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OF TEXT, TECHNIQUE, AND THE TANGIBLE: DRAFTING PATENT CLAIMS AROUND PATENT RULES

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I. INTRODUCTION

Courts have long recognized and policed attempts to contract around the patent code.[1] Settled law establishes that the proprietor of a patent which enjoys market power cannot extend that patent beyond its statutory term or restrain competition in an unpatented product via contract.[2] Yet today a far more subtle and fundamental mechanism for drafting around the statute has materialized: the humble patent instrument itself. Patent drafters have only partially realized the remarkable set of tools they now possess for expanding the scope of patent-eligible subject matter, augmenting the market power of issued patents, and avoiding core precepts of the patent canon.

The source of these new-found resources is case law concerning the claims, the tightly drafted technical aphorisms that close the contemporary patent instrument. It is these few, carefully chosen words of limitation that have traditionally served to define the inventor's patentable advance.[3] Under the stewardship of the Court of Appeals for the Federal Circuit, which possesses exclusive jurisdiction over patent appeals,[4] the claims have assumed a new, more malleable role. Patent claims have become as well a sort of well-pleaded complaint, easily manipulated to comply with or diverge from the patent statute or judicial precedent.

To see why this is so, we must consider among the first issues a claims drafter faces, the characterization or format of the claim. Broadly speaking, the patent law distinguishes between *artifact* and *technique*.[5] The former sort of claim sets forth the components of a tangible thing, a machine, manufacture or composition of matter in the language of the

1. *See* ROBERT PATRICK MERGES, PATENT LAW AND POLICY 1172 (2d ed. 1997).

2. *See, e.g.*, B. Braun Medical, Inc. v. Abbott Labs., Inc., 124 F.3d 1419, 1426 (Fed. Cir. 1997).

3. *E.g.*, Markman v. Westview Instruments, 52 F.3d 967 (Fed. Cir. 1995), *aff'd*, 517 U.S. 370 (1996).

4. *See* Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, 96 Stat. 25.

5. *See Ex parte* Lyell, 17 U.S.P.Q.2d 1548, 1552 (Bd. Pat. App. & Int'f 1990) (noting "the long-standing practice of requiring a product and a process to be separately claimed"); *Ex parte* Forsyth, 151 U.S.P.Q. 55, 56 (Bd. Pat. App. 1965) ("A claim such as those before us cannot be both method and apparatus. It must be clear from its wording that it is drawn to one or the other of these mutually exclusive statutory classes of invention."); ANTHONY DELLER, PATENT CLAIMS § 133 (2d. ed. 1971) ("A claim is single and is either for a product or a process").

patent statute.[6] Technique claims, usually termed a method or process within the patent law, instead track behavior. They set forth a series of steps that act to manipulate the physical subject matter that is the province of the patent law.[7]

The format of a patent claim is pivotal because substantive rights hinge upon whether the claimed invention comprises artifact or technique. For example, infringement of an artifact claim occurs due to the unauthorized making, using, selling, offering for sale or importing into the United States the claimed physical technology.[8] In contrast, courts have traditionally held that one infringes a claim directed towards technique only by performing the steps of the claimed process.[9] Patentees have been held to exhaust the rights provided by artifact claims upon the first sale of their commercial embodiment; yet technique claims have traditionally been exempted from the exhaustion principle, allowing patentees downstream control of technologies within the marketplace.[10] As a final example, the patent statute limits the remedies owing to patentees that do not mark their patented products with the appropriate legend, but the courts have held that the incorporeal steps of a technique claim lie without the marking requirement.[11] For these and other reasons, technologists have recognized that claims directed towards technique to offer a different bundle of rights than that provided by artifact claims.

Given the significance of patent claim format and the ease with which claims may be converted from one format to another,[12] drafters have long attempted to collapse the distinctions between artifact and technique. Early attempts to commingle claim formats resulted in the "function of a machine" doctrine, under which the PTO would reject claims that defined a discrete physical apparatus in functional rather than structural terms. A 1968 opinion of the Court of Customs and Patent Appeals, *In re Tarczy-Hornoch*,[13] squarely overturned this doctrine,

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6. 35 U.S.C. § 101 (1994).

7. *See Lyell*, 17 U.S.P.Q.2d at 1551 ("The first statutory class, process, is defined in 35 U.S.C. § 100(b) and refers to 'arts,' while the last three classes, machine, manufacture and composition of matter, refer to physical things or products.").

8. 35 U.S.C. § 271(a) (1994).

9. *See* Joy Technologies v. Flakt, Inc., 6 F.3d 770, 773 (Fed. Cir. 1993).

10. *See* Bandag, Inc. v. Al Bolser's Tire Stores, 750 F.2d 903, 924 (Fed. Cir. 1984) ("The doctrine that the first sale by a patentee of an article embodying his invention exhausts his patent rights in that article . . . is inapplicable here, because the claims of the [asserted] patent are directed to a 'method . . . ."); *see also* United States v. Univis Lens Co., 316 U.S. 241, 251-52 (1942).

11. *See* Bandag, Inc. v. Gerrard Tire Co., 704 F.2d 1578, 1581 (Fed. Cir. 1983) (It is "settled in the case law that the notice requirement of the statute does not apply where the patent is directed to a process or method.").

12. *See* Richard H. Stern, *Tales from the Algorithm War:* Benson *to* Iwahashi, *It's Deja Vu All Over Again*, 18 AM. INTELL. PROP. L. ASS'N Q.J. 371, 378 (1991).

13. *In re* Tarczy-Hornoch, 397 F.2d 856 (C.C.P.A. 1968).

reasoning that neither earlier case law nor sound patent policy required this limitation of available claim formats.

More recent advances in the biotechnology and software industries have placed new strains upon claim formatting in the patent law. The PTO initially denied biotechnologists patent claims directed towards the technique of making desirable protein products from an engineered host cell, even where that host cell itself presented a patentable advance. Following intensive efforts on both the Hill and Madison Place,[14] the biotechnology industry ultimately walked away with a new Biotechnology Process Patents Act of 1995[15] and the *In re Ochiai*[16] opinion. These two pronouncements each provide applicants with an increased ability to conflate artifact and technique when drafting patent claims.

An even more recent manifestation of these trends has led to the drafting of encoded software instruction as artifact. No longer content with claims directed towards software methods for completing a certain task, drafters are additionally fashioning claims directed towards a computer-usable storage medium, such as a floppy disk, hard disk or CD-ROM, on which software instructions have been recorded. In *In re Beauregard*,[17] the PTO[18] sanctioned this drafting effort by stating that its earlier rejections of these claims had been in error.

Although these three lines of authority have largely been viewed as isolated events, the insight that each concerns the boundary between object and action allows the exploration of a tension within the patent law. The system of patents is one that is fundamentally concerned with the abstraction of technology into text.[19] Yet this process of mapping is hardly an orderly one. Instead, it presents numerous ambiguities that obscure the determination of whether a drafter's chosen claim format is appropriate or not.

This Article contends that the courts and the PTO should recover an awareness of claim formatting when reaching patent eligibility and enforcement decisions. To lay the groundwork for this analysis, Part I of this Article explains the traditional significance of claim formatting within the patent law. In Part II, this Article describes more recent trends that have begun to cross the Rubicon between technique and the tangible, discussing the circumstances surrounding *Tarczy-Harnoch, Ochiai, Beauregard* and related precedent. Part III then offers a primer

14. The current address of the United States Court of Appeals for the Federal Circuit.

15. Biotechnology Process Patents Act of 1995, Pub. L. 104-39 (1995).

16. *In re* Ochiai, 71 F.3d 1565 (Fed. Cir. 1995).

17. *In re* Beauregard, 53 F.3d 1583 (Fed. Cir. 1995).

18. More properly the United States Patent and Trademark Office. At the time this Article goes to press, Congress is considering legislation that would create a distinct PTO as an independent government agency.

19. *See* PETER DRAHOS, A PHILOSOPHY OF INTELLECTUAL PROPERTY 145-64 (1996).

regarding the use of skillful claim drafting to draft around the Patent Code. In so doing, drafters are able to thwart congressional intent and judicial reasoning that weds the scope of proprietary patent rights to the format of the claim.

In Part IV, this Article explores the consequences of a regime where the format of a patent claim plays a significant role in its proprietor's substantive rights. This Article reasons that a regime that allows significant consequences to attend minor drafting changes must exercise vigilance in order to regulate the market power of particular patents, ensure that narrowly cabined statutory exceptions remain of limited applicability, and maintain a more precise line of demarcation between what is patent-eligible and what is not. The difficulty is that decision makers have lacked a framework and vocabulary for discussing the propriety of different claim formats. Turning to the example of *Beauregard*-style claims for encoded machine instruction, Part V of this Article finds appropriate perspective from two different sources.

The first, suggested by the opinion in *Tarczy-Hornoch,* is the willingness to recognize that a solely textual consideration of the propriety of a given format is a hollow one. This Article urges instead that courts employ phenomenological techniques in order to determine whether the ontic dimension of a technology lies in technique or artifact. Applying this analysis towards patent claims drafted in the manner of the *Beauregard* application, this Article reasons that the claimed media presents no more than a vessel for capturing the software method. The encoded machine instruction is not the function itself, but the expression of a function that must be read and interpreted before amounting to the pragmatic technology that is the province of the patent law.

The second analytical framework, following from the line of cases culminating in *Ochiai*, is the requisite to patentability known as nonobviousness. Even where the prior art does not teach precisely the claimed technology, a patent will nonetheless not issue where skilled artisans would readily understand how to achieve it. Recognizing that even lay persons would understood that encoded software may be recorded on various well-known media, such as floppy diskettes or compact discs, this Article concludes that the standard of nonobviousness presents an additional mechanism for rejecting *Beauregard*-style claims.

II. BACKGROUND

A. The Significance of Claim Formatting in Patent Law

The Patent Act limits the availability of patent protection by an invention's subject matter, utility, novelty and nonobviousness. In addition to claiming patent-eligible subject matter, the invention must also meet a minimum standard of utility, or operability towards a useful pur-

pose.[20] The third requirement, novelty, denies patent protection to inventions already known to others, thereby preventing the withdrawal of an invention from the public domain.[21]

The requirement of nonobviousness is typically the most onerous.[22] The Patent Act denies protection to those inventions where "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."[23] An inquiry into nonobviousness primarily entails a comparison of the invention to existing patents, publications and other sources of analogous prior art. Other considerations, such as the sophistication of practitioners in the technical field, the invention's commercial success, or the failure of others to develop the patented invention in the face of industry need, are also apposite.[24]

Unlike most other sorts of intellectual property, patent rights may not arise without government interference. An inventor seeking patent protection for a technology must first prepare an application for submission to the PTO. The application primarily consists of the invention's "specification."[25] The specification is an often lengthy description of the technical problem the inventor faced and the invention produced to solve that problem.[26] The specification includes the invention's ingredients and a description of how the ingredients work together.

The specification serves more as an introduction and foundation than as a source of legal rights. That role is reserved for the claims, the precise delineations of the invention placed at the close of the specification.[27] The claims are the primary source of the bundle or property rights associated with a patent. Because the exclusive rights granted by a patent are measured by the language of the claims, claim interpretation looms extraordinary large in infringement actions. Claims must be read and interpreted both by competitors seeking to avoid infringement and by courts ultimately resolving the issue.

Claims consist of three primary parts. The first, the preamble, is an introductory statement that sets forth the broad classification of the in-

20. 35 U.S.C. § 101 (1994).

21. 35 U.S.C. § 102 (1994).

22. *See, e.g.*, MacLaren v. B-I-W Group, Inc., 535 F.2d 1367, 1376 (2d Cir.), *cert. denied* 429 U.S. 1001 (1976).

23. 35 U.S.C. § 103(a) (1994).

24. *See* Robert P. Merges, *Commercial Success and Patent Standards: Economic Perspectives on Innovation*, 76 CAL. L. REV. 805 (1988).

25. *See* 35 U.S.C. § 111 (1994).

26. 35 U.S.C. § 112 ¶ 1 (1994).

27. 35 U.S.C. § 112 ¶ 2 (1994).

vention as well as the technical environment of the invention. Most drafters format patent claims in terms of the subject matter the Patent Act declares to be patent eligible.[28] Thus, artifact claims are often drafted in terms of a machine, manufacture or composition of matter, while technique claims go towards processes or methods. Drafters frequently employ other, more specific language in the preamble, such as a "wheelbarrel for transporting rocks and stones,"[29] "foam sandwich package,"[30] or "printing system."[31] Such terms may be readily classified into one or more of these statutory categories.[32]

Next is the transition, a short phrase such as "consisting" or "comprising." The body, listing all elements of the invention and how they interact, concludes the claim. In artifact claims, these elements are nouns and may claim discrete structures of the invention, such as a nail, frame or arithmetic logic unit. Alternatively, the drafter may employ the more general "means for" term, such as a "attaching means," "means for supporting," or "means for adding."[33] For technique claims, these elements are ordinarily written in gerund form, setting forth the steps that act to manipulate physical subject matter.

Even the most novice claims drafter would encounter scant difficulty in converting a patent claim from artifact to technique and back again. For example, consider the following artifact claim:

> An apparatus for measuring activity of the autonomic nervous system of a patient, comprising:
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> means for obtaining ECG signals from said patient whilst said patient is at rest; means for measuring the R-R intervals for adjacent PQRS portions of said signals; means for generating a Poincare plot from said R-R intervals; and means for determining a level of parasympathetic activity for said patient from the width of said plot about a line perpendicular to the line of identity of said plot.

A few simple changes to the claim transforms it to one concerned with technique, in the following way:

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28. *See* 35 U.S.C. § 101 (1994).

29. *See* Claim 1 of United States Patent No. 5,190,351, granted to Joe Klumpjan of Campbellsport, Wisconsin on Mar. 2, 1993.

30. *See* Claim 1 of United States Patent No. 4,653,685, granted on May 31, 1987, and assigned to the McDonald's Corporation.

31. *See* Claim 1 of United States Patent No. 5,696,894, issued to Kenichi Ono of Tokyo, Japan on Dec. 9, 1997.

32. *See, e.g., Ex parte* Fressola, 27 U.S.P.Q.2d 1608 (Bd. Pat. App. & Int'f 1993) ("A 'system' is an 'apparatus'").

33. The Patent Act instructs interpreters to read these so-called "means plus function" claim limitations as including "the corresponding structure, material or acts described in the specification and equivalents thereof." 35 U.S.C. § 112 ¶ 6 (1994). *See In re* Donaldson, 16 F.3d 1189 (Fed. Cir. 1994).

> A method of measuring activity of the autonomic nervous system of a patient, comprising the steps of:
>
> obtaining ECG signals from said patient whilst said patient is at rest; measuring the R-R intervals for adjacent PQRS portions of said signals; generating a Poincare plot from said R-R intervals; and determining a level of parasympathetic activity for said patient from the width of said plot about a line perpendicular to the line of identity of said plot.[34]

Use of different claim formats is a matter of drafter discretion. Sometimes the prior art will constrain the availability of certain formats. For example, chemists frequently devise more efficient ways of manufacturing compounds well known to the art. In such instances, drafters ordinarily claimed the technique of making the compound, rather than the unpatentable compound itself.

Where the prior art does not control, however, drafters may employ a variety of claim formats and often do so.[35] As a result, individual patent instruments may contain both artifact and technique patent claims directed to the same invention.[36] An inventor may have fabricated a new chemical compound, for example, and learned as well that that compound is quite suitable for a particular technical application. This latter sort of claim is typically termed a "method of using" claim. Alternatively, the inventor may have discovered a new way to manufacture the compound. In that case, she will likely file an application claiming both the compound and a so-called "method of making."[37]

The addition of claims expressed in different formats is not without cost. The applicant must expend time and fees in drafting claims, and the PTO assesses fees for each claim in an application in excess of twenty.[38] The PTO may also impose a so-called "restriction" requirement when it judges an inventor to have claimed multiple "independent and distinct" inventions in a single application.[39] In practice, restriction forces applicants to pursue two or more patent applications for such tech-

34. For another example of this claim drafting practice see *In re* Trovato, 42 F.3d 1376, 1381-82 (Fed. Cir. 1995), *vacated*, 60 F.3d 807 (Fed. Cir. 1995) (en banc); *see also* Stern, *supra* note 12. These claims are based upon those of United States Patent No. 5,682,901, granted to Peter Walter Kamen of Victoria, Australia on Nov. 4, 1997.

35. *See* Bandag, Inc. v. Al Bolster's Tire Stores, Inc., 750 F.2d 903 (Fed. Cir. 1984) ("It is commonplace that the claims defining some inventions can by competent draftsmanship be directed to either a method or apparatus.").

36. H.R. Rep. 104-178, at 2 (1995); *see also* Steinmetz v. Allen, 192 U.S. 543 (1904) (rejecting PTO regulations that imposed restriction requirement against applications containing both artifact and technique claims).

37. *See In re* Pleuddemann, 910 F.2d 823, 825-26 (Fed. Cir. 1990).

