁴⁵ Therefore, when adaptation leads to working embodiments, those embodiments are considered obvious. However, when used in combination with other types of inventive activities, an analogy to similar problems may provide an inventor with insight regarding the linking principle.

Both the Wright brothers and their contemporaries attempted to adapt solutions from analogous fields to solve the problem of aircraft control. Other experimenters used boats as an analogy. These experimenters looked for ways to make the craft naturally stable such that, if one wing dropped below the other for some reason, the craft would tend to level itself without pilot input.⁴⁶ They assumed they would be able to turn an aircraft in flight using a rudder as boats do in the water. The Wrights, on the other hand, studied birds to see how the birds turn, climb, and descend. They observed that birds actively control their orientation with respect to the ground by twisting their wings such that their wingtips face the air at different angles of incidence causing the bird to bank.⁴⁷ The Wright Brothers' reasoned that a pilot needed a means to twist the wings of an aircraft in order to turn or to level the wings if upset by gusts. This insight proved to be the linking principle that supported the breadth of their eventual patent.⁴⁸

⁴⁵ KSR Intern. Co. v. Teleflex, Inc., 550 U.S. 398, 417 (2007).

⁴⁶ MOOLMAN, *supra* note 42 at 111.

⁴⁷ Letter from Wilbur Wright to Octave Chanute (May 13, 1900) in KELLY *supra* note 41 at 22.

⁴⁸ Flying Machine, U.S. Patent 821,393 p.3 l.38-46 (filed March 23, 1903).

C. Reasoning from Non-Analogous Art

As with adapting solutions from analogous arts, recognition of a connection with something in a non-analogous art may lead to conception of both working embodiments and conception of linking principles. However, when an art is classified as non-analogous, it is presumed that a person of ordinary skill would not recognize the connection.⁴⁹ Although adapting a solution to a similar problem is not considered inventive, combining concepts from disparate fields is considered inventive.

The Wright brothers completed their conception of a workable embodiment of the wing twisting concept by reasoning from a non-analogous art. A critical insight occurred to Wilbur when, as he assisted a customer in the bicycle shop, he handled an empty box that had been opened on both ends.⁵⁰ He discovered that he could easily twist the box.⁵¹ He connected this behavior to the problem of twisting the wings and recognized a similarity between the box and a biplane wing structure.⁵² He reasoned that making the diagonal bracing wires near the wingtips adjustable would twist the wings much as he manually twisted the box.⁵³ The Wrights developed an embodiment for a wing warping mechanism based on this analogy.⁵⁴

Because the Wrights had developed their wing warping mechanism through a process of reasoning rather than pure experimentation, they not only knew that it would cause an aircraft to turn but they also understood why. The mechanism causes the aircraft to turn by causing the

⁴⁹ In re ICON Health and Fitness, Inc., 496 F.3d 1374, 1379-80 (Fed. Cir. 2007).

⁵⁰ MOOLMAN, *supra* note 42 at 112.

⁵¹ *Id.*

⁵² *Id.*

⁵³ *Id.*

⁵⁴ *Id.*

wings to twist which causes the aircraft to bank.⁵⁵ Consequently, they were able to link their embodiment to other embodiments with a linking principle. Specifically, any mechanism that causes one wingtip to have a different angle of incidence than the opposite wingtip would solve the problem. Others later developed a different embodiment, called ailerons, having separate rigid airfoils hinged to the rear of each wing.⁵⁶ This later embodiment was held to infringe the Wright patent.⁵⁷

D. Systematic Experimentation

Often, an inventor undertakes experimentation in a systematic search for a solution to a given problem. Relying on insight from other types of inventive processes or previous systematic experiments, the inventor identifies and parameterizes a design space.⁵⁸ Then, he or she generates samples distributed throughout this design space and tests the samples to measure characteristics related to solving the problem. Conception of working embodiments occurs whenever samples are determined to be solutions. Conception of a linking principle, however, is only possible after enough samples have been tested to empirically reveal relationships between the parameters and the measured characteristics. Depending upon how the inventor parameterized the design space, the data may not reveal a linking principle at all.

Although systematic experimentation is usually the most costly type of inventive activity,⁵⁹ the results are patentable only when they would be unexpected by a person of skill in the art.⁶⁰ Results can be unexpected in one of two ways. First, a person of skill might not expect to

⁵⁵ Flying Machine, U.S. Patent 821,393 p.3 l.75-115 (filed March 23, 1903).

⁵⁶ Mark. A. Lemley, *The Myth of the Sole Inventor*, 110 MICH. L. REV. 709, 726 (2012).

⁵⁷ Wright Co. v. Herring-Curtis Co., 177 F. 257, 259-60 (W.D.N.Y. 1910).

⁵⁸ See e.g. ANGELA DEAN AND DANIEL VOSS, DESIGN AND ANALYSIS OF EXPERIMENTS (1998).

⁵⁹ Skerkow, *supra* note 34 at 1134.

⁶⁰ MPEP, *supra* note 6, § 2143.

find a solution within that design space at all. Second, some region within the design space may be unexpectedly better than neighboring regions.⁶¹ When the experimentation reveals a previously unrecognized characteristic of a known configuration, even if that result is unexpected, the combination is not novel.⁶² Similarly, when the experimentation merely reveals an optimum combination of parameters that are only marginally better than other combinations, the result is considered obvious and thus unpatentable.⁶³

When the Wrights incorporated their wing warping mechanism into gliders in 1900 and 1901, they found the performance to be dramatically different than what they had predicted based on Lilienthal's data.⁶⁴ In the ensuing year, the brothers built a wind tunnel and systematically tested and measured various wing cross sectional shapes, called airfoils.⁶⁵ The results were unexpected in two ways. The Wrights found that a rounded leading edge was superior whereas a sharp leading edge was previously considered preferable. The Wrights also found that the optimum airfoil thickness was greater than previous believed. Although these insights were critical in reducing the invention to practice, they did not contribute to patentability because the airfoil shapes themselves were previously known.