38. *See* 37 C.F.R. § 1.16. The PTO fee structure for claims is actually more complex than this, as additional fees are charged for multiple dependent claims and independent claims in excess of three.

39. 35 U.S.C. § 121 (1994).

nologies as a process and the apparatus for its practice, where each claimed subject matter would be patentable over the others.[40] Not only does restriction considerably raise the cost of patent acquisition, it may cause an inventor's artifact and technique claims ultimately to reside in different patent instruments.

B. Distinctions Between Artifact and Technique Claims

The patent law traditionally did not discriminate between sorts of technologies in terms of the protection they receive. Whether electrical, chemical or mechanical, the technology was subject to the same standard of examination in the PTO, term of protection and standards of infringement.[41] The law did draw boundaries between artifact and technique claims, however. Artifact claims provided patentees with the right to exclude others from making, using, selling, offering to sell or importing into the United States the patented invention.[42] Technique claims presented a lesser scope of infringing acts, however, for courts have held that to be infringed their elements must be performed.[43] The sale of an apparatus does not directly infringe a technique claim even where the only practical use of the apparatus is to perform the patented method.[44] In essence, then, technique claims protect only against the use of the patented invention by others.[45]

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40. *See* Patent & Trademark Office, U.S. Dep't of Commerce, Manual of Patent Examining Procedure §§ 802.01, 806.05(e)-(i) (July 1996).

41. This early uniformity is reinforced by the commitment of the United States to the TRIPS Agreement. Article 27 of the TRIPS Agreement mandates that "patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced."

Seemingly unaware of the treaty that had just been approved, however, Congress and the Clinton Administration signed into law on September 30, 1996, a new 35 U.S.C. § 287(c) which deprives patentees of remedies against medical practitioners engaged in infringing "medical activity." The statute defines "medical activity" as "the performance of a medical or surgical procedure on a body." The statute expressly provides that the use of patented machine, machines, or compositions of matters, the practice of a patented use of a composition of matter, and the practice of a patented biotechnology process do not comprise "medical activity." Under § 287(c), damages and attorney fees are unavailable from medical practitioners and related entities, nor will injunctions be awarded against them. This recent amendment changes usual United States norms and almost certainly presents a violation of the TRIPS Agreement. For more on this legislation, see Gerald J. Mossinghoff, *Remedies Under Patents on Medical and Surgical Procedures*, 78 J. Pat. & Trademark Off. Soc'y 789 (1996).

42. 35 U.S.C. § 271(a).

43. *See* United States v. Studiengesellschaft Kohle, 670 F.2d 1122 (D.C. Cir. 1981).

44. Standard Havens Products Inc. v. Gencor Industries, Inc., 953 F.2d 1360 (Fed. Cir. 1991), *cert. denied*, 506 U.S. 817 (1992).

45. S. Rep. 100-83, at 30 (1987) ("Under our current patent laws, a patent on a process gives the patentholder the right to exclude others from using the process in the United States without authorization from the patentholder. The other two standard aspects of the

Courts likely adopted this rule as an intensely practical matter. Even within the "deep and often murky waters of patent law,"[46] the making or sale of a process presents at best a difficult conceptualization.[47] The marketplace result of this distinction was that of the usual cast of potential defendants—for example, manufacturers, wholesalers, retailers, and users—claims concerning technique were enforceable against a smaller set of individuals than artifact claims.

The holder of a technique claim was not left utterly without a remedy against its competitors, however. The patent statute allows patentees to pursue a charge of indirect infringement against those which actively induce or contribute to another's infringement.[48] The notion of indirect infringement is particularly useful with regard to technique claims.[49] A competitor that never itself practices the claimed technique may nonetheless be held liable if it "actively induces infringement" by selling an artifact along with, for example, instructions on how to use the artifact to practice the patented process.[50] Further, a competitor that sells an "apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and that product is not a staple article or commodity of commerce suitable for substantial non-infringing use, shall be judged a contributory infringer."[51]

An important distinction between direct and indirect infringement is the requirement of intent. Mental status does not form an element of direct infringement,[52] but a finding of indirect infringement requires some level of intent by the accused. Regrettably, the case law has not sparkled with clarity regarding precisely what the level of intent should be, particularly in the context of induced infringement.[53] Recent decisions have variously required that the defendant specifically knew or

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patent right—the exclusive right to make or sell the invention—are not directly applicable to a patented process."); H.R. Rep. No. 100-60, at 4 (1987) ("American patent law has long recognized the validity of securing for inventors the right to exclude others from practicing an invention that consists of a method of making a product. . . . Process patents, however, have been granted only partial protection against acts of infringement").

46. American Cyanamid Co. v. Gentex Corp., 641 F. Supp. 88, 91 (M.D.Pa. 1986).

47. *See* American Med. Sys., Inc. v. Medical Eng'g Corp., 6 F.3d 1523, 1538 (Fed. Cir. 1993), *cert. denied*, 511 U.S. 1070 (1994) ("The reason that the marking statute does not apply to method claims is that, ordinarily, where the patent claims are directed to only a method or process there is nothing to mark.").

48. 35 U.S.C. §§ 271(b), 271(c) (1994).

49. *See, e.g.*, Amsted Industries, Inc. v. Buckeye, Inc., 24 F.3d 178 (Fed. Cir. 1994).

50. 35 U.S.C. § 271(b) (1994).

51. 35 U.S.C. § 271(c) (1994).

52. Hilton-Davis v. Warner Jenkinson, 62 F.3d 1512 (Fed. Cir. 1995) (en banc), *rev'd and remanded*, 520 U.S. 17 (1997).

53. *E.g.*, CVI/Beta Ventures, Inc. v. Tura LP, 905 F. Supp. 1171, 1195 (E.D.N.Y. 1995), *rev'd in part, vacated in part*, 112 F.3d 1146 (Fed. Cir. 1997).

should have known his action would induce actual infringements,[54] more general "knowledge of an infringement controversy,"[55] or merely that the defendant possess "actual intent to cause the acts which constitute the infringement."[56] Of course, the latter standard essentially amounts to no level of intent at all, given the rarity of one commercial actor unintentionally selling or supplying a good to another. The possibility that a court will apply a more stringent standard remains, however, and suggests a weakness of technique claims vis-a-vis artifact claims.

Technique claims did traditionally present some advantages to patentees in comparison with artifact claims. First, technique and artifact claims have also been subject to different treatment in terms of the exhaustion or "first sale" doctrine.[57] Following the principle of exhaustion, courts have held that an authorized sale of a patented product places the product beyond the scope of the patent. The purchaser may freely use or resell the product without regard to the patentee's proprietary rights.[58]

Courts traditionally exempted technique claims from the exhaustion doctrine, however.[59] Most offered scant rationale for this distinction, but the same sense of infringing acts that pertain to a technique claim seemingly applies here. One cannot sell a process *qua* disembodied steps, and therefore one could never obtain a "first sale," or indeed any other sale, of the patented technology *per se*. The result is that the holder of a patent with technique claims can more extensively control the use of his technology in the marketplace, while the proprietor of an artifact claim must employ contractual or technical mechanisms to maintain downstream control of his technology.[60]

A second advantage of technique claims resides in their level of abstraction. All patent claims present generalities from the discrete technology that the inventor manipulated at her workspace. Rather than

54. Manville Sales Corp. v. Paramount Sys., Inc., 917 F.2d 544, 553 (Fed. Cir. 1990).

55. Symbol Technologies, Inc. v. Metrologic Instruments, Inc., 771 F. Supp. 1390, 1404 (D.N.J. 1991).

56. Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469 (Fed. Cir. 1990).

57. *B. Braun Medical,* 124 F.3d at1426 (Fed. Cir. 1997); *see generally* KENNETH J. BURCHFIEL, BIOTECHNOLOGY AND THE FEDERAL CIRCUIT § 6.11(d) (1995).

58. *See, e.g.,* Intel Corp. v. ULSI Sys. Tech., Inc., 995 F.2d 1566, 1568 (Fed. Cir. 1993).

59. *See Bandag,* 750 F.2d at 924 ("The doctrine that the first sale by a patentee of an article embodying his invention exhausts his patent rights in that article . . . is inapplicable here, because the claims of the [asserted] patent are directed to a 'method' . . . .").

60. One early decision of the Federal Circuit *Met-Coil Sys. Corp. v. Korners Unlimited, Inc.*, 803 F.2d 684, 686-87 (Fed. Cir. 1986), is worthy of mention in this context. There, the court held that the sale of so-called "roll-forming machines," useful for making metal ducts, exhausted a patent claiming an apparatus and method of making such ducts. *See* United States Patent No. 4,466,641. *Met-Coil* holds that, in the special case where the patentee sells a machine of sole use in performing a separately patented process, courts will infer the grant of an implied license to practice the process. *See* BUCHFIEL, *supra* note 57, at § 6.11(d) n.350. *See also* Bandag, Inc. v. Al Bolster's Tire Stores, Inc, 750 F.2d at 903.

recite the specific equipment and physical parameters with which the technician operated, soundly drafted patent claims are more encompassing. By more broadly claiming generic devices and ranges of dimensions and qualities, the patentee obtains a stronger instrument more able to ensnare competitor activities as infringements. Technique claims inherently aid this effort by being significantly more abstract: rather than expressing tangible things, they concern conduct that need not be confined to the particular means of carrying out the technical activity.

The result of this dichotomy is that a well-drafted technique claim need not tie an inventor to the particular apparatus she has actually built or envisioned. The most famous example of this principle may be found in the Supreme Court decision in the *Telephone Cases*, with which an entire volume of the United States reporter is concerned.[61] That litigation concerned Alexander Graham Bell's claims to both a method and apparatus for "transmitting vocal or other sounds telegraphically, as herein described, by causing electrical undulations, similar in form to the vibrations of the air accompanying the said vocal or other sounds, substantially as set forth."[62]

At least two sorts of apparatus could cause the claimed "electrical undulations": one employing electromagnetism and the other variable resistance.[63] Bell had experimented principally with the former device, although the latter ultimately prevailed as the preferred mechanism for implementing early telephony. When considering the scope of Bell's patent, the Court refused to confine it to the electromagnetic apparatus disclosed in the specification. Noting the patent's technique claims, the Court concluded that "[s]urely a patent for such a discovery is not to be confined to the mere means he improvised to prove the reality of his conception."[64] The *Telephone Cases* bring home the point that technique claims provide a capacious scope of protection, allowing any sort of apparatus that exhibits the claimed behavior to fall within the ambit of the patent.[65]

C. The Process Patents Amendment Act of 1988

The rule limiting the coverage of technique claims to activity brought significant consequences in a world of piecemeal multinational patenting. The contemporary international patent system is a fractionalized one where national or regional authorities grant strictly territo-

61. Dolbear v. American Bell Tel. Co., 126 U.S. 1 (1887).

62. *Id.* at 531.

63. *See* Donald S. Chisum, Chisum On Patents § 1.03[2][c] (1997).

64. *Dolbear,* 126 U.S. at 539.

65. *See* William B. Whitney, *Patentable Processes*, 19 Harv. L. Rev. 30, 31-32 (1905).

rial, legally independent patent instruments.[66] The territorial scope of patent rights often rendered technique claims of limited applicability against multinational business actors. Patentees could not successfully make a case of infringement against foreign manufacturers that imported products made abroad by a process patented in the United States. If inventors did not obtain patent protection in the country of manufacture, or indeed were not able to do so under foreign law, they were without a remedy.

This situation struck biotechnology-based enterprises with particular force. Biotechnologies typically concern the artificial manufacture of substances such as human insulin or growth hormone. Because such products occur in nature, they are often unpatentable themselves.[67] Technique claims were often the only form of patent protection available to the industry, yet such protection was easily circumvented through manufacture overseas.

Congress responded to this situation by enacting the Process Patents Amendment Act of 1988.[68] This legislation led to a new § 271(g), which rendered an infringement the importation, offer to sell, sale or use of a product made by a process patented in the United States.[69] 35 U.S.C. § 271(g) (1994).[70] Under that statute, the owner of a patented method of making a naturally occurring product may block imports of that product made abroad via the proprietary technique. In enacting § 271(g), Congress asserted that there was "no logical reason to exclude from the ambit of patent infringement acts associated with the abuse of a United States process as long as they occur within the reach of United

66. John R. Thomas, *Litigation Beyond the Technological Frontier: Comparative Approaches to Multinational Patent Enforcement*, 27 LAW & POL'Y INT'L BUS. 277, 278 (1996).

67. S. Rep. No. 100-83, at 30 (1987).

68. Pub. L. No. 100-418, §§ 9001-07. *See generally* Eli Lilly & Co. v. American Cyanamid Co., 82 F.3d 1568 (Fed. Cir. 1996); W. Bradley Haymond, *The Process Patent Amendments Act of 1988: Solving An Old Problem, But Creating New Ones*, 1989 BYU L. REV. 567; Glenn E.J. Murphy, Note, *The Process Patent Amendments Act of 1988*, 9 J. L. & COM. 267 (1989).

69. 35 U.S.C. § 271(g) (1994) provides in full:

> Whoever without authority imports into the United States or offers to sell, sells, or uses within the United States a product which is made by a process patented in the United States shall be liable as an infringer, if the importation, offer to sell, sale or use of the product occurs during the term of such process patent. In an action for infringement of a process patent, no remedy may be granted for infringement on account of the noncommercial use or retail sale of a product unless there is no adequate remedy under this title for infringement on account of the importation or other use, offer to sell, or sale of that product. A product which is made by a patented process will, for purposes of this title, not be considered to be so made after—
>
> (1) it is materially changed by subsequent processes or
>
> (2) it becomes a trivial and nonessential component of another product.

70. *Id.*

States domestic law."[71]

Recognizing that § 271(g) significantly enhanced the value of technique claims, Congress tempered the statute in two ways. First, § 271(g) excludes products "materially changed by subsequent processes."[72] Similarly, if the product of the process "becomes a trivial and nonessential component of another product," then it too is exempted from holdings of infringement.[73] The Federal Circuit's recent decision in *Eli Lilly & Co. v. American Cyanamid Co.*[74] suggests that these provisions will be given a broad reading. Over a dissenting opinion, the court held that a pharmaceutical compound represented a "material change" over a patented chemical intermediate, despite the fact that the only practical use of the intermediate was to produce the compound.

This legislation modified the Patent Act in other ways.[75] Among these additional changes was the creation of § 295, which alters the usual burden of proof upon process patentees. Previously all patentees were required to demonstrate infringement by a preponderance of the evidence.[76] Section 295 instead directs courts to consider whether a substantial likelihood existed that the product was made by the patented process and that the patentee made a reasonable effort to determine the process employed by the accused infringer, but was unable to do so. If so, then the court must presume that the product was made by the patented process. Thus, the burden falls to the accused infringer to establish that the product was not made via the patented process.

A third significant change concerned the rights accorded to holders of patents with technique claims.[77] Congress amended § 154 to direct that where "the invention is a process" the patent proprietor gains the right to exclude others from using or selling products made by that process.[78] This language expanded the domain of exclusivity accorded to technique claims by allowing them to encompass artifacts as well as behavior. The statute seemingly extends protection only in the domain of manufactured products, though, and by its own terms does not apply towards method of using claims. While a claimed method of making oil wells would allow a patentee to control manufactured oil wells them-

71. H.R. Rep. 100-60, at 6 (1987).

72. 35 U.S.C. § 271(g)(1) (1994).

73. 35 U.S.C. § 271(g)(2) (1994).

74. Eli Lilly & Co. v. American Cyanamid Co., 82 F.3d 1568 (Fed. Cir. 1996).

75. *E.g.*, 35 U.S.C. § 287(b) (1996); *see generally* Robert R. Deveza, *A Grandfather Clause, Due Process and the GATT: Whatever Happened to the Grandfather Clause of the Process Patent Act of 1988?*, 18 RUTGERS COMPUTER & TECH. L.J. 65 (1992).

76. *E.g.*, Morton Int'l, Inc. v. Cardinal Chem. Co., 5 F.3d 1464 (Fed. Cir. 1993).

77. *See* BURCHFIEL, *supra* note 57, at § 14.2.

78. 35 U.S.C. § 154 (1988). In keeping with the TRIPS Agreement, the defined infringing acts have since been augmented to include offers for sale and importations into the United States. *See* 35 U.S.C. § 154 (1994).

selves, under § 154 a claimed method of using an oil well would track neither the oil wells themselves nor any recovered oil.

III. ANALYSIS

This Article has thus far described a corpus of statutory and case law that weds varying rights to patent claims depending upon whether they have been cast as artifact or technique. Any individual who writes should recognize the powerful incentives this scheme presents for inventors to obtain both sorts of claims in order to achieve the full panoply of property rights. Whether lodged in a single patent or in different instruments, plural claims employing different descriptive styles offer patentees stronger protection than the exclusive use of a single format.

Cognizant of this approach, technologists have for over a century attempted to draft into or around patent law precepts. At least three lines of authority have resulted from their efforts: the "function of a machine" doctrine arising in the mechanical arts, the distinction between product and process within chemistry and biotechnology, and most recently the ruling in *Beauregard* concerning encoded computer software. This Article turns next to these episodes and the substantial liberalization of claim drafting that they have worked.