E. Virtual Experimentation

Modern inventors have powerful tools, programmable digital computers, which were not available to the Wright brothers. In many art areas, the laws of nature are sufficiently understood that a computer can be programmed to calculate the functional characteristics of a system based

⁶¹ Lemley, *supra* note 56 at 722-23 (discussing Thomas Edison's systematic experimentation which identified particularly effective materials for incandescent light bulb filaments).

⁶² MPEP, *supra* note 6, § 2145 II.

⁶³ MPEP, *supra* note 6, § 2144.05 II.

⁶⁴ MOOLMAN, *supra* note 42 at 117, 123.

⁶⁵ *Id.* at 124.

on a structural description of the system. Using artificial intelligence techniques, a computer can also be programmed to search through a very large design space by generating structural descriptions and then calculating their functional properties.⁶⁶ An inventor can provide a description of what functional characteristics he or she desires and use such a program to find one or more structures that provide those functional characteristics.⁶⁷ The inventor conceives the embodiments by reviewing the outputs of the computer program. The structures produced may be structures that a human inventor is unlikely to conceive through intuition.⁶⁸ However, the computer does not explain why the structure produces the desirable functional characteristic. Therefore, as with systematic physical experimentation, a linking principle does not emerge until the inventor recognizes a structural pattern among a number of embodiments. Robert Plotkin argues that an inventor should be allowed to claim the functional characteristics themselves, essentially using the fact that the embodiments solve the problem as the linking principle.⁶⁹ Courts have not been receptive to functional linking principles, however, because they block all solutions to the problem.⁷⁰

F. Accidental Discovery

Sometimes, an inventor discovers a working embodiment by accident. This can happen in either of two situations. First, an experimenter may accidentally produce a sample that he or

⁶⁶ ROBERT PLOTKIN, *THE GENIE IN THE MACHINE* 67-68 (2009).

⁶⁷ *Id.* at 45-46.

⁶⁸ *Id.* at 1.

⁶⁹ *Id.* at 119-23.

⁷⁰ See *O'Reilly v. Morse*, 56 U.S. 62, 119-20 (1853) (invalidating claim to all machines that solve the problem solved by Morse's telegraph); *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1349 (Fed. Cir. 2010) (warning that courts should apply the written description requirement more strictly to claims stated in broad functional language).

she did not intend to produce.⁷¹ Second, an experimenter may be searching for a solution to an entirely different problem and happen to recognize a useful characteristic different than the characteristics for which he or she was searching. Ordinarily, accidental discovery only leads to conception of a working embodiment. The inventor must rely on other types of inventive activities to conceive a linking principle.⁷²

In 1902, the Wrights built a new glider that included a fixed vertical rudder.⁷³ As they tested the glider, they discovered a new phenomenon. Occasionally, the glider would be disturbed by a wind gust and would bank sharply. Before the pilot had time to correct the bank using the wing warping mechanism, the glider would slide sideways and dive into the ground.⁷⁴ This phenomenon, which they called well-digging, is now understood as a slip. Modern pilots are trained to intentionally slip an aircraft when they need to lose altitude quickly or when they are landing in crosswinds.⁷⁵

G. Theorizing and Confirming

Thinking and experimenting are sometimes used in combination. Sometimes, an inventor has a vague or partial understanding of a problem that is sufficient to generate a theory but inadequate to eliminate the need for experimentation. The inventor's theory indicates what properties an embodiment must have in order to solve the problem, so it leads directly to conception of

⁷¹ The invention of vulcanized rubber illustrates this type of accidental discovery. Natural rubber had some interesting properties, but the properties were too temperature dependent for most practical applications. THOMAS J. CRAUGHWELL, *THE BOOK OF INVENTION* 230 (2008). While experimenting with various rubber mixtures, Charles Goodyear accidentally left a batch of rubber on the stove much longer than he intended. Lemley, *supra* note 56 at 733. To his surprise, when the mixture cooled, the rubber properties had been stabilized. CRAUGHWELL.

⁷² In the case of vulcanized rubber, Goodyear had been experimenting with rubber for some time so he was in a position to appreciate that heating the mixture is what had stabilized the properties.

⁷³ MOOLMAN, *supra* note 42 at 128.

⁷⁴ Orville Wright's Diary (September 23, 1902) in KELLY *supra* note 41 at 76.

⁷⁵ WOLFGANG LANGEWIESCHE, *STICK AND RUDDER: AN EXPLANATION OF THE ART OF FLYING* 177-78 (1944).

a linking principle. However, at least one embodiment must be tested to confirm that the theory accurately predicts behavior. If the experimentation is successful, the inventor has conceived both a working embodiment and a linking principle.

When the Wrights discovered the slip phenomena, their goal was not to patent it but to find a way to prevent it. The brothers' understanding of the phenomena was not clear enough to suggest the solution by pure reasoning, but it was clear enough to suggest a theory.⁷⁶ Since they first observed the phenomena after they added the fixed vertical rudder, they suspected a causal linkage. Orville suggested trying a movable rudder. Since the pilot literally had his hands full with other controls, they needed a way for the pilot to control the rudder position. Since they expected to move the rudder in the same circumstances that they would warp the wings, they decided to interconnect those controls. A movable rudder in combination with wing warping became the basis for additional claims in their patent.⁷⁷

H. Reasoning from Basic Principles

In predictable arts, the underlying laws of nature that govern behavior are well understood so that an inventor can accurately predict how a proposed device will function. However, the inventor may have unique insights about how to take maximum advantage of these laws of

⁷⁶ The brother's explanation of the phenomena mixes the concept of a slip, sliding sideways while banked, with the concept of adverse yaw in which drag from the banking control causes an airplane to turn in the opposite direction. *Flying Machine*, U.S. Patent 821,393 p.4 l.15-38 (filed March 23, 1903). Both of these phenomena are avoided by use of a rudder in coordination with banking.