A. THE "FUNCTION OF A MACHINE" DOCTRINE

As claims of the patent instrument were increasingly relied upon as the measure of its owner's proprietary rights throughout the Nineteenth Century,[79] drafters attempted to paint more than a merely accurate verbal portrait of a specific artifact. In an effort to obtain broader coverage, they quickly attempted to augment their patent instruments with additional claims drawn to broader technical effects. Among the first efforts to result in litigation was made by Nathaniel J. Wyeth, inventor of a machine for cutting ice into uniformly sized blocks. Wyeth's patent claimed the machine as well as the method of cutting ice into blocks of a uniform size. Justice Story held the technique claim void, declaring that "[a] claim broader than the actual invention of the patentee is, for that very reason, upon the principles of the common law, utterly void, and the patent is a nullity."[80]

The function of a machine doctrine emerged from this early sense of claim breadth. As the system of claiming became increasingly refined in the United States patent system, the courts were generally hostile to attempts at claiming a technology both as artifact and technique. The Supreme Court concluded in *Corning v. Burden* that "it is well settled

79. *See* Markman Inc. v. Westview Instruments, 517 U.S. 370, 378-79 (1996).

80. Wyeth v. Stone, Fed. Cases No. 18,107 (C.C. Mass. 1840).

that a man cannot have a patent for the function or abstract effect of a machine, but only for the machine that produces it."[81] The Court offered the following illustration to point to the difference between artifact and technique:

> As, for instance, A has discovered that by exposing India rubber to a certain degree of heat, in mixture or connection with certain metallic salts, he can produce a valuable product or manufacture; he is entitled to a patent for his discovery, as a process or improvement in the art, irrespective of any machine or mechanical device. B, on the contrary, may invent a new furnace or stove, or steam apparatus, by which this process may be carried on with much saving of labor, and expense of fuel; and he will be entitled to a patent for his machine, as an improvement in the art. Yet A could not have a patent for a machine, or B for a process . . . .[82]

Here the Court seemed to rely upon nothing more than its intuition whether a technologist had invented artifact or technique. Yet even a moment's reflection indicates the profound limitations of this positivist statement, so typical of nineteenth century patent decisions. "A" could just as well have drafted a more narrow claim directed towards a specific artifact that cures rubber, or "B" presented claims stating the technique by which he built his stove or through which his steam apparatus operates. The Court's bold pronouncement does not explain why these alternative descriptive formats are improper, or capture the realization that invention itself is activity that can be expressed as technique. Varying results in subsequent cases betrayed this lack of analytical rigor: although the Court on occasion upheld patents directed towards mechanical processes,[83] its 1894 decision in *Risdon Locomotive Works v. Medart*[84] vigorously reaffirmed the function of a machine doctrine en route to striking down a patented method of making belt pulleys.

The courts began to demonstrate a more wholesale weariness with the function of a machine doctrine by the mid-Twentieth Century. The final Supreme Court decision considering this doctrine, *Waxham v. Smith*,[85] confirmed a distinction that arose in lower tribunals between claims drawn to the mere effect results of a machine and those that described mechanical operations without specified instruments of performance. The former were not patent eligible, but for the latter a technique claim could be obtained. Thus the Court concluded:

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81. Corning v. Burden, 56 U.S. (15 How.) 252 (1853).

82. *Id.* at 268.

83. *See* Tilghman v. Proctor, 102 U.S. 707 (1880); Cochrane v. Deener, 94 U.S. 780 (1876).

84. Risdon Locomotive Works v. Medart, 158 U.S. 68 (1894).

85. Waxham v. Smith, 294 U.S. 20 (1934).

A method, which may be patented irrespective of the particular form of the mechanism which may be availed of for carrying it into operation, is not to be rejected as "functional," merely because the specifications show a machine capable of using it.[86]

As the supervisory role of the Supreme Court over the patent law diminished,[87] the battleground for the "function of a machine" doctrine became the Court of Customs and Patent Appeals. In *In re Conover*,[88] the applicant claimed a method of making a roller bearing as well as the roller bearing itself. The PTO Board had rejected the claims on the ground of obviousness. Following an appeal to the Court of Customs and Patent Appeals, predecessor to the Federal Circuit, the applicant obtained a reversal. Regarding the applicant's use of both artifact and technique claims, Judge Smith briefly stated:

> [I]t is our conclusion that the invention for which a patent is sought here is one of those inventions where it is doubtful whether the invention resides in the process or the structure and which may be claimed with equal facility in terms either of method or structure. Since both types of claims are recognized by the statute, . . . it is our opinion that both types of claims may properly be allowed to issue in a single patent where, as here, they are but alternative expressions for defining a single invention.[89]

Judge Smith seemed to have underestimated the number of circumstances in which a technology may be claimed in either format. As demonstrated previously, conversion from one sort of claim to another is a straightforward matter indeed. Judge Smith also provided little guidance on how to determine whether a particular invention "resides" in the category of artifact or technique.

A need for guidance would soon be unnecessary in light of the C.C.P.A.'s subsequent decision in *In re Tarczy-Hornoch*.[90] There, the applicant appealed an adverse opinion from the PTO Board of Appeals. The Board had affirmed the examiner's rejection of certain claims of an application directed towards a "Pulse Sorting Apparatus and Method." While the examiner had allowed the applicant's apparatus claims, those claims directed towards a method of using were rejected for merely defining the function of the apparatus.

On appeal, the C.C.P.A. reversed in a 3-2 opinion. Judge Rich authored a magisterial majority opinion that flatly overruled earlier C.C.P.A. decisions relying upon the function of a machine doctrine. The court seemed unconcerned that several Supreme Court opinions, includ-

86. *Id.* at 22.
87. *See* CHISUM, *supra* note 63, at § 15.02[d].
88. *In re* Conover, 304 F.2d 680 (C.C.P.A. 1962).
89. *Id.*, 304 F.2d at 684-85.
90. *In re* Tarczy-Hornoch, 397 F.2d 856 (1968).

ing *Corning* and *Risdon*, had uniformly been read to establish this doctrine. According to the court, which traced the function of machine doctrine from its earliest underpinnings, these decisions were not directed to process claims *per se* but instead to claim breadth.[91] Judge Rich also found the doctrine unsupportable on policy grounds. Noting *The Telephone Cases*,[92] he concluded:

The essential difficulty is in the fact that, although at the time of the application only one apparatus may be known which is capable of carrying out the process, others may become available later. In which case, of course, the inventor is cheated out of his invention. It is peculiarly our responsibility to see that the decisional law does not require this kind of inequity.[93]

Two of the five members of the C.C.P.A. dissented. According to Judges Kirkpatrick and Worley, whether the "function of an apparatus" curtailed the rights of inventors to a substantial extent was an open question. In light of this perceived uncertainty, the dissenters reasoned that the rule of stare decisis counseled against overturning "a well established and accepted rule of nearly seventy years' standing."[94]

Despite the closeness of the vote in the case and the significant body of precedent reciting the "function of a machine" mantra, scant controversy surrounded *Tarczy-Hornoch*. The PTO and other courts readily accepted its holding.[95] Judge Rich's approval of the conversion of machine claims into processes nonetheless marks a point of departure in the patent law. Fueled by *Tarczy-Hornoch*, the patent system has increasingly embraced inventions of greater abstraction.[96] Psychological techniques,[97] sports methods,[98] commercial strategies,[99] and other inventions that many would judge not to be fundamentally technological in character are now within the ambit of the United States patent regime.

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91. *Id.* at 867.

92. *See supra* notes 61-65 and accompanying text.

93. *In re Tarczy-Hornoch*, 397 F.2d at 868.

94. *Id.* at 868-70.

95. *See* Federal Sign and Signal Corp. v. Bangor Punta Operations, Inc., 357 F. Supp. 1222, 1234 (S.D.N.Y. 1973); UNITED STATES PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE § 2173.05(v) (1996) (reciting rule of *Tarczy-Hornoch*).

96. A point recognized by Justice Stevens and discussed in his dissenting opinion in *Diamond v. Diehr*, 450 U.S. 175, 198 (1981). *See also* MARTIN J. ADELMAN ET AL., CASES AND MATERIALS ON PATENT LAW 104-05 (1998).

97. *See* United States Patent No. 5,190,458, granted on Mar. 2, 1993, to Valma R. Driesner (directed towards a "Character Assessment Method").

98. *See* United States Patent No. 5,616,089, granted on Apr. 1, 1997, to Dale D. Miller (directed towards a "Method of Putting").

99. *See* United States Patent No. 5,668,736, granted on September 16, 1997, to Edwin S. Douglas and Daryl V. Turner (directed towards a "Method for Designing and Illustrating Architectural Enhancements to Existing Buildings").

The controversy between technique and artifact would soon begin to run in another venue, however, that of biotechnology.

B. Product Versus Process in Biotechnology

The advent of biotechnology brought additional tensions to the distinction between artifact and technique in the patent law. Broadly speaking, recombinant biotechnologies involve the alteration of a host cell so that it replicates a desirable protein. The resulting products, including erythropoietin, interferon, and tissue plasminogen activator (tPA), are identical or similar to naturally occurring products.[100] As such, the valuable protein product is often not patent eligible in and of itself.

Biotechnologists have recognized that they may patent the transformed host cells as a sort of "machine" capable of producing a desirable protein. This style of artifact claim may provide insufficient protection to the inventor, however. In the event the host cells are used abroad, the resulting product may be freely imported into the United States.[101] To guard against unauthorized importation, inventors must include claims directed towards the technique of making the end product, allowing them to trigger § 271(g).

Biotechnologists discovered significant opposition to such technique claims within the PTO, however. Many examiners rejected such claims because the process of obtaining desirable protein products from transformed host cells is ordinarily well understood by skilled artisans. This set of skills applies even to host cells that are themselves patentable starting materials.[102]

A simple analogy may place this complex technology on more familiar terrain.[103] Consider a team of botanists, which jointly invents a new sort of fruit hybrid, such as a fanciful "appleberry." They file an application at the PTO claiming the appleberry and a method of making an appleberry pie. Plainly the applicants' appleberry pie recipe is novel. Indeed, it could not have possibly existed prior to the invention of the appleberry. But should the mere substitution of a new filling entitle the botanists to a patent on a recipe for fruit pie? The rejection of the botanists' technique claims on the ground of nonobviousness amounts to the policy judgment that they should not.

The entry point for much of this debate was the 1961 decision of the

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100. Burchfiel, *supra* note 57, at § 2.1.

101. *See* Amgen, Inc. v. International Trade Comm'n, 902 F.2d 1532 (Fed. Cir. 1990).

102. Jeremy (Je) Zhe Zhang, In re Ochiai, In re Brouwer *and the Biotechnology Process Patent Act of 1995: The End of the* Durden *Legacy?*, 37 IDEA 405, 415 (1997).

103. This example follows from Merges, *supra* note 1, at 606.

C.C.P.A. in *In re Larsen*.[104] Larsen's patent applications contained two sorts of claims: those directed towards certain organic compounds as well as the process of preparing them. The examiner had allowed the first group of claims on the basis of the unique and unexpected properties of the claimed compounds. The examiner rejected the process claims, however, over references that taught extremely similar techniques for making organic compounds. According to the PTO, the method of making Larsen's compound would have been obvious even though Larsen's compound was not.

On appeal, the C.C.P.A. affirmed the rejection of the PTO. Judge Worley explained:

> Under these circumstances, however, the inventive concept is that of the compounds themselves. When they have been conceived, the processes by which they may be prepared may or may not be obvious. If, as is the case here, such processes, given the idea of the compound, are obvious then it is apparent that the invention resides in the compounds *per se* and is not properly defined as a process.[105]

Judge Worley offered little explanation for the majority's repeated assertions that "the sole inventive concept resides in the product."[106] Judge Smith picked up this point in his dissent, stating:

I view the product and process claims as but different ways of claiming the disclosed invention. At the time the invention was made, the prior art did not disclose either the claimed product or the claimed process for making that product. I am unable to find a factual basis for the assumption stated in the majority opinion written by Judge Worley, that "clearly the invention lies in the compounds themselves, by whatever process employed."[107]

Judge Rich authored a concurring opinion in which he derided Larsen's putative attempt to "jumble up the product and the process and regard it as all the same thing,"[108] and further opined that:

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104. *In re* Larsen, 292 F.2d 531 (C.C.P.A. 1961).

105. *Id* at 533.

106. *Id.*

107. *Id.* at 536.

108. *Id.* at 534. Whether this statement can be reconciled with Judge Rich's famous dicta issued just two years later in *In re Papesch*, 315 F.2d 381 (C.C.P.A. 1963), is an interesting point of conjecture:

> From the standpoint of patent law, a compound and all of its properties are inseparable; they are one and the same thing. 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 isolated, 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.

Id.

> Were we in a mechanical art, I think no one would trouble to argue that every time a new tool or machine is invented one can obtain process claims directed to nothing more than the obvious steps of selecting the materials, forming the parts on suitable machines, and assembling them in their operative relationship.[109]

Judge Rich offered no explanation for this dearth of argumentation nor did he suggest why a mechanical technology should be treated differently from the chemical one before the court.

Hostility to the *Larsen* holding ran deep in the patent bar. Nonobviousness is an inquiry to be conducted in light of technical knowledge at the time the invention was made,[110] many argued, but Larsen's claimed compounds were known only on the basis of his own patent application. One short-lived attempt at overturning the case involved the conspicuous disharmony between *Larsen* and the court's subsequent decision in *Tarczy-Hornoch*. On at least two occasions, parties before the C.C.P.A. argued that *Tarczy-Hornoch*'s conflation of artifact and technique should also apply to situations analogous to that in *Larsen*. In *In re Susi*[111] the court noted that the argument was "interesting" but did not address the issue, nor did it further discuss the matter in the subsequent *In re Herbert*[112] opinion.

Following the creation of the Court of Appeals for the Federal Circuit, arguments correlating *Larsen* and *Tarczy-Hornoch* apparently fell out of fashion. The *Larsen* rule enjoyed considerable vitality, however, as demonstrated by the much-maligned decision of *In re Durden*.[113] There, the applicants had filed applications claiming oxime compounds, insecticidal carbamate compounds, and a process for producing the carbamate compounds using the oxime compounds as starting materials. Patents had issued on the oxime and carbamate compounds, but the PTO had rejected the process claims over a prior art patent.

On appeal, the applicants conceded that "the claimed process, apart from the fact of employing a novel and unobvious starting material and apart from the fact of producing a new and unobvious product, is obvious."[114] The Federal Circuit stated the issue to be resolved as "whether a chemical process, otherwise obvious, is patentable *because* either or both the specific starting material employed and the product obtained,

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109. *In re* Larsen, 292 F.2d 531, 535 (C.C.P.A. 1961) (Rich, J., concurring).

110. *See supra* notes 22-24 and accompanying text.

111. *In re* Susi, 440 F.2d 442, 444 n.1 (C.C.P.A. 1971).

112. *In re* Herbert, 461 F.2d 1390 (C.C.P.A. 1972). Note that the same jurist, Judge Giles S. Rich, was the author of the majority opinion in *Susi, Herbert, Tarczy-Harnoch, Pleuddemann,* and *Iwahashi*, and also wrote a concurring opinion in *Larsen*.

113. *In re* Durden, 763 F.2d 1406 (Fed. Cir. 1985). *See generally* Harold C. Wegner, *Much Ado About Durden*, 71 J. PAT. & TRADEMARK OFF. SOC'Y 785 (1989).

114. *In re Durden,* 763 F.2d at 1408.

are novel and unobvious."[115] The court affirmed the rejection, concluding that "a *new* process may still be obvious . . . notwithstanding the specific starting material or resulting product, or both, is not to be found in the prior art."[116]

Perhaps in response to pressures from the bar, the Federal Circuit endeavored to soften the holding of *Durden*. Its next significant decision was *In re Pleuddemann*,[117] involving claims to certain silane coupling agents, the use of such agents in bonding, and a method of priming a surface to improve bonding. The PTO had denied all but the first sort of claims on the authority of *Durden*. On appeal, the Federal Circuit reversed the rejection. The court reasoned:

> the compounds and their use are but different aspects of, or ways of looking at, the same invention and consequently that invention is capable of being claimed both as new compounds or as a new method or process of bonding/priming. On the other hand, a process or method of making the compounds is a quite different thing; they may have been made by a process which was new or old, obvious or nonobvious. In this respect, therefore, there is a real difference between a process of making and a process of using . . . .[118]

The patent bar immediately recognized that any competent claims drafter could readily circumvent the supposed "real difference" identified by *Pleuddemann*. Virtually all making involves as well the use of artifacts. Further, the necessary result of using certain artifacts is the creation of new ones, either as the yield or by-product.[119] Thus, to take advantage of *Pleuddemann*, a drafter might simply alter a claim directed towards "a recombinant DNA process for making a protein" into one concerned with "contacting DNA with cellular enzymes or with a transcription/translation apparatus."[120] The biotechnology industry nonetheless remained concerned that the PTO might assert that such a claim was "really a process-of-making claim in disguise."[121] Indeed, two commentators with PTO backgrounds suggested the adoption of a "proximate function" test whereby examiners would determine whether the "essence

115. *Id.*

116. *Id.* at 1410.

117. *In re* Pleuddemann, 910 F.2d 823 (Fed. Cir. 1990).

118. *Id.* at 827.

119. CARL MITCHAM, THINKING THROUGH TECHNOLOGY: THE PATH BETWEEN ENGINEERING AND PHILOSOPHY 231 (1994).

120. *See* United States Patent No. 5,004,690, issued on Apr. 2, 1991, to David R. Light and William H. Rastetter (directed towards "Ascorbic Acid Intermediates and Process Enzymes").

121. David Beier & Robert H. Benson, *Biotechnology Patent Protection Act*, 68 DENV. U. L. REV. 175, 179 (1991).

of the invention" was a method of making or using.[122]

In the face of this wavering line of precedent, on October, 1992, Professor Harold Wegner argued the case of *In re Ochiai* before the Federal Circuit. Ochiai's appeal concerned the rejection of a claimed method of making a new, nonobvious cephalosporin antibiotic, using a novel and nonobvious starting material, via a conventional acylation reaction that would have been apparent once the starting material was known.[123] Over three years would pass before the Federal Circuit issued its decision. In the meantime, the biotechnology industry sought a legislative solution to the so-called "burden of *Durden*."[124]

C. THE BIOTECHNOLOGICAL PROCESS PATENTS ACT OF 1995

Congress responded to intensive industry lobbying by enacting the Biotechnological Process Patents Act of 1995 ("BPPA"). The primary effect of this legislation was to add an intricate provision, codified as 35 U.S.C. § 103(b), to the Patent Code.[125] Applicants may invoke the statute to require the PTO to consider as nonobvious a biotechnologial pro-

122. *See* Allen B. Curtis & Thomas A. Waltz, *Process—Making or Using??*, 73 J. PAT. & TRADEMARK OFF. SOC'Y 442, 443 (1991).

123. *See Ex parte* Ochiai, 24 U.S.P.Q.2d 1265 (Bd. Pat. App. & Int'f 1992).

124. BURCHFIEL, *supra* note 57, at § 6.11(a); I. McAndrews, *Removing the Burden of* Durden *Through Legislation: H.R. 3957 and H.R. 5664*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 1188 (1990); *see also* Rochelle K. Seide & Aimee H. Weiss, *The Biotechnology Patent Protection Act of 1991: The Battle Lines Have Been Drawn*, 4 J. PROPRIETARY RIGHTS, 6 (Mar. 1992); Harold C. Wegner, *Biotechnology Process Patents: Judicial or Legislative Remedy*, 73 J. PAT. & TRADEMARK OFF. SOC'Y 24 (1991).

125. 35 U.S.C. § 103(b) (1994) provides:

> (1) Notwithstanding subsection (a), and upon timely election by the applicant for patent to proceed under this subsection, a biotechnological process using or resulting in a composition of matter that is novel under § 102 and nonobvious under subsection (a) of this Section shall be considered nonobvious if—
> (A) claims to the process and the composition of matter are contained in either the same application for patent or in separate applications having the same effective filing date; and
> (B) the composition of matter, and the process at the time it was invented, were owned by the same person or subject to an obligation of assignment to the same person.
> (2) A patent issued on a process under paragraph (1)—
> (A) shall also contain the claims to the composition of matter used in or made by that process, or
> (B) shall, if such composition of matter is claimed in another patent, be set to expire on the same date as such other patent, notwithstanding § 154.
> (3) For purposes of paragraph (1), the term "biotechnological process" means—
> (A) a process of genetically altering or otherwise inducing a single- or multi-celled organism to—
> (i) express an exogenous nucleotide sequence,
> (ii) inhibit, eliminate, augment, or alter expression of an endogenous nucleotide sequence, or
> (iii) express a specific physiological characteristic not naturally associated with said organism;

cess that uses or results in a composition of matter that is new and nonobvious.[126]

Section 103(b) is best viewed as a temporary expedient that was an unfortunate addition to the patent law. Rather than recognize the broader implications of claim formatting issues, Congress merely passed a stopgap statute that attempts to solve biotechnology claiming problems by bludgeon. The statute's specific definition of the term "biotechnological process" ties it to contemporary biotechnology research that will quickly become outdated.[127] Section 103(b) further created difficult administrative problems for the PTO, which was for the first time required to tie different claims together for substantive examination purposes. However, the Federal Circuit still had a card to play in this game.

D. In re Ochiai

A few weeks following the passage of the BPPA, the Federal Circuit at last issued its *per curiam* opinion in *In re Ochiai*.[128] In reversing the PTO Board, the court reasoned that the claimed starting material was unknown to skilled artisans prior to the filing of Ochiai's application.[129] The court then reasoned that although the claimed method was extremely similar to teachings of the prior art, the prior art nonetheless offered no suggestion or motivation to perform the claimed process. According to the *Ochiai* panel, "[s]imilarity is . . . not necessarily obviousness."[130]

In addition to deciding the case before it, the *Ochiai* panel responded to complaints by both the applicant and the PTO that *Durden, Pleuddemann* and related case law were inconsistent. According to the court, each of these cases stated no more than the general rule "that section 103 requires a fact-intensive comparison of the claimed process with the prior art rather than the mechanical application of another *per se* rule."[131] The court reconciled the holdings of its precedent by asserting that the cases presented no more than "applications of a unitary legal regime to different claims and fields of art to yield particularized re-

(B) cell fusion procedures yielding a cell line that expresses a specific protein, such as a monoclonal antibody; and

(C) a method of using a product produced by a process defined by subparagraph (A) or (B), or a combination of subparagraphs (A) and (B).

Id.

126. *See* Merges, *supra* note 1, at 602-04; Leon Radomsky, *Can Process Claims that Include New and Unobvious Product Limitations Still Be Obvious After* In re Ochiai?, 79 J. Pat. & Trademark Off. Soc'y 567, 572 (1997).

127. Merges, *supra* note 1, at 603.

128. *In re* Ochiai, 71 F.3d 1565 (Fed. Cir. 1995).

129. *Id* at 1569-70.

130. *Id.* at 1571.

131. *Id.*

sults."[132] According to the court, given the complex factual issues at stake, reasonable persons could well disagree about the outcome of a particular nonobviousness determination.[133]

The PTO Commissioner responded to *Ochiai* with a Notice that resembled a sigh of relief. Recognizing the holding of *Ochiai*, the Commissioner discouraged use of § 103(b) and additionally announced that the PTO would not issue implementing regulations.[134] Instead, applicants wishing to employ the statute were invited to petition the Commissioner. The Notice further instructed examiners that "language in a process claim which recites making or using a unobvious product must be treated as a material limitation."[135]

Despite its rather suspect attempt to harmonize flatly inconsistent holdings, *Ochiai* has been favorably received by most commentators.[136] Nonetheless, its consistency with the congressional intent underlying § 103(b) may be questioned. Congress enacted § 103(b) as a narrow provision that solved a specific problem for a single industry. More broadly worded proposals that would have applied to all technologies had been considered and rejected.[137] For example, because Ochiai's application involved a chemical technology, it would not be considered a "biotechnological process" under the statute ultimately enacted. Plainly *Ochiai*'s holding considerably opens up what Congress had crafted as a narrow exception to the prevailing case law.[138]

This Long March from *Larsen* to *Ochiai* has further described the difficulties the patent system has faced with artifact and technique claims. It has also demonstrated the broad discretion applicants now possess in drafting patent claims. The combination of *Tarczy-Hornoch* and *Ochiai* invests technologists with the ability to append a variety of claims of different formats to their patent instruments, no matter what the nature of their inventions. The culmination of this trend is occurring not within the chemical or biotechnological arts with which the *Ochiai* line of cases was concerned, however, nor in the mechanical and electrical technologies that were subject to the function of a machine doctrine.

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132. *Id.*

133. *Id.*

134. Commissioner of the United States Patent and Trademark Office, *Guidance on Treatment of Product and Process Claims in light of In re* Ochiai, *In re* Brouwer *and 35 U.S.C. Section 103(b)*, 184 OFF. GAZ. PAT. OFF. 86 (March 26, 1996).

135. *Id.*

136. *See* Zhang, *supra* note 102, at 447; Radomsky, *supra* note 126, at 595-97.

137. *See* BURCHFIEL, *supra* note 57, at § 6.11(d).

138. *Cf.* Warner Jenkinson Corp. v. Hilton-Davis, 520 U.S. 17 (1997) (noting that § 112 ¶ 6 was enacted as a limited response to the holding of *Haliburton Oil Well Cementing Co. v. Walker*, 329 U.S. 1 (1946), not as a provision intended to swallow the Doctrine of Equivalents).

Intense debate now surrounds the appropriate claim format for software-related inventions, a topic this Article takes up next.

E. Encoded Computer Instruction as Artifact

The patent law has come full circle from *Tarczy-Hornoch* in the area of computer-related inventions. Instead of claiming artifact as technique, applicants are instead claiming computer instruction steps in the form of apparatus.[139] One recently issued patent provides a straightforward example of such claims:

> 13. A method for enabling maintenance communication by a line element interconnected to a digital transmission line, said digital transmission line carrying a stream of coded data, said element defining an address, said method comprising the steps of:
>
> detecting a maintenance code; and
>
> introducing a responsive communication signal into said stream of coded data, said responsive communication signal comprising an inversion of said address.
>
> 15. A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method steps of claim 13.[140]

Possible program storage devices of the sort recited in Claim 15 include floppy disks, compact disks, or hard drives onto which the appropriate software program has been recorded. Such claims could conceivably read upon electronic signals upon which the program data has been impressed, and perhaps even programs written upon paper in conjunction with an ordinary optical scanning device.[141]

The only formal treatment of claims of this sort, *In re Beauregard*,[142] comprises an unpublished decision from the PTO Board of Appeals. There, the PTO initially rejected this sort of claim on the basis of venerable "printed matter" cases. Those decisions had found unpatent-

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139. *See* Keith E. Witek, *Developing a Comprehensive Software Claim Drafting Strategy for U.S. Software Patents*, 11 Berkeley Tech. L.J. 363 (1996); Robert C. Laurenson, *Computer Software "Article of Manufacture" Patents*, 77 J. Pat. & Trademark Off. Soc'y 811 (1995); Victor Siber & Marilyn Smith Dawkins, *Claiming Computer-Related Inventions As Articles of Manufacture*, 35 IDEA 13 (1994); Richard H. Stern, *Solving the Algorithm Conundrum: After 1994 In the Federal Circuit, the Patent Law Needs a Radical Algorithmectomy*, 22 Am. Intell. Prop. L. Ass'n Q.J. 167 (1994).

140. *See* United States Patent No. 5,437,023, issued on July 25, 1995, to Laurence Sheets and Guy Cerulli (directed towards a "Noise-Tolerant Address Transmission System for Digital Telecommunication Network").

141. Professor Chiappetta discusses this possibility in his Symposium Paper. *See* Vincent Chiappetta, *Patentability of Computer (Software) Instruction as an "Article of Manufacture": A Change Here, A Change There and Pretty Soon We're Talking A Real Solution* (1998).

142. *In re* Beauregard, 53 F.3d 1583 (Fed. Cir. 1995).

able "claims defining as the invention certain novel arrangements of printed lines or characters, useful and intelligible only to the human mind."[143] The PTO Board had previously reasoned that the printed matter rule acted to preserve statutory limits on patentable subject matter. According to the Board, "when the real substance of the contribution by its originator clearly is unpatentable in its own right," the printed matter rule cut off attempts to obtain a patent "by indirection."[144]

Beauregard quickly filed an appeal, cognizant that the printed matter rule had not fared well at the Federal Circuit. Commencing with one of its earliest decisions, the Federal Circuit had referred to the printed matter rule as one of "questionable legal and logical footing."[145] A later opinion, *In re Lowry*,[146] had denied the rule's applicability to a computer memory storage system. The court there held that the claimed computer "memory for storing data" did not recite merely the information content of the memory, but instead "specific electronic structural elements which impart a physical organization on the information stored in memory."[147]

The Federal Circuit never heard oral argument in *In re Beauregard*. The position of the Solicitor of the PTO changed hands during the pendency of Beauregard's appeal, with the new incumbent quickly filing a motion to dismiss. According to the Solicitor, the PTO now accepted "that computer programs embodied in a tangible medium, such as floppy diskettes, are patentable subject matter . . . ."[148] The Federal Circuit granted the motion, vacating the Board's opinion and remanding the case to the PTO for further consideration on other requisites of patentability.

Although the Federal Circuit's dismissal of Beauregard's appeal hardly amounts to judicial imprimatur, an increasing number of patents are employing this format. Regrettably, subsequent discussion of the propriety of *Beauregard*-style claims has largely been confined to whether such claims comprise printed matter or not.[149] Seen in combination with *Ochiai* and *Tarczy-Hornoch*, however, *Beauregard* holds far more dramatic consequences for the patent system than can be expressed by the bankrupt printed matter rule. It instead suggests potent possibilities for claims drafters under prevailing notions of claim format,

143. *In re* Bernhart, 417 F.2d 1395, 1399 (C.C.P.A. 1969). *See also In re* Jones, 373 F.2d 1007 (C.C.P.A. 1967); *see also,* Note, *The Patentability of Printed Matter: Critique and Proposal*, 18 GEO. WASH. L. REV. 475 (1950).

144. *In re Bernhart*, 417 F.2d at 1385 (quoting unpublished opinion of the Board).

145. *In re* Gulack, 703 F.2d 1381, 1385 n.8 (Fed. Cir. 1983).

146. *In re* Lowry, 32 F.3d 1579 (Fed. Cir. 1994).

147. *Id.* at 1583.

148. *In re Beauregard,* 53 F.3d at 1584.

149. *But see* Siber & Dawkins, *supra* note 139 (considering the propriety of these claims on many fronts).

and as well a significant reinterpretation of core notions of the United States patent regime. This Article turns to this effort in Part III, articulating potential uses and abuses of claim formatting within the patent law.

F. Drafting Claims Around the Patent Statute

The techniques employed by Tarczy-Hornoch, Ochiai, Beauregard and other applicants suggest powerful tools for drafting patent claims around patent rules. This Part explores more fully the consequences of the favorable reception of their efforts by the courts and PTO. In so doing, it presents something of a primer on how to avoid substantive patent law rules through skillful claim drafting.

1. *Drafting Around the Infringement Statute*

One of the significant limitations surrounding technique claims is that they are infringed only through performance.[150] Although the Process Patents Amendment Act introduced some exceptions to this traditional rule,[151] the range of potential infringements nonetheless remains diminished compared with artifact claims. A key decision tracking this distinction is *Joy Technologies, Inc. v. Flakt, Inc.*[152] The litigants both designed and built flue gas desulfurization technology. The patentee, Joy Technologies, Inc., successfully enforced United States Patent No. 4,279,873 against Flakt, Inc. Each of the '873 patent claims was directed towards a recursive technique for desulfurizing fly ash-containing flue gas that resulted from coal combustion. For example, Claim 1 of the '873 patent, included the steps of "collecting a fly ash-containing dry powder" and "atomizing an aqueous feed suspension comprising $Ca(OH)_2$ and fly ash."

The district court faced a difficult task when framing the remedies owed to Joy. The court recognized that power plant construction often consumed five or more years. If Joy were unable to obtain an injunction preventing Flakt from constructing devices that performed the patented process, then it could essentially deduct the lengthy construction time from the term of the '873 patent. In contrast, Flakt, recognizing the more narrow scope accorded to technique claims, argued that its equipment sales did not comprise an infringement so long as the equipment was not operated. The district court ultimately sided with Joy, enjoining Flakt from entering into any contracts during the term of the '873 patent for sales of devices designed to carry out the patented process.

150. *See supra* notes 42-45 and accompanying text.

151. *See supra* notes 68-73 and accompanying text.

152. Joy Technologies, Inc. v. Flakt, Inc., 6 F.3d 770 (Fed. Cir. 1993).

On appeal, the Federal Circuit vacated the injunction and remanded. The court expressly recognized that the "law is unequivocal that the sale of equipment to perform a process is not a sale of the process within the meaning of section 271(a)."[153] Not only did Flakt not directly infringe Joy's technique claims, the court reasoned, Flakt's equipment sales neither induced infringement nor constituted contributory infringement. According to the court, if the equipment sold by Flakt was not employed by purchaser, then no direct infringement occurred at all, and therefore no form of indirect infringement was possible.[154]

Joy Technologies reads as a solemn and well-reasoned opinion. Nonetheless, following *Tarczy-Hornoch* and *Ochiai*, it appears to be entirely irrelevant, at least to informed claims drafters. *Joy Technologies* is merely a case about the recitation of a few formalisms within the language of patent claims.