⁷⁷ *Flying Machine*, U.S. Patent 821,393 (filed March 23, 1903). Claims 7, 8, 11, 14, 15, 16, and 18 mention the vertical rudder. Only claim 18 specifically recites the interconnection.

nature. In such circumstances, the inventor conceives the linking principle first and the working embodiments follow logically from the linking principle.⁷⁸

When the Wright brothers were confident that they understood how to control an aircraft, they undertook the task of mounting an engine and propeller.⁷⁹ The Wrights thought about the nature of a propeller that rotates as the airplane moves forward and realized that existing propeller designs were very inefficient. Recognizing that the relative direction of the airflow near the propeller hub is different than near the propeller tip, they concluded that a propeller blade should be twisted.⁸⁰ The brothers also recognized that applying torque to a propeller would create a reaction torque tending to bank the aircraft. To avoid this, they used two propellers spinning in opposite directions so that the reaction torques would cancel.

I. Drafting Patent Claims

The processes of invention and patent drafting are not always sequential. The process of expressing an invention in writing often clarifies the inventor's conception.⁸¹ Also, many inventors focus on creating optimal embodiments and do not necessarily think about what characteristics would define acceptable embodiments. A practitioner must sometimes push an inventor to identify a linking principle that links a preferred embodiment to a broad class of embodiments.

III. AN ILLUSTRATIVE EXAMPLE

Different inventive processes are further illustrated by the following fictional scenario. Consider how the types of inventive activities in this scenario impact the question of proper

⁷⁸ When the embodiments follow too easily, the invention may be unpatentable as an attempt to patent the underlying law of nature itself. *Mayo Collaborative Serv's v. Prometheus Labs., Inc.*, 132 S.Ct. 1289, 1294 (U.S. 21012).

⁷⁹ Letter from Orville Wright to George Spratt (June 7, 1903) in KELLY *supra* note 41 at 90.

⁸⁰ See Letter from Wilbur Wright to Octave Chanute (June 18, 1903) in KELLY *supra* note 41 at 93.

⁸¹ See Matthew Salzwedel, *Legal Writing as Clear Thinking*, LAWYERIST.COM (August 22, 2012), <http://lawyerist.com/legal-writing-as-clear-thinking>.

claim scope. Suppose that many people enjoy consuming liquid A. According to a recipe circulating on the Internet, mixing 3 ounces of B with a quart of liquid A causes the mixture to solidify into nuggets. These nuggets have become popular with golfers because they are much more convenient to carry than liquid A. The popularity has been limited, however, by the unfortunate property that the solidified mixture is virtually impossible to remove from pans, utensils, countertops, etc. The desire for a nugget recipe that would not ruin kitchens is a common topic on the golf course.

Inventor Charlie approaches the problem through directed experimentation based on reasoning from a non-analogous art. Charlie's hobbies include both golf and metal sculpture. He is not surprised by the adhesive property of the A-B mixture because the mixture is often used precisely for that purpose in metal sculpture. However, metal sculptors know that it is important to clean pieces before gluing them because substance C, a common rust inhibitor, sometimes prevents proper adhesion. Some studies have shown that the ratio of C to B is what determines whether the mixture is effective or not. Charlie reasons that adding C to the nugget recipe would avoid the problem of sticking to utensils. When he researches the properties of C, he learns that C is highly toxic, so it would not be an appropriate ingredient for human consumption. Upon further reading, he learns that C is chemically related to D, a common kitchen spice. He develops a theory that an A-B-D mixture might have the desired properties. Some experimentation confirms this theory, revealing that a mixture of 1 quart of A, 3 ounces of B, and 2 teaspoons of D solidifies into nuggets without sticking to the pans and utensils. Unfortunately, D appears to adversely impact the taste of the nuggets. To improve the taste, he tries reducing the amount of D, but he finds that he needs at least 1 teaspoon of D to avoid sticking. Charlie takes his recipe to a patent attorney. A prior art search finds a type of glue containing, among many other ingre-

dients, A, B, and trace amounts of D. To avoid define over this art the attorney must specify in the claim that the nuggets have more than a trace amount of D. The attorney files a patent application with the independent claim:

A solid food product comprising:
A;
B; and
at least one teaspoon of D per quart of A.

In addition to disclosing the final recipe, the specification references literature describing the adverse impact of C on the adhesive properties of A-B and the chemical relationship between C and D.

Inventor Ann accidentally discovers a solution to the stickiness problem. Ann's hobbies include golfing and cooking. Ann experiments with the addition of various kitchen spices to the nugget recipe in hopes of creating better tasting nuggets. To her surprise, sometimes the mixture doesn't stick to the pan. Although she fails to find a combination that tastes good, she takes notes about which mixtures don't stick and takes these notes to a patent attorney. Her first non-sticking mixture contains: 1 quart of A, 3 ounces of B, 3 teaspoons of D, 2 teaspoons of E, and 1 teaspoon of F. Her second non-sticking mixture contains: 1 quart of A, 3 ounces of B, 1 teaspoon of D, 3 teaspoons of E, and 2 teaspoons of F. She has no idea which additional ingredient, D, E, or F, modified the stickiness property. Ann's attorney finds the same prior art reference that Charlie's attorney found disclosing trace amounts of D. Ann's attorney drafts two independent claims:

Edible nuggets comprising:
A;
B; and
E.

Edible nuggets comprising:

A;
B; and
F.

Ann's attorney also asks Ann what other ingredients she plans to try to improve the taste. Ann lists additives G, H, I, J, K, and L as likely flavor enhancers. The specification discloses the two recipes and the list of candidate flavor enhancers.⁸²

After Charlie and Ann file their respective patent applications, each publishes their recipes on the Internet. Building upon the work of Charlie and Ann, inventor Frank continues to refine the recipes. Frank discovers that the stickiness property is related to the ratio of D to B, not the ratio of D to A. Previously, nobody seemed to question the proper amount of B because it is inexpensive and doesn't influence the taste. Frank discovers that a mixture of 1 quart of A, 1 ounce of B, and 1/3 teaspoon of D solidifies without sticking and minimizes the taste impact of D. Further, he discovers that he can mask the taste of D by adding G. Golfers nationwide adopt Frank's recipe soon after he publishes it. Charlie and Ann review their pending patent applications and are disappointed to discover that Frank's recipe would not infringe. Both contact their respective attorneys to discuss broadening their claims. The next section discusses how they can overcome the current disclosure doctrines to accomplish that.