To see why this is so, consider the absence of artifact claims in the '873 patent. The Federal Circuit offered no explanation for the lapse, but two possibilities present themselves. The first, and most likely, possibility is that Joy would have been able to obtain apparatus claims in view of the prior art and the holding of *Tarczy-Hornoch*, but did not. Given the patentability of the Joy process, the possibility that a device capable of carrying out to the process was already used in some other context, such as to remove pollutants from automobile emissions, is quite unlikely. In that case, Joy was essentially punished for failing to recite the word "machine" rather than "process" in its claim preamble, and to place the words "means for" in front of each of its claimed steps.

The second possibility is that the prior art actually would have prevented Joy from obtaining apparatus claims. Even in that case, the reasoning of *Ochiai* allows even minimally competent drafters to place a sort of "method of making" claim within Joy's '873 patent. Such claim would recite "*a process for building machinery to be used in* a process for desulfurizing fly ash-containing flue gas" and include such steps as "*building machinery capable of* collecting a fly ash-containing dry powder" and "*building machinery capable of* atomizing an aqueous feed suspension comprising $Ca(OH)_2$ and fly ash." The mere addition of the italicized language to the actual '873 patent claim language precisely describes the competitive behavior with which Joy was concerned. Flakt could have been prevented from manufacturing machines that would carry out the patented process even though no artifact claim appeared in the '873 patent.

Although this style of claim is not a common one, *Ochiai* may be read to confirm its propriety. The proposed method of making claim that

153. *Id.* at 773.
154. *Id.* at 774-76.

would have proved useful to Joy is analogous to the acylation reaction that, despite its conventionality, was upheld in *Ochiai*. Undoubtedly skilled chemical engineers and machinists would be readily able to manufacture devices capable of performing Joy's patentable process once they knew of it. But, via *Ochiai*, such knowledge may not be on the table when the nonobviousness determination is made. Competent artisans would possess no motivation to build a device to perform an unknown process, and even the presence of similar devices within the prior art does not change this result.

This simple claim-drafting exercise demonstrates how *Joy Technologies* and a considerable body of supporting case law have been obviated in view of contemporary claim formatting policy. Section 271(a) is not the only provision of the Patent Act that may be easily drafted around, however.

2. *Drafting Around Deepsouth*

The Supreme Court's controversial opinion in *Deepsouth Packing Co. v. Laitram Corp.*,[155] formed the impetus for another paragraph of the infringement statute. Deepsouth was the proprietor of a patent claiming a "shrimp de-veining machine" that consisted of knives spaced above an inclined trough along with a water supply. Its competitor, Laitram, assembled the parts necessary to construct the patented machine, but did not finally assemble them in the United States. Laitram instead shipped the parts to a Brazilian customer which could quickly assemble them to form a functioning device. The Louisiana District Court had refused to enjoin this activity, reasoning that Deepsouth's patent protected only the combination of the claimed parts.[156] The Fifth Circuit reversed after finding the lower court's reasoning "an artificial, technical construction" that did not further the constitutional mandate of promoting the useful arts.[157]

Following its grant of certiorari,[158] the Supreme Court again reversed. According to the Court, the precedent was clear that a combination patent protected only against the operable assembly of the whole, not the sum of its parts. The Court reasoned that to hold otherwise would mark a significant expansion of the scope of a patent. The Court closed by suggesting that Congress send a "clear and certain" signal to augment those acts that would infringe artifact claims.

Congress responded by enacting § 271(f). That statute in essence declares that the supply of uncombined components comprising a sub-

155. Deepsouth Packing Co. v. Laitram Corp., 406 U.S. 518 (1972).
156. Deepsouth Packing v. Liatram Corp., 310 F. Supp. 926, 929 (E.D. La. 1970).
157. Deepsouth Packing, 443 F.2d 936, 938 (5th Cir. 1971).
158. Deepsouth Packing, 404 U.S. 1037 (1972).

stantial portion of a patented invention constitutes a patent infringement. The components of the patented invention need not be combined within the United States under § 271(f), but the statute does require that defendants fulfill the requisites of the indirect infringement statutes, §§ 271(b) and (c).[159] The Senate Committee Report remarked that § 271(f) would "prevent copiers from avoiding U.S. patents by shipping overseas the components of a *product* patented in this country so that the assembly of the components will be completed abroad,"[160] suggesting that § 271(f) applies only to artifact claims.

Throughout this episode, both Court and Congress spoke reverently of constitutional mandates, basic tenets of the patent system and "this Nation's historical antipathy to monopoly."[161] Properly seen, however, *Deepsouth* presented simply another case of poor claim drafting. Deepsouth could have drafted a so-called "kit" claim of the type approved by the C.C.P.A. in *In re Venezia*.[162] There, the applicant offered the following claim:

> A splice connector kit having component parts *capable of being assembled* in the field . . ., the kit comprising the combination of:
>
> a pair of sleeves of elastomeric material, each sleeve of said pair *adapted to be fitted* over the insulating jacket of one of said cables . . .;
>
> electrical contact means *adapted to be affixed* to the terminus of each exposed contact . . .;
>
> a pair of retaining members *adapted to be positioned* respectively between each of said sleeves . . .; and
>
> a housing, . . . *whereby said housing may be slidably positioned* over one of said cables . . . .[163]

The PTO had rejected the claim based upon two grounds. First, the PTO held that the claim language was indefinite[164] because "the elements are recited without present co-operation. The language is futuristic and conditional in character . . . ."[165] The PTO additionally held that the claimed kit did not qualify as an "article of manufacture" within the terms of the Patent Act because a "kit" comprised a plurality of separate manufactures, rather than a single manufacture.

On appeal to the C.C.P.A., the court overturned the PTO on both grounds. According to Judge Lane, the claim language was not "a mere direction of actions to take in the future" but a structural limitation upon

159. *See supra* notes 48-56 and accompanying text.
160. S. Rep. No. 98-663, at 6 (1984) (emphasis added).
161. *Deepsouth Packing*, 406 U.S. at 530.
162. *In re* Venezia, 530 F.2d 956 (C.C.P.A. 1976).
163. *Id.* at 957.
164. 35 U.S.C. § 112 ¶ 2 (1994).
165. *In re* Venezia, 530 F.2d at 958.

the claim elements. Further, a skilled artisan would possess no difficulty in determining whether a collection of interrelated parts would infringe. Regarding patent eligibility, the court concluded:

To hold that the words "any manufacture" exclude from their meaning groups or "kits" of interrelated parts would have the practical effect of not only excluding from patent protection those "kit" inventions which are capable of being claimed as a final assembly (e.g., a splice connector), but also many inventions such as building blocks, construction sets, games, etc. which are incapable of being claimed as a final assembly.

Although the C.C.P.A. plainly could have allowed kit claims only in the latter instance, its sweeping ruling provides a useful tool for claim drafters. Following *Venezia*, for example, Deepsouth simply could have drafted a claim towards "a shrimp-deveining kit having component parts capable of being assembled." Curiously, although *Deepsouth* was decided less than four years prior to *Venezia*, and within in an era where the Supreme Court only infrequently turned to patent cases, the C.C.P.A. made no mention of *Deepsouth* in its opinion.

A *Venezia*-style claim is not the only mechanism for avoiding *Deepsouth*. One could also draft an additional claim directed towards "a *method of gathering components in order to construct* the shrimp de-veining machine of Claim 1." This claim differs somewhat from a pure "method of making" claim in that it does not require connection of the claimed parts. Of course, such language falls within Judge Rich's disapproving dicta in *Larsen* about the lack of patentability of the gathering of parts of a machine.[166] Although this statement seems of dubious merit even at the time it was written, plainly the law has taken a different turn following *Ochiai*. If artisans were unmotivated to employ the patentable set of parts, then under *Ochiai* they may also be deemed to lack the inspiration to construct the set in the first instance.

3. *Drafting Around §§ 271(b) and (c)*

The current environment of claim drafting provides even more possibilities for skirting the infringement statute. In addition to avoiding judicial interpretations of § 271(a) regarding technique claims and rendering § 271(f) a nullity, those portions of the statute regarding indirect infringement also appear increasingly vitiated.[167] Contemporary case law has empowered claims drafters with the ability to recite those technologies directly practiced or sold by their competitors. The need for patentees to resort to §§ 271(b) and (c) thus becomes more limited. Given the stricter requirements associated with indirect infringement as com-

166. *See supra* note 108 and accompanying text.

167. *See supra* notes 48-56 and accompanying text.

pared to direct infringement, this trend marks a significant augmentation of the rights of patentees.

This realization appears to be among the chief motivations of Beauregard in drafting patent claims directed towards a storage device encoded with software instructions.[168] Earlier inventors of software technologies usually wrote patent claims solely in the form of technique. Among the consequences of this drafting choice was that retailers or other actors that sold encoded disks were essentially immune to charges of infringement. Such individuals did not perform the patented methods themselves, at least in commercially significant ways,[169] so they did not commit direct infringement. The majority of downstream actors were also oblivious to patent rights associated with various software products and therefore lacked the requisite intent associated with indirect infringement. Only at such time as they were informed of the patentee's rights could a charge of indirect infringement hold.

Even if intent could be proven, proprietors of software patents claiming techniques would be required to tie the contributory or induced infringement to the directly infringing acts—in this case, the practice of the method claims by individual customers. Not only might the extent of customer use prove burdensome to demonstrate in court, patentees are typically reluctant to sue or seek discovery from their own potential customers.

The augmentation of software patent with artifact claims allows patentees to avoid such difficulties. Inventors such as Beauregard have instead claimed precisely the things that all actors in the stream of commerce ultimately make, use or sell: encoded diskettes, compacts disks, and other media. Such claims therefore present far more than a procedural quibble. They significantly enhance the scope of the patentee's rights, streamlining the cause of action for infringement while simultaneously expanding the set of potential defendants.

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168. *See* Edward P. Heller, III, *Letter to the Editor*, 78 J. PAT. & TRADEMARK OFF. SOC'Y 188, 188 (1996).

169. Retailers might operate a telephone help line, for example, or have a display model available for use by employees and customers. One wonders if even these minimal directly infringing uses might extend liability to all sold programs, however, under the reasoning of *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538 (Fed. Cir.) (en banc), *cert. denied*, 516 U.S. 867 (1995). In that case the court concluded that "[i]f a particular injury was or should have been reasonably foreseeable by an infringing competitor in the relevant market, broadly defined, that injury is generally compensable absent a persuasive reason to the contrary." *Rite-Hite*, 56 F.3d at 1546. Given that retailers intend their directly infringing acts to induce sales, which in turn would reasonably lead to future infringements, a patentee would seem able to tie each of a competitor's sales to its few direct infringements without turning to a charge of indirect infringement. Carried to its logical conclusion, the reasoning of *Rite-Hite* seems to render many indirect infringement concepts unnecessary in common commercial settings.

G. Other Infringement Doctrines

The ability of patentees to obtain freely both artifact and technique claims carries with it still further consequences in terms of patent infringement law. A review of additional infringement principles reveals at least one patent-limiting rule that claims drafters can readily circumvent; one patent-strengthening rule that nearly any patentee can invoke through skillful drafting; and yet another provision of the patent statute that appears utterly irrelevant.

The exhaustion, or "first sale" doctrine is one that now can be readily avoided through well-drafted claims.[170] Patent applicants need merely include technique claims involving the manufacture or use of an artifact that has been directly claimed elsewhere. Then the patentee could avoid altogether the usual principle that artifact claims are exhausted through the sale of artifacts. Its process claims will survive numerous transactions regarding the patented good, allowing the force of the patent to intrude deeply into the stream of commerce. Given that the exhaustion doctrine ordinarily places significant limitations upon the market power of a particular patent,[171] this trivial drafting exercise appears exception-

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170. *See supra* notes 57-60 and accompanying text.

171. To the extent that a patentee could enhance its control over the use of its proprietary technology through careful claim drafting, technique claims could present an advantage over artifact claims in terms of exhaustion. More recent developments may have significantly diluted this advantage, however. The Federal Circuit has signaled that it is quite receptive to patentee control over patented goods through the express grant of limited license.

The Federal Circuit did so in the controversial decision of *Mallinckrodt, Inc. v. Medipart, Inc.*, 976 F.2d 700 (Fed. Cir. 1992), which involved a patented device for trapping radioactive aerosol mist. Hospitals used the device, a filter to trap exhaled mist contained inside lead shielding, in the diagnostic imaging of lung patients. Patentee Mallinckrodt labeled the unit "single use only," sold it to hospitals for approximately $50, and instructed the hospitals to dispose of the unit after a single use. The entrepreneurial Medipart defied this notice, however, recycling the units at a substantially lower fee. Mallinckrodt promptly brought suit against Medipart for patent infringement, but on summary judgment the district court held that Mallinckrodt's sales exhausted its patent right.

On appeal, the Federal Circuit reversed. Writing for the panel, Judge Newman concluded that customer disregard of the restriction notice constituted a patent infringement. Reasoning that prior Supreme Court decisions were inapplicable, the court broadly approved of patentee restrictions upon the use of patented goods. Unless such restrictions offered some other norms, in particular those of antitrust, the patentee could compel customer obedience via injunction.

Mallinckrodt seemingly provides patentees with a potent set of tools for controlling the use of their proprietary technologies. It may well signal the end of a robust exhaustion doctrine as applied to artifact claims. Nonetheless, members of the technological community are reportedly reluctant to rely upon *Mallinckrodt*, *see* Richard H. Stern, *Post-Sale Patent Restrictions After* Mallinckrodt*—An Idea in Search of Definition*, 5 Alb. L.J. Sci. & Tech. 1, 8-10 (1994), despite its subsequent reaffirmance by the Federal Circuit in *B. Braun Medical*, 124 F.3d at 1426-27 (Fed. Cir. 1997). Rather than attempt to prophesize

ally worthwhile for patent applicants.

In contrast, a significant change wrought by the Process Patents Amendment Act,[172] the presumption afforded to patentees by § 295, appears readily appropriated into every patentee's bundle of rights. Again, one need only draft claims directed towards the technique of making an artifact that is itself claimed elsewhere. This strategy allows the patentee to invoke the altered presumption of § 295, essentially placing the burden upon defendants that they do not practice the claimed technique.

Finally, another amendment made by the Process Patents Amendment Act, § 271(g), appears unnecessary in view of case law developments concerning claim formatting.[173] That statute renders an infringement the importation, sale or use of the product of a patented process, provided that the imported product is not materially changed or the trivial or nonessential component of another product. The legislative drafters of the Process Patents Amendment Act may be surprised to learn that not only may claims drafters achieve the same effect that § 271(g) mandates, they may also simply ignore the "material change" and "trivial component" restrictions that were thought to limit that statute.[174]

To accomplish this feat, applicants need merely draft a claim setting forth a product as a result of a particular process. One could, for example, offer the following claim to an avian interferon protein:

An avian interferon protein, produced by the following method:

culturing a microorganism transformed with a nucleic acid molecule; and

recovering said avian interferon protein from the cell culture.[175]

Although purified avian interferon protein is well known to the art, this particular method of producing it may not be. As such, a protein produced from a specified process arguably should be judged a valid claim format under the liberal notions entertained today. Judge Learned Hand had earlier recognized the possibility of such a claim format in *Buono v. Yankee Maid Dress Corp.*[176]

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the deference that subsequent courts and technologists will accord *Mallinckrodt*, this Article will proceed on the assumption that the exhaustion doctrine continues to motivate technologists to draft claims directed towards technique.

172. *See supra* note 75 and accompanying text.

173. *See* BURCHFIEL, *supra* note 57, at § 13.2.

174. *See supra* notes 71-73 and accompanying text.

175. This claim is based upon United States Patent No. 5,641,656, granted on June 24, 1997, to Margaret J. Sekellick et al. (directed to "Nucleic acids encoding avian interferon (IFN) proteins and recombinant methods using them"). Such proteins are useful for protecting fowl from certain viral diseases.

176. Buono v. Yankee Maid Dress Corp.,77 F.2d 274, 279 (2d Cir. 1935).

Conceivably it might be possible to patent a product merely as the product of the machine or of the process, even though it were anticipated if made in other ways. While it would in that case not be infringed by anything but the product of the machine or of the process, it might be an important protection to the inventor, if the machine or the process were used in another country and the product imported. Such competition effectively diminishes the market for the patented machine or process. That is probably not the law, though it is hard to find instances, probably because the PTO does not grant product patents in that form.[177]

The paucity of case law noted by Judge Hand continues today. Claims drafters have extensively employed these so-called "product-by-process" claims as a means of defining new products, however, as opposed to defining known artifacts that have been manufactured via patentable techniques. Product-by-process claims find particular application where other definitional methods are unavailable due to an inability to determine the invention's structure or a lack of consensus concerning technological parlance. For example, suppose that a chemist synthesized a novel compound that, due to the limitations of contemporary spectroscopy, had an unknowable molecular composition. Product-by-process claiming would present the only mechanism for defining this technology within the constraints of the patent law.