IV. THE DISCLOSURE REQUIREMENTS DO NOT REQUIRE APPRECIATION

The very first U.S. Patent statute, which passed in 1790, required a patentee to produce a specification that describes the invention and enables a person of skill in the art to practice it.⁸³ An enabling specification is what the inventor provides to the public in exchange for the rights

⁸² Charlie and Ann would eventually have a priority contest to determine which of them should get a patent, but that is not relevant to the issues discussed in this paper.

⁸³ Patent Act of 1790, Ch. 7 § 2, 1 Stat. 109-112 (April 10, 1790).

granted under the patent.⁸⁴ However, the specification also serves a second role. It provides evidence of what the inventor knew at the time of filing.⁸⁵ To properly serve this second role, the disclosure requirements must be satisfied at the time a patent application is filed or, if an earlier priority date is claimed based on a previous application, at the time of filing of that application.⁸⁶

The current statute requires that

[t]he specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor or a joint inventor of carrying out the invention.⁸⁷

The current interpretation of the statute identifies three separate disclosure requirements: i) enablement, ii) written description, and iii) best mode.⁸⁸

The sections below discuss the deficiencies of enablement and written description as methods of enforcing an appreciation requirement.⁸⁹ These deficiencies will be illustrated using the examples of sections II and III. In particular, although the Wright brothers did not appreciate slips as a valuable piloting technique, would the disclosure requirements have prevented them from amending their claims to add a method claim covering intentional slips? Although neither Ann nor Charlie appreciated that the adverse impact of D could be reduced by reducing the amount of B, would the disclosure requirements prevent them from amending their claims to cover Frank's improved nugget recipe?

⁸⁴ Jacob Adam Schroeder, *Written Description: Protecting The Quid Pro Quo Since 1793*, 21 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 63, 89-90 (2010).

⁸⁵ *Id.* at 92-94.

⁸⁶ *In re Oda*, 433 F.2d 1200, 1203 (CCPA 1971).

⁸⁷ 35 U.S.C. § 112(a).

⁸⁸ *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336 (Fed. Cir. 2010).

⁸⁹ The third requirement, best mode, forbids a patentee from keeping the best embodiment secret from the public. The best mode requirement is solely related to the first role of the specification. In fact, a deeper understanding of the invention actually makes the best mode requirement more difficult to satisfy. An inventor that has not decided which embodiment is best, as of the filing date, is excused from the best mode requirement.

A. Enablement

Some jurist, such Judge Linn of the Federal Circuit, have argued that the enablement requirement is sufficient to prevent people from claiming more than they have invented.⁹⁰ This argument is based on the reasonable sounding premise that one cannot teach someone else what one does not know. A counter-example of this premise is illustrated by the case *University of Rochester v. G.D. Searle & Co.*⁹¹ In that case, the patentee described a process for identifying drugs that affect particular enzymes in the human body.⁹² They claimed a method of treatment that included administering drugs identified using their disclosed process.⁹³ The treatment methods were enabled because a person of skill in the art could identify a drug using their described process and then practice the claimed method of treatment. However, as of the filing date of the patent application, there was no evidence that the patentee had actually identified any such drugs and therefore would not yet have been able to practice the claimed method of treatment.⁹⁴ An invention is enabled if a person could practice the invention without undue experimentation. In *In re Wands*, the Federal Circuit established a list of factors to consider when determining whether the amount of experimentation required is excessive.⁹⁵ One of these factors is the amount of guidance provided by the inventor in the specification.⁹⁶

Suppose the Wright brothers observed other pilots intentionally performing slip maneuvers and wanted to add a method claim in their patent to cover this technique. Since their patent describes how to position the controls to prevent a slip, little experimentation would be needed to

⁹⁰ *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1371 (Fed. Cir. 2010) (Linn, J., dissenting).

⁹¹ 358 F.3d 916 (Fed. Cir. 2004).

⁹² *Id.* at 917-18.

⁹³ *Id.* at 918.

⁹⁴ *Id.* at 929-30. The patentees were following the theorizing and confirming process described in Section II. G. but had not done the confirming.

⁹⁵ 858 F.2d 731, 737 (Fed. Cir. 1988).

⁹⁶ *Id.*

determine how to position the controls to induce a slip.⁹⁷ Therefore, the enablement requirement would not have precluded the Wrights from adding such a claim. The fact that the Wrights did not consider slips to be useful does not enter into the enablement question.

In the example of section III, both Charlie and Ann could likely broaden their claims to encompass Frank's recipe without violating the enablement requirement. Since Charlie's disclosure referenced literature saying that D is related to C and that the proportion of C to B influences the property in question, he provides significant guidance to future experimenters regarding proportions. Ann could add a restriction requiring G because her disclosure guided future experimenters by providing a list of flavor enhancers to try. That restriction would allow Ann to remove the restrictions requiring E and F while still distinguishing the prior art.

Professor Lefstin points out a more fundamental limitation of the enablement doctrine as a claim scope limiting doctrine.⁹⁸ Although enablement may provide a useful gauge for evaluating whether an applicant has mentally conceived particular embodiments, it does not indicate whether the applicant has conceived a linking principle that ties those embodiments to the remainder of the claim scope. Patent claims define the scope by listing certain components or properties common to all embodiments within the scope.⁹⁹ The scope often includes embodiments that have additional components and properties, including configurations not envisioned by the inventor.¹⁰⁰ The inventor cannot be expected to enable every eventual improvement upon his invention, so the existence of a non-enabled embodiment within the claim scope does not de-

⁹⁷ Flying Machine, U.S. Patent 821,393 p.4 l.10-45 (filed March 23, 1903).