The Federal Circuit has debated the interpretation of these so-called "product-by-process" claims in some length.[178] Product-by-process could conceivably cover products generated by any process whatsoever, as one panel of the court initially reasoned,[179] or instead be limited to products generated only by the claimed process steps, as another panel controversially concluded less than one year later.[180] Lower court response suggests that the latter view will prevail, however, resulting in the conclusion that the claimed process steps comprise meaningful limita-

177. *Id.* at 279. This consequences of this decision are discussed in Rebecca S. Eisenberg, *Genetics and the Law: Patenting the Human Genome*, 39 EMORY L.J. 721, 734-35 (1990).

178. *See, e.g.*, Brian S. Tomko, Comment, *Scripps or Atlantic: The Federal Circuit Squares Off Over the Scope of Product-by-Process Patents*, 60 BROOK. L. REV. 1693 (1995); Calvin Fan, *Construing Product-by-Process Claims in Scripps and Atlantic*, 28 U.C. DAVIS L. REV. 219 (1994); Mark D. Passler, Comment, *Product-by-Process Patent Claims: Majority of the Court of Appeals for the Federal Circuit Forgets Purpose of the Patent Act*, 49 U. MIAMI L. REV. 233 (1994); David W. Whealan, Note, *Atlantic Thermoplastics v. Faytex: The Federal Circuit Debate Over the Scope of Product-by-Process Claims*, 20 RUTGERS COMPUTER & TECH. L.J. 633 (1994).

179. Scripps Clinic & Research Foundation v. Genentech, Inc., 927 F.2d 1565, 1583-84 (Fed. Cir. 1991).

180. *See* Atlantic Thermoplastics Co. v. Faytex Corp., 970 F.2d 834 (Fed. Cir.), *reh'g denied*, 974 F.2d 1279 (Fed. Cir. 1992) (en banc).

tions on the scope of the claim.[181]

In light of this holding and the liberal treatment of varying claim formats expressed by *Tarczy-Harnoch*, *Ochiai*, and related precedent, there appears scant reason to deny technologists patent claims directed towards a known product manufactured by a patentable process. This sort of product-by-process claim coverage seemingly renders § 271(g) unnecessary, for skilled claims drafters already possess the ability to capture imported products made by a specified process.

H. Drafting Around the Marking Statute

Patent marking doctrine, too, places considerable weight upon whether the infringed claim is artifact or technique.[182] The marking requirement arises out of § 287(a) of the Patent Act, which limits the recoverable damages of patentees that make or sell "any patented article" without labeling the article or its package with the appropriate patent number. Patentees that fail to do so cannot recover damages until they actually notify the accused infringer.[183] The marking statute serves "to give patentees the proper incentive to mark the products and thus place the world on notice of existence of the patent."[184]

The apparent difficulty of marking the incorporeal has not failed to impress the courts. The Supreme Court held in *Wine Railway Appliance Co. v. Enterprise Railway Equipment Co.*[185] that the idea of a tangible article proclaiming its own character runs through this and related provisions. Two kinds of notice are specified—one to the public by a visible mark, another by actual advice to the infringer. The second becomes necessary only when the first has not been given; and the first can only be given in connection with some fabricated article.

This language implies only that the patentee sell a "tangible article," not necessarily that the patentee has claimed one. Nonetheless the Federal Circuit declared early in its history that it is "settled in the case law that the notice requirement of this statute does not apply where the pat-

181. *See* Tropix, Inc. v. Lumigen, 825 F. Supp. 7, 10 (D. Mass. 1993); Fairfax Dental v. Sterling Optical, 808 F. Supp. 326, 338 (S.D.N.Y. 1992), *aff'd mem.*, 11 F.3d 1074 (Fed. Cir. 1993).

182. *See* James M. Markarian, *Can the Marking Requirements for a Patented Article Be Circumvented By Obtaining A Process Patent?*, 79 J. Pat. & Trademark Off. Soc'y 365 (1997); Joel Voelzke, *Patent Marking Under 35 U.S.C. § 287(a): Products, Processes, and the Deception of the Public*, 5 Fed. Circuit B.J. 317 (1995).

183. 35 U.S.C. § 287 (1994).

184. *American Med. Sys.*, 6 F.3d at 1538 (quoting Laitram Corp. v. Hewlett-Packard Co., 806 F. Supp. 1294, 1296 (E.D. La. 1992)).

185. Wine Railway Appliance Co. v. Enterprise Railway Equipment Co., 297 U.S. 387, 395 (1936).

ent is directed to a process or method."[186]

Perhaps cognizant of the restrictiveness of its early reading, the Federal Circuit refined this principle in its subsequent case law. *American Medical Sys., Inc. v. Medical Eng'g Corp.*[187] involved a patent with claims directed towards both a medical prostheses and a method of packaging it in a sterile state. The court provided that where a particular patent instrument contains both apparatus and method claims, "to the extent that there is a tangible item to mark by which notice of the asserted method claims can be given," that a party must mark in order to take advantage of the constructive notice provision of § 287.

In yet another decision, however, the Federal Circuit seemingly provided clever claim drafters with the tools to write their way around even this refinement. In *Hanson v. Alpine Valley Ski Area, Inc.*,[188] the asserted patent covered a method and apparatus for making artificial snow. The infringer, Alpine, sought to avoid an assessment of damages because Hanson's licensee had not marked its patented snow-making machines. The Federal Circuit opted not to apply § 287, reasoning only that "[t]he only claims that were found infringed in this case [were] drawn to '[t]he method of forming, distributing and depositing snow upon a surface. . . .'"[189] Because only technique claims had been found to have been infringed, the court reasoned that the marking requirement did not apply even though Hanson's patent included parallel artifact claims.

Reconciliation of *Hanson*, which presents a sort of well-pleaded complaint rule, with *American Medical Systems,* which concentrates on the need to supply notice whenever a tangible item presents the opportunity, appears difficult.[190] *Hanson* and *Wine Railway* remain in the reporters, however, and, as they predate *American Medical Systems*, are presumptively the controlling precedent on this matter.[191] In combination with *Tarczy-Hornoch* and *Ochiai*, these decisions present claim drafters with potent mechanisms for drafting around the marking statute. Simply put, few savvy technologists need mark their products in order to maxi-

186. Bandag, Inc, v. Gerrard Tire Co., 704 F.2d at 1581 (quoting Hanson v. Alpine Valley Ski Area, Inc., 718 F.2d 1075, 1083 (Fed. Cir. 1983)).

187. American Med. Sys. v. Medical Eng'g Corp., 6 F.3d 1523 (Fed. Cir. 1993), *cert. denied*, 511 U.S. 1070 (1994).

188. Hanson v. Alpine Valley Ski Area, Inc., 718 F.2d 1075 (Fed. Cir. 1983).

189. *Id.* at 1083.

190. The Federal Circuit's loose handling of the marking statute also seems puzzling in light of its much more strict interpretation of notice, a damages requisite that occurs when the patentee is found not to have marked in accordance with the statute. *See* Amsted Industries Inc. v. Buckeye Steel Castings Co., 24 F.3d 178 (Fed. Cir. 1994).

191. *See* Atlantic Thermoplastics Co. v. Faytex Corp., 974 F.2d 1279, 1281 (Fed. Cir. 1992) ("no [Federal Circuit] precedent can be disregarded or overruled save by an *en banc* court") (Rich, J., dissenting from the denial of rehearing *en banc*).

mize an award of damages under § 287. Instead they are well-advised to draft additional method claims and to segregate them into distinct patent instruments, or, at the least, to assert only method claims during enforcement litigation.

I. DRAFTING INTO PATENT ELIGIBILITY

Statutory restrictions upon the subject matter suitable for patenting have also been manipulated by the claims drafter. Outside of the United States, technologists have proven adroit in partially surmounting bans against patents directed towards methods of medical treatment.[192] In contrast, American claims drafters have principally directed their efforts towards computer-related inventions. Over the past two decades, they have successfully overcome PTO resistance to such claims in what is best described as a war of attrition. Full appreciation of the latest skirmish, in which the PTO acquiesced to Beauregard's encoded instruction claims,[193] suggests that the greatest spoils of victory for potential patentees may yet lie ahead.

Beauregard's encoded software claims again call upon the caretakers of the patent system to determine the limits of patentable subject matter. The patent law traditionally concerned itself with industrial technologies; innovations in the ordering and representation of information were left to the realm of copyright.[194] Manifestations of this principle included the printed matter doctrine[195] as well as a rule disallowing patents on "mental steps,"[196] the latter leading to decisions banning patents concerning mathematical algorithms. The Supreme Court judged such inventions to represent "abstract intellectual concepts" that comprised the "basic tools of scientific and technological work."[197]

Computer technology tremendously strained these historical distinctions. Software programs appear as text, yet when appropriately processed by a computer come to represent functional steps.[198] Further, artisans commonly describe even the electronic signals and components that comprise computer hardware through mathematical terminology.

192. *See John Wyeth & Brother Ltd.'s Application*, [1985] RPC 545 (United Kingdom Patents Court 1985) (accepting the tortured format of "Swiss"-style patent claims directed towards a second medical use of a known substance despite the restrictions of section 4 of the Patents Act 1977).

193. *See supra* notes 140-46 and accompanying text.

194. *See* Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308, 2344 (1994).

195. *See supra* notes 141-45 and accompanying text.

196. *See* Hallibuton Oil Well Cementing Co. v. Walker, 146 F.2d 817 (9th Cir. 1944), *rev'd on other grounds*, 326 U.S. 705 (1945).

197. Gottschalk v. Benson, 409 U.S. 63 (1972).

198. *See* Samuelson et al., *supra* note 194, at 2315-16.

One can appreciate that the processing of electrocardiographic signals requires operations that may be expressed in terms of mathematical functions, but represent the tangible manipulation of electrical signals that regulate the function of the human heart.[199]

Not only do perplexing conceptual issues attend computer-related inventions, they bring with them complex issues for claims drafters. Within this discipline, engineers may accomplish identical technical behaviors through differently phrased software texts[200] and a wide variety of hardware arrangements.[201] Specific structural claiming is of extremely limited utility within the computer-related arts. Yet broad functional claiming only makes the technology appear more abstract and contributes to the sense that such inventions lie without the patent system.

Claims drafters responded to these competing pressures by reciting apparatus, but at its broadest conceptual level. The ordinary mechanism for achieving this goal was the phrase "means for," followed by the specific function to be performed.[202] Thus, instead of drafting the abstract step of multiplying two numbers, or the overly specific combination of capacitors, transistors and other elements that comprise a multiplier circuit, the drafter would simply recite "means for multiplying." Professor Richard Stern has aptly termed such a claim element as "nominal hardware" out of the recognition that the presence of the hardware limitation in the claim does not, as a practical matter, limit the scope of the claim any more than if it were omitted.[203]

The PTO identified this claim drafting technique and initially rejected such claims as identifying nonstatutory subject matter. Often examiners would reason that these claims actually described an abstract technique, yet recited hardware only through the guile of the drafter.[204] The Federal Circuit ultimately adopted a far more formalistic approach, however, as indicated by its opinion in *In re Iwahashi*.[205]

In that case Iwahashi, who had submitted a patent application entitled "Auto-Correlation Circuit for Use in Pattern Recognition," appealed from the rejection of a single claim on the grounds of ineligible subject matter. Iwahashi's application disclosed a schematic, flow-chart-like diagram of his invention as well as more detailed diagram with specific electronic elements. Iwahashi had drafted his claim almost exclusively

199. *See* Arrhythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053 (Fed. Cir. 1992).

200. Samuelson, et al., *supra* note 194, at 2317.

201. Stern, *supra* note 12, at 382-84.

202. *See supra* note 33 and accompanying text.

203. Stern, *supra* note 12, at 382.

204. *See In re* Alappat, 33 F.3d 1526, 1540 (Fed. Cir. 1994) (en banc).

205. *In re* Iwahashi, 888 F.2d 1370 (Fed. Cir. 1989).

in functional terms, however, including such elements as the "means for calculating the sum" of two sample values.[206] One of Iwahashi's claim limitations did facially define structure, however: "a read only memory associated with said means for calculating."[207] In lay terms, a "read only memory," or ROM, amounts to an information storage device, programmed to respond to given inputs with a predetermined output. Iwahashi's application specified that the ROM would output the square of the number provided to it.

In issuing its rejection, the PTO reasoned that each of the claimed "means" was in fact merely a mathematical step. The recited "means for calculating the sum," for instance, amounted to merely the step of adding two numbers. Further, the sole structural limitation, the ROM, comprised nothing more than a multiplication table on a chip. The PTO concluded that the invention as a whole consisted of a mathematical technique that was not patent eligible.

On appeal, the Federal Circuit reversed the PTO rejection. The court sharply disagreed that Iwashashi's claims solely recited mathematics. According to Judge Rich, the recited ROM was a "specific piece of apparatus," and the claim as a whole "a combination of interrelated means." The court dismissed the PTO's conclusion that the claim was in reality a cleverly disguised technique, concluding that the court's precedent "held some claims statutory and other claims nonstatutory, depending entirely on what they said. We have to do the same here."[208]

The *Iwahashi* reasoning was criticized as emphasizing claim drafting manipulations over the substance of what had been invented.[209] Nonetheless, *Iwahashi* came to represent the contemporary stance of the PTO and Federal Circuit. Subsequent holdings, in particular the *en banc* decision in *In re Alappat*,[210] have confirmed that so long as the claims drafter formalistically recites some sort of structure, inventors may obtain patents for what many technologists would describe as a mathematical discovery.[211]

The claiming concept presented by the applicant in *In re Beauregard* appears to take the reasoning of *Iwahashi* and *Alappat* one step further. Even the abstract artifacts that were claimed by Iwahashi appear to be of a different flavor than the computer storage device recited by Beauregard. In *Iwahashi*, the claimed means actually performed the recited functions. But Beauregard's storage medium appears merely as a vessel for housing the encoded software.

206. *Id.* at 1373.
207. *Id.*
208. *Id.* at 1374.
209. *See* Stern, *supra* note 12.
210. *In re* Alappat, 33 F.3d 1526 (Fed. Cir. 1994).
211. *See id.* at 1561-62 (Archer, C.J., dissenting).

Acceptance of *Beauregard*-style claims appears to hold significant consequences for the patent system. Chief among them is that the statutory boundaries of the patent law seem greatly expanded. If any encoded disk comprises a patent-eligible article of manufacture, then few principles appear to restrain the eligibility of any recorded information whatsoever. In particular, aesthetic creations traditionally considered to be within the purview of the copyright statute also suddenly appear to lie within the ambit of the patent system as well. If we allow claims directed toward a CD encoded with a Word Perfect™ 6.0, for example, there seems scant reason to deny a patent on a CD recording of Peter Ilyich Tchaikovsky's Sixth Symphony.[212]

Recognizing this concern, the PTO issued Guidelines for Computer-Related Inventions (hereinafter *Guidelines*) that attempt to distinguish between "functional descriptive material" such as a data structure and "non-functional descriptive media" including music and literary works.[213] The *Guidelines* provide:

> When functional descriptive material is recorded on some computer-readable medium it becomes structurally and functionally interrelated to the medium and will be statutory in most cases. When non-functional descriptive material is recorded on some computer-readable medium, it is not structurally and functionally interrelated to the medium but is merely carried by the medium. Merely claiming non-functional descriptive material stored in a computer-readable medium does not make it statutory. Such a result would exalt form over substance.[214]

This sort of conclusory reasoning hardly inspires confidence that the PTO will be able to distinguish successfully between industrial and aesthetic works. Whether users value the encoded data for use as a word processor or musical composition, no difference exists between the manner in which the media records the information. Indeed, the computer software that audibilizes encoded musical compositions could likely play data that was intended to be a spreadsheet program, although the generated sounds may not suit the tastes of many individuals.[215] Stating that one set of data is merely recorded on a medium, while the other bears a functional relationship towards that medium is simply a misstatement of fact.

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212. The title of the latter work, "The Pathetique," appears as well an appropriate commentary on this possibility.

213. Patent and Trademark Office, *Examination Guidelines for Computer-Related Inventions,* 61 Fed. Reg. 7478 (Feb. 28, 1996).

214. *Id.* at 7481.

215. Perhaps some future hacker will succeed in crafting a sort of Nabokov-like pun by generating a software fragment that calculates pi to one thousand places past the decimal point, yet could simultaneously be audibilized as Gustav Mahler's "Symphony of a Thousand." *See, e.g.,* VLADIMIR NABOKOV, ADA, OR ARDOR: A FAMILY CHRONICLE (1969) (referring to a yellow-blue vase; in Russian, "*ya lyublyu vas*" means "I love you.").

Further, deciding whether an encoded work is principally aesthetic or functional presents a complex judgment. Many individuals have experienced the pleasures that attend the appreciation of an artifact's elegant design, be it a software program, medieval clock or late model automobile.[216] Conversely, issued patents describe how playing music encourages plant growth,[217] induces the interest of customers[218] and discourages shoplifting.[219] The PTO approach takes examiners perilously close to judging the aesthetic merits of the submitted work, an inquiry that the copyright law has declined to enter into.[220] With such a scant basis for distinguishing one sort of encoded data from another, the acceptance of claims towards encoded software suggests a greater place for information products within the patent law, provided the appropriate drafting formalities are observed.