⁹⁸ Lefstin, *supra* note 9.

⁹⁹ *Id.* at 1169-70.

¹⁰⁰ *Id.*

feat enablement.¹⁰¹ Yet, requiring enablement of only one embodiment does nothing to constrain claim scope. Enablement of a large number of embodiments that are very similar to one another proves little more than enablement of one representative embodiment. Courts have struggled to articulate any practical rule by which to decide how many embodiments must be enabled and how those embodiments must be distributed throughout the claimed scope.¹⁰²

B. Written Description

Prior to the Federal Circuit en banc decision in *Ariad*, there was a debate about what the words “written description” in § 112 meant. Some argued that the words merely indicated how the enablement standard should be satisfied.¹⁰³ Others, convinced that the enablement standard was inadequate, insisted that the words convey a separate, additional requirement.¹⁰⁴ In the *Ariad* case, the Federal Circuit ultimately sided with the latter group.¹⁰⁵

Even among those who agree on the existence of a separate written description requirement, however, not all agree on what purpose the requirement serves. At least three purposes have been identified: providing public notice, policing new matter, and showing possession. Each of these is related to the goal of preventing a patentee from amending the claims to cover subject matter that he or she had not invented as of the filing date.

¹⁰¹ *Id.* at 1170-74. A Boeing 747 would infringe some of the claims of the Wright patent. However, the fact that the patent does not teach everything needed to build a jet airliner would not render those claims invalid for lack of enablement.

¹⁰² *Id.* at 1174-81.

¹⁰³ See e.g. *Kennecott Corp. v. Kyocera Int'l Inc.*, 835 F.2d 1419, 1421 (Fed. Cir. 1987).

¹⁰⁴ See e.g. *University of Rochester v. G.D. Searle & Co.*, 358 F.3d 916 (Fed. Cir. 2004); Schroeder, *supra* note 84 at 108-09.

¹⁰⁵ *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1349 (Fed. Cir. 2010) (*en banc*).

1. *Public Notice*

The first U.S. Patent Act did not require applicants to include claims.¹⁰⁶ Courts at the time relied upon the written description to prevent a patentee, during an infringement lawsuit, from “pretending that his invention is more than what it really is.”¹⁰⁷ Under modern law, every patent contains claims that define the boundaries of the patent owner’s right to exclude.¹⁰⁸ Some jurist, such as Federal Circuit Chief Judge Rader, have argued that claims now completely fulfill the public notice function.¹⁰⁹ However, as the executive in the Introduction is learning, the right to amend claims greatly limits their effectiveness in providing public notice.¹¹⁰ Under current law, the public cannot rely on stability of the claims until two years after the patent issues and only then if no continuation applications or broadening re-issue applications are pending.¹¹¹ Until that time, the public must rely on the specification and guess what the patentee could legally claim under the disclosure requirements of § 112.

2. *New Matter*

In *In re Ruschig*, the application described a class of chemical compounds and a number of examples of specific compounds within that class.¹¹² Later, the applicant added a claim to a specific compound that was within the class but was not among the examples in the description.¹¹³ The originally filed claims to the class of compounds were rejected as anticipated by

¹⁰⁶ Schroeder, *supra* note 84 at 73.

¹⁰⁷ *Evans v. Eaton*, 20 U.S. 356, 434 (1822).

¹⁰⁸ *McClain v. Ortmyer*, 141 U.S. at 424 (1891).

¹⁰⁹ *Enzo Biochem, Inc. v. Gen-Probe Inc.*, 323 F.3d 956, 977 (Fed. Cir. 2002) (Rader, J., dissenting) (“In later enactments [of the Patent Act], this notice function was assigned to claims, leaving enablement as the only purpose of the ‘written description’ language.”).

¹¹⁰ See Longo, *Checking The Staats: How Long Is Too Long To Give Adequate Public Notice In Broadening Reissue Patent Applications?*, 2011 DUKE L. & TECH. REV. 9 (2011).

¹¹¹ *Infra* section V.

¹¹² 379 F.2d 990, 993.

¹¹³ *Id.* at 991.

prior art.¹¹⁴ The examiner rejected the specific claim under § 112 because the applicant had not described that embodiment in the initial application.¹¹⁵ The applicant argued that § 112 was satisfied because the specification would have enabled one of skill in the art to make and use the specific compound.¹¹⁶ The court upheld the rejection.¹¹⁷ This was a case of an applicant narrowing his claims to avoid prior art rather than broadening claims to establish infringement. However, the rule that evolved is applicable in either type of amendment. When an applicant wants to move the boundaries defined by a claim, whether narrowing or broadening, he or she must choose something described in the specification as filed to define the new boundary line. The rule is often applied when an applicant describes a range for some quantity, like 25% to 60%, and later wants to use new endpoints, like 35% to 75%.¹¹⁸

In the example of section III, Charlie would not be able to amend the claim limitation “at least one teaspoon of D per quart of A” to read “at least a quarter of a teaspoon of D per quart of A” because his written description doesn’t mention that ratio. Similarly, Ann’s specification would not support any specific ratio less than one teaspoon per quart. However, each could use language like “a sufficient amount of B to prevent stickiness” which would broaden the claim enough to encompass Frank’s recipe.¹¹⁹ Although, at the time they filed their claims, neither Ann nor Charlie appreciated that the proportion of D to B was the critical proportion, both have disclosed embodiments with the required proportions. Therefore, either could now amend their claims to state the required amount of D in relation to B instead of in relation to A.

¹¹⁴ *Id.*

¹¹⁵ *Id.* at 992.

¹¹⁶ *Id.* at 993.

¹¹⁷ *Id.* at 996.

¹¹⁸ Schroeder, *supra* note 84 at 87.