J. CONSEQUENCES OF CONTEMPORARY CLAIM DRAFTING NORMS

This Article has demonstrated that claims drafters have only partially realized the powerful tools they possesses to circumvent the legal distinctions between artifact and technique. If unchecked, the newly acquired skills of claims drafters will have a potent impact upon the patent law. Although claims have traditionally been seen as setting forth an inventor's patentable advance, they have now assumed the role of a sort

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216. *See* SAMUEL C. FLORMAN, THE EXISTENTIAL PLEASURES OF ENGINEERING 127-40 (1976). *But see* Dennis S. Karjala, *Patent* and *Copyright in the Protection of Computer Software* (1998). Professor Karjala's Symposium Paper suggests the contrary, noting that no one designs or structures a computer program in order to appeal to the aesthetic tastes of humans. According to Professor Karjala, the use of terms such as "elegant" or "creative" to describe software is intended to convey praise at a design that works well within the given constraints of the software environment. This analysis appears as a high-tech version of Samuel Johnson's famed aphorism: "No man but a blockhead ever wrote, except for money." A similar analysis could seemingly apply to any literary form, from haiku to the modern novel. Experience suggests that aesthetic considerations do influence software design, both for applications, *see* David McCandless, *Legion of Doom*, 6.03 WIRED 156, 157 (Mar. 1998) (describing *Doom*), and for operating systems, *see* Glyn Moody, *The Greatest OS That (N)ever Was*, 5.08 WIRED 122, 123-24 (Aug. 1997) (describing LINUX).

217. *See* United States Patent No. 3,703,051, granted on Nov. 21, 1972, to Pearl Weinberger (directed towards a "Method for Improving the Growth Characteristics of Plant Material Such as Seeds and Growing Plants").

218. *See* United States Patent No. 5,051,728, granted on Sept. 24, 1991, to Frank Y. Wang (directed towards a "Music Poster").

219. *See* United States Patent No. 4,395,600, granted on July 26, 1983, to Rene R. Lundy and David L. Tyler (directed towards an "Auditory Subliminal Message System and Method").

220. *See* Bleistein v. Donaldson Lithographing Co., 188 U.S. 239 (1903) (Holmes, J.) ("It would be a dangerous undertaking for persons trained only to the law to constitute themselves final judges of the worth of pictorial illustrations, outside of the narrowest and most obvious limits.").

of well-pleaded complaint. The deleterious consequences that flow from this new status of patent claims are worthy of further exploration.

Foremost among the ramifications of these new claim drafting rules is the capability for a dramatic expansion of the market power of a particular patent, a possibility best demonstrated by example. Consider the invention of a patentable shovel. Claims drafters of an earlier era would likely have been content to recite merely the shovel itself. Such a claim would allow the patentee to prohibit others from making, using, offering for sale, selling, or importing into the United States the patented shovel.[221]

Inspired by such decisions as *Tarczy-Harnoch* and *Ochiai*, however, contemporary claims drafters will likely wish to obtain a separate patent claiming a method of using the shovel to extract items from the earth. Not only would the patentee be able to found suits based upon uses of the patented shovel itself, but also for using, offering for sale, selling, or importing into the United States products of the patented method, such as unearthed minerals, fossil fuels or even excavated cultural artifacts.[222] Although this example may appear fantastic, consider the implications of method of use claims for such devices as oil well drill bits or catheters for extracting human blood.[223]

The claims drafter might also see the advantages of obtaining a third patent directed towards a method of making the shovel. Once asserted against accused infringers, the patentee would be able to employ § 295 to its advantage. If the court found a substantial likelihood that the accused shovels were made by the claimed method and that the patentee made reasonable efforts to determine which process was actually used, it will invert the usual burden of proof and require that the defendant prove the shovel does not infringe.[224]

Individually, any one of these claim formats possesses disadvantages. The exhaustion and marking doctrines would encumber the artifact claim.[225] Sole ownership of a method of using claim would require the patentee to plead indirect infringement against sellers of the shovel that did not use the shovels themselves, requiring some proof of intent.[226] And the method of making claim would by its own terms not reach actors that did not manufacture shovels.[227] But the combination of the three patents provides the patentee with an impressive array of

221. 35 U.S.C. § 271(a) (1994).

222. *See* 35 U.S.C. § 154(a)(1) (1994); *see supra* notes 68-70 and accompanying text.

223. 35 U.S.C. § 154 (1994); *see* BURCHFIEL, *supra* note 57, at § 6.11(d).

224. *See supra* notes 74-75 and accompanying text.

225. *See supra* notes 57-58, 181-90 and accompanying text.

226. *See supra* notes 52-56 and accompanying text.

227. *See supra* notes 43-47 and accompanying text.

proprietary rights that earlier notions of claim formatting would have denied.

A new sense of the role of patent claims places a premium upon artful claim drafting, not in the usual sense of capturing the inventor's technological contribution and surmounting the prior art, but in perceiving the legal ramifications of different descriptive formats. Sophisticated applicants have been encouraged to file more lengthy patent applications, or even different patent applications, containing repetitively drafted claims.[228] Those lacking the legal knowledge or funds to engage in duplicative drafting exercises will find themselves unable to take advantage of the nuances of these special rules.

Among the heightened powers of claims drafters is also the ability to flout congressional intent. This facility is most apparent with regard to § 271(g), a statute that extends the definition of infringement to commercial activities concerning the product of a patented process. Section 271(g) includes two significant exemptions, however. Neither products that were materially changed by subsequent processes nor products that become a trivial and nonessential component of other products fall within the statute.[229] Yet, as demonstrated previously, appropriately drafted product-by-process claims may achieve the same effect as § 271(g).[230] But they do so without regard to the provisions Congress intended to temper the scope of that statute.[231]

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228. *See* Joel Voelzke, *Patent Marking under 35 U.S.C. § 287(A): Products, Processes, and the Deception of the Public*, 5 FED. CIRCUIT B.J. 317, 336-38.

229. *See supra* notes 71-73 and accompanying text.

230. *See supra* notes 172-80 and accompanying text.

231. Although § 271(g) largely mimics the language of numerous foreign statutes, S. Rep. No. 100-83, at 31-35 (1987), this legislation is intensely xenophobic. In passing the statute Congress demonstrated a profound distrust of foreign patent offices and enforcement regimes. The Process Patents Amendment Act discourages individuals from patenting without the United States, denying overseas regimes the benefits of local patent instruments as well as patent acquisition fees. *See* THE ROLE OF PATENT INFORMATION IN THE TRANSFER OF TECHNOLOGY (F.A. Sviridov ed. 1981); A. Samuel Oddi, *TRIPS—Natural Rights and a "Polite Form of Economic Imperialism"*, 29 VAND. J. TRANSNAT'L L. 415, 461-62 (1996); Masaaki Suzuki, *The Importance of Patents in Developing Countries for the Encouragement of Inventiveness and Industrial Research and Development*, *in* WORLD SYMPOSIUM ON THE IMPORTANCE OF THE PATENT SYSTEM IN DEVELOPING COUNTRIES 121-28 (1977); Robert M. Sherwood, *The TRIPS Agreement: Implications for Developing Countries*, 37 IDEA 491 (1997). The same remarks apply to § 271(f) as well.

Whatever force the Process Patents Amendment Act had in 1988, the world order in intellectual property has changed. In the past decade, the United States successfully pressed the Agreement on Trade-Related Aspects of Intellectual Property Rights into the framework of the World Trade Organization. Marrakesh Agreement Establishing the World Trade Organization, Annex 1C: Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, *reprinted in* THE RESULTS OF THE URUGUAY ROUND OF MULTILATERAL TRADE NEGOTIATIONS 365 (GATT Secretariat 1994). The so-called "TRIPS Agreement" requires its signatories to maintain specified standards of substantive patent law as

Similarly, other provisions of the Patent Code now appear to accomplish little more than to influence the PTO fee schedule. A competent claims drafter appears quite capable of bypassing the marking statute[232] and thereby subverting the statutory goal of notifying the public of patent rights.[233] The marking statute has instead been transformed into a PTO revenue raising measure, for rather than encouraging patentees to label their products it will simply spur them into obtaining additional patent instruments with technique claims.[234] Conversely, statutes such as § 271(f) must be seen merely as saving patentees the burden of drafting additional *Venezia*-style "kit" claims and absorbing the additional fees those claims would entail.[235]

The possibility that the current claim formatting environment will benefit any besides patentees appears remote. The C.C.P.A. once noted that the technical disclosure set forth in the patent specification might be enriched by allowing applicants to present claims in different formats,[236] better allowing others to profit from the teachings contained within. This argument lacks much persuasive force, however, for the patent statute presently requires applicants to convey how to make and use their patented technologies.[237] It is also conceivable that more individuals will be encouraged to invent and to patent based upon the richer rewards that may be obtained through skillful claim drafting. While the prospect of speeding technical advance through liberal claim drafting policies seems dubious, this contention ultimately presents an empirical

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well as enforcement mechanisms. Thomas, *supra* note , at 295-96. While Congress sought to abate infringement within the reach of United States courts, it has been argued elsewhere that, in appropriate circumstances, United States courts possess jurisdiction to hear suits founded upon foreign patent instruments. *See* Thomas, *supra* note 66.

232. *See supra* notes 181-90 and accompanying text.

233. The extent to which the marking doctrine serves to notify prospective accused infringers may be called into question. Fundamentally, the marking statute confuses the claimed technology and its physical embodiment. One may question how any one product could capture all the limitations of each of many claims included in many patent instruments and, indeed, why the courts are not in the business of conducting inverted infringement trials to determine the propriety of particular product marking. *Cf.* King Instruments, Inc. v. Perego, 65 F.3d 941 (Fed. Cir. 1995) (noting prospect of "reverse infringement trial" in the context of damages awards). Finally, the extent to which the marking of a geographically isolated or secreted technology could provide others with notice remains a puzzle. *See* Voelzke, *supra* note 180, at 323-34.

234. *See supra* note 190 and accompanying text.

235. *See supra* notes 154-65 and accompanying text.

236. *See In re* Kuehl, 475 F.2d 658, 666 (C.C.P.A. 1973) ("We believe the constitutional purpose of the patent system is promoted by encouraging applicants to claim, and therefore to describe in a manner required by 35 U.S.C. § 112, all aspects of what they regard as their inventions, regardless of the number of statutory classes involved.") (quoted in *In re Pleuddemann*, 910 F.2d at 826); IRAH H. DONNER, PATENT PROSECUTION 424-25 (1996).

237. 35 U.S.C. § 112 ¶ 1 (1994).

matter that is beyond the scope of this Article to address.[238]

Unfortunately, the mere recognition that harmful consequences flow from diluted notions of claim formatting does not in itself provide pragmatic tools for courts and the PTO to analyze the propriety of particular patent claims. That the patent system struggled with the "function of a machine" doctrine for over a century suggests that the problem of claim formatting is an intractable one indeed. Yet it is not one without solutions. This Article turns to a normative task in Part V, suggesting mechanisms through which the patent law can restore its own probity by recovering its earlier awareness of claim formatting distinctions.

K. The Propriety of Claiming Encoded Machine Instruction As Artifact

One way out of this morass of confused jurisprudence would simply be to abolish the historical distinctions between artifact and technique in their entirety. Whether judged in terms of marking or infringement, the scope of each patent claim could extend to any tangible embodiment; every patentee could invoke the altered burden of proof against uncooperative defendants; and the patent law could wholly dispense with the exhaustion doctrine and the assessment of an infringer's intent. Not only would this proposal solve the current crisis in claiming by eliminating the incentives drafters possess to employ multiple formats, the Patent Code would assuredly be a simpler one.

Undoubtedly such sweeping statutory changes would attract considerable public attention, for the legislative process would provide concerned parties with ample notice that the rights afforded by patents were undergoing significant expansion. The recognition that skilled drafters can essentially enact such legislation on the basis of each claim they write has proven more elusive, however. Lacking the prospect for congressional reform, the caretakers of the patent system should instead endeavor to maintain the integrity of the Patent Code as it presently stands. This effort calls for a recognition of the significance of claim formatting and a renewed commitment to assessing the propriety of claim formats on a case-by-case basis.

This Article turns to this task by considering whether *Tarczy-Harnoch* and *Ochiai*, the decisions that more than any other have created the current crisis in claiming, contain as well the seeds of standards that may speed its solution. Rather than addressing the numerous claiming styles identified in this Article, however, this Article offers a detailed examination of a single format: *Beauregard*-style claims reciting encoded machine instruction. Given their increasing popularity among

238. *See* Rebecca S. Eisenberg, *Genetics and the Law: Patenting the Human Genome*, 39 Emory L.J. 721, 736 (1990).

claims drafters, sprawling implications for patent eligibility doctrine, as well as the paucity of judicial precedent addressing their substance, *Beauregard*-style claims provide a timely exemplar of how the propriety of a particular claim format may be judged.

1. *Phenomenology and Technology*

The translation of technology into the abstract, linguistic form of patent claims presents numerous ambiguities. Even the fundamental form a particular claim may take—either object or action, or both—appears uncertain. The response of the court in *Tarczy-Harnoch* to this quandary was simply one of resignation. Its opinion heralded an climate where courts are unwilling to step beyond a textual posture to determine the propriety of particular claim format. As Judge Rich later stated in *Iwahashi*, contemporary courts analyze claims "depending entirely on what they said. We have to do the same here."[239]

For all of its flaws, the "function of a machine" doctrine overturned by *Tarczy-Harnoch* presented an initial effort to pierce the veil of claim format and identify the reality of an inventor's technology. It was nonetheless a tremendously blunt inquiry. Rather than engage in a costly, individualized consideration of the propriety of a particular claim format, courts simply held that artifact descriptions were the only appropriate ones for a broad class of technologies.

Although the "function of a machine" doctrine may appear too coarse a mechanism for our tastes, these early efforts at determining the character of an inventor's inventive contribution seem well placed. Doctrines such as these offer us the possibility of addressing the propriety of different claim formats. We could, for example, conclude that an artifact claim cannot stand because of our shared sense that the inventor's contribution amounted to technique, not artifact.

Unfortunately, jurists, PTO officials, and commentators concerned with the patent system have not been particularly articulate in describing this ontological task. They have instead offered little more than slogans that ask us to ponder an "inventive concept,"[240] "the real substance" of the invention,[241] or the "essence of the invention,"[242] as well as to judge where the "invention lies,"[243] what the "different aspects of . . . the same invention,"[244] are, and whether the drafted claims present a "guise"[245] or claiming "by indirection."[246] Perhaps the most suc-

239. *In re* Iwahashi, 888 F.2d 1370, 1374 (Fed. Cir. 1989).
240. *Larsen*, 292 F.2d 531, 533 (C.C.P.A. 1961).
241. *In re* Bernhart, 417 F.2d 1395, 1398, (C.C.P.A. 1969).
242. Curtis & Waltz, *supra* note 122, at 443.
243. *Id.*
244. *In re* Pleuddemann, 910 F.2d 823, 827 (Fed. Cir. 1990).
245. *See In re Alappat*, 33 F.3d at 1541.

cinct expression was the remark of the C.C.P.A. that in "the final analysis . . . the claimed invention, as a whole must be evaluated for what it is."[247] Such shallow expressions suggest that the patent system has yet to achieve a framework and vocabulary for assessing the propriety of particular claim formats.[248]

This Article proposes a new resource to guide this inquiry: the philosophical discipline of phenomenology. Through its development of a rigorous science of experience, phenomenology offers the patent system the possibility of a meaningful ontic evaluation of the technologies that are placed before it. Once we are able to determine in which dimension the "being" of a particular technology lies, the determination of which claim formats appropriately describe it should prove straightforward.

This proposal has been made with full awareness that phenomenology does not yet comprise a leading style of philosophical inquiry.[249] Further opposition to the approach may result from the traditional view that "a patent system must be related to the world of commerce rather than to the realm of philosophy."[250] But this Article does not assert that we need accept all the trappings of phenomenology, nor the beliefs of some its more notorious practitioners, among them Martin Heidegger. It instead recognizes that some truth lies in Heidegger's assertion that: "Only as phenomenology, is ontology possible."[251] Phenomenology teaches powerful methodologies that has already been successfully applied to the study of technology.[252] Its potential contribution to that legal discipline most intimately bound up with the assessment of technology, the patent law, appears fruitful indeed.

As initially articulated by Edmund Husserl, phenomenology asserts that truth must be realized through a dialectic between the environment and an actual, embodied observer.[253] Husserl urged us to recapture a clearer, more vital sense of being by recognizing that our primary rela-

246. *In re* Gulack, 703 F.2d 1381, 1385 n.8 (Fed. Cir. 1983).

247. *In re* Grams, 888 F.2d 835, 839 (Fed. Cir. 1989) (quoting *In re* Abele, 684 F.2d 902, 907 (C.C.P.A. 1982)).

248. *See* John R. Thomas, *The Question Concerning Patent Law and Pioneer Inventions*, 10 HIGH TECH. L.J. 35, 82 (1995).