¹¹⁹ This type of claim limitation still satisfied the definiteness requirement because it states a clear test for whether an accused product satisfies the limitation.

Of course, practitioners are aware that they may need to amend the claims in the future, so they draft the specification accordingly. For example, even though Ann did not appreciate which component was responsible for avoiding stickiness, listing all of the candidates (D, E, and F) in the specification ensured that the specification would support broader claims when Ann, or someone else, figures out which component is responsible. Ann's attorney was particularly shrewd to list potential flavor enhancers so she has support for a claim limitation requiring G.

3. *Possession*

The claims filed with a patent application are part of the disclosure.¹²⁰ Therefore, originally filed claims never present new matter concerns. Some people contend that the new matter policing function discussed in *Ruschig* is the only function of the written description requirement making it inapplicable to the originally filed claims.¹²¹ However, in *Ariad*, the Federal Circuit disagreed with this contention and declared that, to satisfy the written description requirement, the specification must indicate that the applicant 'possessed' the invention on the date of filing.¹²² The court stressed that possession does not require actual reduction to practice, but that it does require more than a statement of a desired result or an experimental plan.¹²³ Prophetic examples, examples that the inventor has not yet tested, demonstrate possession if a person on skill in the art would expect the example to work.¹²⁴ The distinction between a prophetic example and an experimental plan is not always clear.

¹²⁰ *Ariad Pharm., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1351 (Fed. Cir. 2010) (*en banc*).

¹²¹ Schroeder, *supra* note 84 at 87.

¹²² *Ariad*, 598 F.3d 1336, 1370 (Linn, J., dissenting).

¹²³ *Id.* at 1352.

¹²⁴ *Id.*

The facts of *Ariad* parallel the facts of *Rochester*. The inventors identified a gene transcription factor called NF-kB which, when activated, causes cells to produce cytokines.¹²⁵ When too many cytokines are produced, they produce harmful symptoms.¹²⁶ The specification hypothesized three types of molecules that were likely to interfere with transcription, thus alleviating the symptoms.¹²⁷ However, the specification did not indicate that the inventors ever actually produced any of the three types of molecules. The application claimed all methods of controlling the symptoms by inhibiting NF-kB.¹²⁸

Neither the *Rochester* case nor the *Ariad* case presented the issue of allowable claim scope. In both cases, the inventors appeared to appreciate the linking principle that would tie together embodiments within the claimed scope. What each applicant lacked was possession of any embodiments. The case *Regents of the University of California v. Eli Lilly & Co.* better illustrates the claim scope issue.¹²⁹ In that case, the inventors developed insulin encoding cDNA for rats, but claimed cDNA for vertebrates and mammals.¹³⁰ Although the application disclosed one embodiment, the Federal Circuit found that it did not satisfy the written description requirement.¹³¹ The court stated that describing a broad scope (commonly called a genus claim in patent literature) requires either i) describing a representative number of embodiments (commonly called species in patent literature), or ii) describing structural features common to all embodiment within the broad scope.¹³²

¹²⁵ *Id.* at 1340.

¹²⁶ *Id.*

¹²⁷ *Id.* at 1341.

¹²⁸ *Id.*

¹²⁹ 119 F.3d 1559 (Fed. Cir. 1997).

¹³⁰ *Id.* at 1562-63. They also claimed cDNA for humans, but that doesn't illustrate the claim scope issue.
Id.

¹³¹ *Id.* at 1568.

¹³² *Id.* at 1569; *Ariad*, 598 F.3d at 1350.

This written description test is deficient as a test for appreciation of a broad invention scope. First, as described above, invention of a particular scope requires both i) conception of one or more embodiments, and ii) conception of a linking principle that ties the remainder of the scope to those embodiments. Therefore, the test should require description of both representative examples and common features as opposed to one or the other. Second, the number of examples is less important than the distribution of those examples throughout the claimed scope. If the inventors in *Ariad* had disclosed three cDNAs that included a rat, a dog, and a cow, they would have a much stronger case to claim all mammal cDNA than if they disclosed cDNAs for 100 rodents. To support the claim for vertebrate cDNA, the disclosure should include birds, amphibians, etc. Third, description of a common structural feature in the specification merely proves that the inventor knew about the feature. It does not indicate that the inventor appreciated the significance of the feature in solving the problem. On the other hand, including a structural feature in an independent claim of the application as filed is much stronger evidence that the inventor regarded the feature as significant.

The examples of sections II and III illustrates that the possession inquiry is more demanding than the new matter inquiry but possession still does not require appreciation. If the Wrights attempted to add a method claim to cover slipping to lose altitude, could they show possession? The patent specification would show possession of a control system having both a rudder and wing warping and an understanding of how the relative positions of these controls impacts slips.¹³³ The brothers had, in fact, performed slips and lost altitude.

¹³³ Flying Machine, U.S. Patent 821,393 p.4 l.15-38 (filed March 23, 1903).

In the example of section III, suppose that Charlie amends his claim to say “at least one teaspoon of D per three ounces of B.” The common structural feature Charlie is now relying on is the ratio between D and B. Although Charlie did not appreciate this ratio as significant when he filed, he has a credible argument that he described the feature by describing an embodiment with one teaspoon of D and three ounces of B. Furthermore, if an examiner does not consider the amended claim unduly broad, then disclosure of one embodiment might be a sufficient number to satisfy the first prong of the test.

Suppose that Ann were to add a claim limitation requiring G, and remove the claim limitations that require E or F. This claim is allowable if the list of flavor enhancers in the specification is treated as a list of prophetic examples, but would violate the written description requirement if treated as merely an experimental plan.¹³⁴ One factor in distinguishing between prophetic examples and experimental plans is the degree of predictability.¹³⁵ If a person of skill in the art of would be able to predict that the listed additives would likely work for the stated purpose of improving taste, then the list would be treated as prophetic examples. Another factor is whether the features are described functionally or structurally.¹³⁶ An ingredient in a mixture is a structural feature, supporting the argument that the flavor enhancers are prophetic examples and the specification satisfies the written description requirement.

V. PROPOSAL

As discussed in Section II, invention is a process and an inventor’s appreciation of the scope of an invention may continue to evolve long after the inventor conceives the first patent-

¹³⁴ Ariad, 598 F.3d at 1357.

¹³⁵ *Id.* at 1351-52.

¹³⁶ *Id.* at 1352-53.

ble embodiment. Under the first to file priority system adopted with the AIA, there is no need to maintaining the fiction that invention is an event or a process that is completed on a particular date. The inventor should not be allowed to claim scope that he or she did not appreciate until after filing the patent application, especially if the increased appreciation is the result of the disclosure of others.

The originally filed claims are better evidence than the specification regarding the scope an inventor appreciated on the filing date. As discussed in Section IV, the disclosure requirements are not an effective mechanism to limit claim scope. Although the disclosure requirements mandate that the specification describe the features that the inventor considers important, applicants are not penalized for describing other features that they do not consider important. This encourages a shotgun approach to specification writing.¹³⁷ The specification need not clearly indicate which of the features the inventor regards as important. The originally filed claims, on the other hand, are likely to express what the inventor appreciated on the filing date. The statute mandates that the claims particularly point out what the applicant regards as his invention.¹³⁸ Applicants are strongly discouraged from including unimportant features in the independent claims because doing so would provide potential infringers an easy way to avoid paying royalties.

The current rules governing patent prosecution, the procedures for obtaining a patent, place excessive emphasis on the specification and insufficient attention on the originally filed claims. Applicants have virtually unfettered ability to amend the claims at any time until the

¹³⁷ See e.g. U.S. Patent 6,130,602 (containing 3072 sheets of drawings and having 36 continuation or divisional applications).

¹³⁸ 35 U.S.C. § 112.

prosecution closes.¹³⁹ When a patent issues, an applicant may file a continuation application preserving the opportunity to continue amending the claims.¹⁴⁰ An applicant may even file broadened claims for at least two years after a patent is granted by filing a re-issue application.¹⁴¹ Although an applicant is not allowed to add new matter to the original disclosure,¹⁴² nothing prevents the applicant from relying on statements that the inventor did not appreciate as significant to satisfy the written description and enablement requirements. Some of these rules should be changed in order to limit claim scope to subject matter that the applicant appreciated before it was made public by another.

Whenever an applicant seeks to broaden a claim by amendment, the applicant should be required to overcome a rebuttable presumption that the claims as filed accurately reflect the inventor's understanding of the scope of his or her invention at the time of filing.¹⁴³ An absolute prohibition of broadening amendments would be excessively restrictive. Patent claims can be difficult to understand, so there may be circumstances when an inventor is mistaken about what the claims mean.¹⁴⁴ In such circumstances, the applicant will be able to present evidence to overcome the presumption including the previous claims, the amended claims, and the specification. Disclosure of subject matter that falls within the amended claims but outside the original

¹³⁹ 37 C.F.R. 1.115. 37 C.F.R. 1.121.

¹⁴⁰ 35 U.S.C. § 120.

¹⁴¹ “Whenever any patent is, through error, deemed wholly or partly inoperative or invalid, . . . by reason of the patentee claiming more or less than he had a right to claim in the patent, the Director shall . . . reissue the patent for the invention disclosed in the original patent.” 35 U.S.C. § 251(a). The “errors” correctable by re-issue include failure to appreciate the scope of the invention. “No reissued patent shall be granted enlarging the scope of the claims of the original patent unless applied for within two years from the grant of the original patent.” 35 U.S.C. § 251(d). As long as the broadening re-issue application is filed within two years, the opportunity to introduce new amended claims last as long as that application is pending.

¹⁴² 37 C.F.R. 112(f). 35 U.S.C. § 132(a).

¹⁴³ At the time of filing an original non-provisional application, each inventor must sign an oath or declaration stating that he or she “has reviewed and understands the contents of the application, including the claims.” 37 C.F.R. 1.63(c).

¹⁴⁴ *Topliff v. Topliff*, 145 U.S. 156, 171 (1892).

claims would be a strong indication that the inventor appreciated a larger scope than conveyed by the original claims. On the other hand, introduction of a competitive product that falls within the amended claims but outside the original claims would be evidence that the applicant did not appreciate this incremental scope until the competitive product appeared. Therefore, introducing a broadening amendment would invoke the applicant's duty to disclose such products.¹⁴⁵

Under this proposal, an applicant who appreciates additional scope of an invention after filing is not without recourse. Applicants are permitted to add new matter to an existing application by filing a continuation-in-part.¹⁴⁶ A continuation-in-part application is entitled to the priority date of the original application for all of the subject matter supported by the original application and to the filing date of the continuation-in-part application for the new material. Therefore, if the inventor files a continuation-in-part application promptly after appreciating the additional scope, then the inventor would be entitled to claim that additional scope unless prior art has appeared in the intervening interval.

In the example of section III, neither Ann nor Charlie would be permitted to amend their claims to encompass Frank's recipe. If Charlie attempted to amend his claim to rely on the ratio of D to B, he would need to overcome the presumption that, at the time of filing, he regarded the ratio of D to A as the characteristic defining the scope of his invention. Since nothing in the specification overcomes this presumption, the effective filing date for the amended claim is the date of the amendment rather than the date of the original filing. Since Frank's publication of his recipe precedes the amendment date, it is prior art and the claim will be rejected under § 102. Similarly, if Ann attempts to amend her claims to remove the limitations requiring E and F, she

¹⁴⁵ 37 C.F.R. 1.56.

¹⁴⁶ 37 C.F.R. 1.53(b)(2).

would fail to overcome the presumption that, at the time of filing, she regarded those ingredients as part of her invention.

VI. RESPONSE TO OBJECTIONS

Of course, if the proposal above is implemented, then patent applicants would change their behavior in response. Some of these changes in behavior might be contrary to the intended purposes of patent law. This section responds to some anticipated objections.

A. Inventors should be able to expand their claims to cover inventions that build upon their contribution.

A common theory justifying patent law asserts that innovation and disclosure is encouraged by ensuring that inventors are compensated when others build on their contribution to make profitable products.¹⁴⁷ Some may argue that drafting claims that anticipate all of the ways someone might incorporate the technical contribution into future products is too difficult, so patentees need the ability to adjust their claims as the future products appear. Without the option of amending claims, they would argue, people will not choose to invest in innovation or will choose to keep their inventions secret.

First, one of the policy rationales for the Doctrine of Equivalents is addressing the limitations of language to express an inventive concept.¹⁴⁸ This proposal does not eliminate the Doctrine of Equivalents. Second, the drafters of U.S. patent laws did not base liability directly on whether or not a technical contribution is utilized to make an accused product. Certain types of contributions, such as basic research into the laws of nature, are excluded from patent protection

¹⁴⁷ Lemley, *supra* note 56 at 745-49.

¹⁴⁸ *Autogiro Co. of America v. United States*, 384 F.2d 391, 397 (Ct. Cl. 1967).

even though these contributions are utilized by others to produce profitable products.¹⁴⁹ Unlike copyright law, patent infringement does not require that the accused utilize the teachings of the patent, or even have access to the patent, during development of the product.¹⁵⁰ In fact, the defendant in most patent infringement cases is an independent inventor rather than a copier.¹⁵¹

B. It will encourage applicants to delay filing.

The patent system facilitates collective innovation by encouraging inventors to disclose their inventions promptly, making the disclosure available to potential improvers. Some may be concerned that inventors will delay filing until they have identified a linking principle that links their embodiments to as many embodiments as possible. However, early filing is still advantageous to inventors, especially under the AIA. This proposal does not penalize a person for filing before they have identified the broadest possible linking principle. An inventor is allowed to broaden claims after identifying a broader linking principle by treating the broadening amendment as a continuation in part. This gives the applicant the same rights to the broader claims as they would have by waiting to file in addition to securing their rights to the narrower invention.

C. It will encourage applicants to file excessively broad claims initially.

Some may be concerned that applicants facing additional barriers to broadening amendments will respond by drafting excessively broad claims in the initial application. However, sev-

¹⁴⁹ “It is admitted, that a principle is not patentable. A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.” *Le Roy v. Tatham*, 55 U.S. 156, 174-75 (1852). *See also* *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972); *Parker v. Flook*, 437 U.S. 584, 589 (1978); *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *Mayo Collaborative Serv’s v. Prometheus Labs., Inc.*, 132 S.Ct. 1289, 1293-94 (U.S. 21012).

¹⁵⁰ “[W]hoever without authority makes, uses, offers to sell, or sells any patented invention, within the United States, or imports into the United States any patented invention during the term of the patent therefor, infringes the patent.” 35 U.S.C. § 271.

¹⁵¹ Christopher A. Cotropia & Mark A. Lemley, *Copying in Patent Law*, 87 N.C. L. REV. 1421, 1424 (2009).

eral considerations will discourage this practice. First, ethical rules prohibit practitioners from filing claims that they know are not patentable.¹⁵² Second, an excessively broad claim increases the amount of prior art that is material to patentability and thus increases the burden on the applicant to submit known prior art to the patent office.¹⁵³ Finally, narrowing amendments during prosecution may restrict a patentee's ability to take advantage of the doctrine of equivalents during an infringement suit.¹⁵⁴ Effort getting the claim scope correct before filing reduces the likelihood of such narrowing amendments.

D. It will encourage applicants to file unclear claims initially so applicant can later argue that they didn't understand them.

The proposal recognizes that inventor confusion about the scope of the original claims may be a valid argument to overcome a presumption that the initial claims state what the inventor regards as his or her invention. Some may be concerned that practitioners will intentionally draft confusing claims in order to avail themselves of this argument later. Several considerations mitigate this possibility. First, the oath or declaration requires each inventor to swear that they have read and understand the claims.¹⁵⁵ Ethical practitioners would not advise inventors to sign such a declaration while habitually attempting to confuse inventors about claim meaning. Second, one of the factors indicating inventor confusion is the presence of disclosed subject matter that is not encompassed by the allegedly confusing claim. Intentionally leaving claimable subject matter outside the scope of the original claim would present a risk of losing that scope if a broadening amendment is not permitted.

¹⁵² “[A] practitioner shall not [k]nowingly advance a claim or defense that is unwarranted under existing law, except that a practitioner may advance such claim or defense if it can be supported by good faith argument for an extension, modification, or reversal of existing law.” 37 C.F.R. 10.85(a)(2).

¹⁵³ 37 C.F.R. 1.56.

¹⁵⁴ *Festo Corp. v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.*, 535 U.S. 722, 733-34 (2002).

¹⁵⁵ 37 C.F.R. 1.63(b)(2).

CONCLUSION

The common practice of amending claims after a competitive product is introduced is contrary to the statutory interpretation that an inventor is only entitled to claim patent protection for what he or she appreciated as the invention at the time of filing the patent application. The scope of what an inventor appreciated at the time of filing should be defined to include only i) the embodiments that are disclosed, and ii) other embodiments that are related to the disclosed embodiment by a disclosed linking principle. While the detailed description section of a patent application is evidence of the inventor's conception of embodiments, it is not a reliable indicator of the inventor's conception of a linking principle. The originally filed independent claims, however, are very strong evidence of what the inventor regarded as the linking principle at that time. Consequently, whenever an applicant seeks to amend claims to broaden their scope, the applicant should be required to overcome a rebuttable presumption that the original claims accurately capture what he or she regarded as the invention at the time of filing. Disclosed embodiments that fall outside the original claims and within the amended claims would be evidence tending to overcome this presumption. On the other hand, intervening art, such as introduction of a new product, would be evidence that appreciation of the incremental scope occurred after the filing date.