249. DON IHDE, EXPERIMENTAL PHENOMENOLOGY 16 (1977).

250. Brenner v. Manson, 383 U.S. 519, 536 (1966) (quoting *In re* Ruschig, 343 F.2d 965, 970 (C.C.P.A. 1965)).

251. MARTIN HEIDEGGER, BEING AND TIME 60 (John Macquarrie & Edward Robinson trans. 1962).

252. *E.g.*, Martin Heidegger, *The Question Concerning Technology*, *in* MARTIN HEIDEGGER, BASIC WRITINGS 283 (David Farrell Krell ed. 1977).

253. *See* EDUMND HUSSERL, CARTESIAN MEDITATIONS 12-13 (Dorion Cairns trans. 1960); *see also* DON IHDE, PHILOSOPHY OF TECHNOLOGY: AN INTRODUCTION 39 (1993); MAURICE MERLEAU-PONTY, PHENOMENOLOGY OF PERCEPTION (Colin Smith trans. 1962); Don Ihde, *The Experience of Technology*, 2 CULTURAL HERMENEUTICS 267 (1974).

tions to the world come not through objects of conceptual knowledge, but instead objects of perceptive experience. These experiences, coupled with reflection, allow us to elicit an ontology of the world of objects, including those entities would we would call technological.[254] As Husserl succinctly pronounced, phenomenology calls upon us to turn "to the things themselves!"[255]

Although Husserl conceived of phenomenology as an *a priori* inquiry,[256] subsequent practitioners have fashioned phenomenology as an empirical task.[257] A phenomenological examination consists of a detailed thought experiment, or, as better phrased by Don Ihde, an "experience experiment" with regard to a specific object of study.[258] This Article turns to this task by addressing first two of the sorts of mechanical artifacts that fueled the "function of a machine" inquiry.

2. *The Phenomenology of Tarczy-Harnoch*

Consider at first a simple hammer, the famous example of Martin Heidegger's monumental BEING AND TIME.[259] A hammer presents a hand-operated object for use. Whether designed to dress stone, shoe horses or strike enemies, it remains a static implement that must be human-powered. A hammer is a tool for accomplishing a task, but does not itself present a doing or making. It instead is a means for performing such activity.

Consider next a steam engine, the artifact that powered the nineteenth century "Age of Steam"[260] and with which the patent system was so intimately concerned.[261] In its earliest embodiments one observes little more than a boiler, encased cylinder, piston, condenser and air pump. Subsequent engines included such refinements as a sun-and-planet gear

254. *See* IHDE, *supra* note 249, at 29-54.

255. HUSSERL, *supra* note 253, at 12-13.

256. *See* A.R. LACEY, A DICTIONARY OF PHILOSOPHY 175 (1976).

257. *See* IHDE, *supra* note 249, at 14; *see also* MARTIN HEDIEGGER, ON TIME AND BEING 76-78 (Joan Stambaugh trans. 1972).

258. *See* IHDE, *supra* note 249, at 14.

259. HEIDEGGER, *supra* note 251; *see* DON IHDE, TECHNOLOGY AND THE LIFEWORD 31-34 (1990).

260. *See, e.g.*, ARNOLD PACEY, THE CULTURE OF TECHNOLOGY 12 n.18 (1983) ("the development of steam for the factory . . . lead to a new economic system: capitalism") (quoting Anthony Wedgwood Benn); T.K. DERRY & TREVOR I. WILLIAMS, A SHORT HISTORY OF TECHNOLOGY 312 (1960) (quoting French scientist Sadi Carnot who, in 1824, declared: "To rob Britain of her steam-engines would be to rob her of coal and iron, to deprive her of sources of wealth, to ruin her prosperity, to annihilate that colossal power.").

261. *See* G.N. VON TUZELMANN, STEAM POWER AND BRITISH INDUSTRIALIZATION TO 1860 292-94 (1978); H. W. DICKINSON, A SHORT HISTORY OF THE STEAM ENGINE 71-73, 80-89 (1939); ROBERT H. THURSTON, A HISTORY OF THE GROWTH OF THE STEAM-ENGINE 33, 103-06 (1878).

or double-acting "parallel motion" mechanism. However, no matter how sophisticated the steam engine, it seems just as the hammer: inert parts placed together to yield a passive instrument.

Yet operation of the engine yields a much different perception. Burning coal heats the base of the boiler, causing steam to rise into the steam case. The expansion of the steam accomplishes work against the piston, forcing it upwards. Steam then departs the cylinder and enters the condenser, causing the piston to fall. After the steam condenses, water is transmitted back to the boiler so that the cycle may contain. We may observe not only the activity of the steam engine itself, but of the devices it powers, be they the plunger of a Cornish mine pump,[262] the gearing that supported weavers and spinners in the textile mills of Lancashire,[263] or the great paddle wheel of a Mississippi steamboat.[264]

Thus the engine, autonomous and divorced from human power, exhibits behavior. It is an article as well, but a dynamic one that initiates and sustains a physical process.[265] We may thus properly conclude that such famous technologists as Thomas Newcomen, James Watt and Oliver Evans invented not only an artifact, but also an enclosed technique that their artifacts actively performed.[266]

In a sense, then, once an artifact exceeds the status of tool, it becomes as well the container of a process.[267] But it is a container in a much different way than, for example, a crucible, test tube or simple cooking pot. Quite different processes may occur within these artifacts depending upon the substances that are placed within them and the external conditions that are applied. In contrast, water placed within the boiler of the steam engine performs an expressly engineered task only under those conditions established by the internal environment of the engine.

To be sure, the shape of such a container might influence the process that is ultimately carried out. A crucible may be constructed of a material that allows heat to be conducted quickly and uniformly across its surface. The internal surface of a cooking pot might feature a low coefficient of friction, allowing for the ready removal of objects processed within it. Further, the shape of a test tube may facilitate the handling and observation of chemical reactions occurring within it. But such con-

262. RICHARD L. HILLS, POWER FROM STEAM: A HISTORY OF THE STATIONARY STEAM ENGINE 99-101 (1989).

263. *See* HILLS, *supra* note 262, at 208-12.

264. DERRY & WILLIAMS, *supra* note 260, at 326-31.

265. *See generally* ROBERT M. PIRSIG, ZEN AND THE ART OF MOTORCYCLE MAINTENANCE 76-78, 97-111 (1974)

266. *See generally* David Billington, *Structures and Machines: The Two Sides of Technology*, 57 SOUNDINGS 275 (1974).

267. *See* IVAN ILLICH, TOOLS FOR CONVIVIALITY 21-22 (1973).

tainers do not provide the process itself. Their structure does not provide the functionality of any processes that might occur within.

Much of this phenomenology follows the contours of the discussion maintained in Herbert Simon's seminal work, THE SCIENCES OF THE ARTIFICIAL.[268] Among Simon's goals was the direction of efforts towards a science of analytical design, partly formalizable, partly empirical. Simon was thus intensely concerned with teleological problems that transcend what we would call the technological. Business organizations, economic systems, and even the law are within the grasp of Simon's methodologies.

Simon saw individual artifacts as a nexus point between an inner environment, the "substance and organization of the artifact itself," and an outer environment comprising the surroundings in which the artifact operates.[269] To Simon, design exercises were primarily concerned with attaining goals by adopting the inner environment towards the outer environment. Simon realized that, within the technological arts, the conception and creation of artifacts necessitated a reasoning that transcended the natural sciences. The inner environment was an artificial one that contained its own logic.

Simon's work has largely been associated with artificial intelligence and related disciplines of computer science. Yet, his observations hold true for a broader class of technologies. This brief phenomenological encounter with technological objects suggests that sophisticated technologies present more than mere artifact. At least if an artifact presents more than a simple tool, it amounts as well to a vessel of technique.[270] We can therefore conclude that *Tarczy-Harnoch* was rightly decided: a claims drafter's objectification of a particular invention in the form of artifact or technique presents a valid realization of that technology.

3. *The Phenomenology of Beauregard*

The style of claims presented in *Beauregard* presents the logical converse of those seen in *Tarczy-Hornoch*. Where *Tarczy-Hornoch* presented the conversion of artifact into technique, *Beauregard*-style claims concern the shift from technique to artifact. Such a claim typically recites a computer-readable storage device that is said to embody functional software steps.[271]

A phenemonological examination of the technology undergirding this claim style begins with a sense of the thing itself, the floppy diskette. More specifically, the diskette has been coated with magnetic ma-

268. *See* HERBERT A. SIMON, THE SCIENCES OF THE ARTIFICIAL 9-12 (3d ed. 1996).
269. *See* SIMON, *supra* note 268, at 6.
270. *Cf.* MITCHAM, *supra* note 119, at 168-69.
271. *See supra* note 139 and accompanying text.

terial arrayed in concentric circles around the center. The encoded program, which may be conceptualized as a list of data in binary format, has been physically realized through the alignment of successive magnetic molecules on the diskette.[272]

In order for the diskette to accomplish the recited function, the diskette must interface with a computer input device, ordinarily by being inserted into a disk drive. Other software will then instruct the computer to read and analyze the diskette's massed magnetic alignments. The computer initially considers preliminary coding in the data to determine what sort of information an engineer intends the data to represent, be it numbers, text, musical notes or machine instruction. If it decides the latter, then the computer may need to employ further software, such as a compiler or interpreter, to translate the data into a form that directly embodies signals employable by a computer. The circuitry within the computer may then employ the translated functional form to perform directed tasks.

A realization of what it is that a diskette tangibly incarnates, along with the process by which a computer processes information that has been encoded upon it, indicates that the diskette cannot be said to embody a software process. It is instead several steps away from doing so. As a first hurdle, the value of the encoded data must be subjectively determined, although programmers ordinarily accomplish this determination through programmed heuristics. In other words, an observer decides whether the value of the data lies in its interpretation as text, musical score or encoded instruction.

Even more tellingly, any data that we conclude comprises encoded software must be recovered and ordinarily translated before the innovative function may be achieved. In this sense, then, encoded software presents something of a blueprint. To be sure, it is an extremely useful blueprint. The function of encoded software is much more readily realizable than that of a technical diagram. Rather than construct a boiler, condenser and other parts of a steam engine in a machine shop, one must merely insert the diskette into a compatible computer and supply the appropriate commands. But the encoded software does not present the function itself.

This appreciation exceeds the mere recognition that encoded software does nothing without the aid of another apparatus, namely a computer capable of being instructed by that software.[273] Such a status is true for many sorts of patentable technologies, many of which are use-

272. *See* SEIICHI YASKAWA & JOHN HEATH, DATA STORAGE ON FLEXIBLE DISKS, *in* MAGNETIC RECORDING HANDBOOK: TECHNOLOGY & APPLICATIONS 772, 797-800 (C. Dennis Mee & Eric D. Daniel eds. 1990).

273. *See* Siber & Dawkins, *supra* note 139, at 21-22.

ful as little more than a paperweight until combined with other apparatus. But just as a test tube or cooking pot does not provide the functionality that may occur within it, so too does machine instruction not instantiate an instructed machine. In either case, the artifact's physical manifestation does not hold the key to the referenced function. A floppy diskette is indeed a vessel for storing software, but it is no more than a vessel.

This analysis does not overlook the fact that a floppy diskette itself appears as a utilitarian device. Diskettes feature a variety of functional parts such as a sliding metal shutter, a tab that may be employed to "lock" the disk, and an indexing hole through which the disk's rotational position may be determined.[274] But none these parts bears upon the working of the software process, which lies in the encoded instructions, not the tangible apparatus that comprises the media.

A careful reading indicates that the *Tarczy-Hornoch* opinion itself supports this result. As suggested by the very name of the "function of a machine" doctrine itself, *Tarczy-Hornoch* addressed a patent application where the process claim set forth a functional series of steps, and the claimed apparatus a functioning artifact.[275] An encoded floppy diskette does not meet this standard. Based upon this reasoning, one could offer a stronger argument for the acceptance of claims directed to stored software in the context of an entire computer system. Thus a drafter could present a claim that included such features as a central processing unit, input/output device and display, along with a memory unit upon which machine instruction has been recorded. Given the distinct market for unbundled software, however, drafters apparently have found little allure in these sorts of claims.

By offering meaningful analytical techniques through which the patent system can analyze individual technologies, phenomenology provides powerful teachings for judging the propriety of a particular claim format. Although a phenomenological inquiry supports the abrogation of the "function of a machine" doctrine accomplished in *Tarczy-Hornoch*, it indicates that current PTO policy regarding *Beauregard*-style claims is misguided. Encoded software comprises nothing more than expression that must be read and interpreted before obtaining functionality. Claims reciting encoded software as artifact are mere guises that courts and the PTO should reject.

4. *On Ochiai and Obviousness*

Where *Tarczy-Harnoch* was bound up in ontology, *Ochiai* concerned

274. *See* YASAKAWA & HEATH, *supra* note 272, at 772-97.

275. *See supra* note 89 and accompanying text.

obviousness.[276] *Ochiai* and its predecessors provide another, more familiar mechanism through which the propriety of *Beauregard*-style claims can be weighed. As couched in the language of these cases, we must judge whether a computer-readable storage device is itself a novel and nonobvious artifact, presenting an entirely new structure of encoded binary data.

Although proponents of *Beauregard*-style claims have urged that such media present nonobvious articles of manufacture, they have not explored the implications of this assertion in light of the most apposite precedent, the family of decisions extending from *Larsen* to *Ochiai*.[277] This lapse is perhaps understandable. Given the complexity of the debate and the *Ochiai* panel's struggle to relegate itself and its predecessors to the status of nonprecedential opinions,[278] *Ochiai* is not the most sturdy anchor around which claim format may be discussed. Yet these decisions should not be ignored, for nonobviousness has served as the patent law's favorite proxy for addressing the issues of market power involved in claim formatting.

Of the cases in the *Larsen* line, *In re Neugebauer*,[279] appears most applicable to the *Beauregard* claim format. There, Neugebauer's patent application claimed an oxadiazole compound, a method of using the compound in an electrophotograhic material, and a method of making the electrophotographic material. The PTO allowed claims towards a method of using but rejected the others on the basis of the prior art Siegrist patent. Siegrist disclosed the identical compound as an optical brightener but did not teach its use in electrophotography.

On appeal, the C.C.P.A. affirmed in part. According to the court, the fact that the preambles of the rejected artifact and method of making claims recited the intended use of the compound in electrophotography could not impart patentability. Recognizing that much debate has surrounded the extent to which a claim preamble comprises a structural limitation upon the claim,[280] the court concluded that the claimed oxandiazole was known to the art no matter how it was labeled in the preamble. Significantly, the C.C.P.A. reversed the PTO with respect to certain artifact claims that, within their body, recited further limitations

276. *Ochiai*, 71 F.3d at 1565; *see supra* notes 127-37 and accompanying text.

277. *E.g.*, Witek, *supra* note 139, at 407 (appealing to "common sense" in order to support the nonobviousness of *Beauregard*-style claims, yet citing only 5 IRVING R.KAYTON, PATENT PRACTICE).

278. *In re* Ochiai, 71 F.3d at 1571-72; *see generally* Elizabeth M. Horton, Comment, *Selective Publication and the Authority of Precedent in the United States Courts of Appeals*, 42 UCLA L. REV. 1691 (1995).

279. *In re* Neugebauer, 330 F.2d 353 (C.C.P.A. 1964).

280. *Id.* at 356. This debate continues unchecked today. *See* Corning Glass Works v. Sumitomo Electric USA, Inc., 868 F.2d 1251 (Fed. Cir. 1989).

that distinguished Neugebauer's application from Siegrist's patent.[281]

This analysis suggests that precatory statements within the claim preamble should hold scant weight when considering the nonobviousness of alternatively claimed technologies. As with *Beauregard*-style claims, the subsequent process steps at issue in *Neugebauer* did not depend upon the preamble for completeness.[282] They could instead have stood on their own, as they actually did in both *Neugebauer* and *Beauregard* in the form of earlier presented claims. The reasoning of *Neugebauer* therefore suggests that *Beauregard*-style claims should not withstand the scrutiny of a nonobviousness inquiry.

This conclusion is founded upon the realization that, as a factual matter, both skilled artisans and lay persons recognize the routine nature of encoding known software instructions. This approach dates back at least to 1945, when John von Neumann realized that both data and machine instruction could be represented in binary format and stored in a computer memory.[283] Further, although each of the *Ochiai* line of cases fell within the unpredictable arts of chemistry and biotechnology, where subtle changes in chemical structure may often lead to enormous differences in the behavior of the compound,[284] the technology at stake in *Beauregard* has long been deemed to be predictable.[285] Although "similarity is . . . not necessarily obviousness,"[286] the predictability of a particular result does suggest that a technology would have been obvious.[287]

As the *Neugebauer* court placed weight upon the location of structural limitations within the claim, unfortunately this decision too may be read as one calling for skillful claim drafting. Out of a recognition of the formalism upon which claim formatting decisions presently rest, commentators have already proposed the use of a stilted claiming style that simply shifts structure from the claim preamble into the body of the claim.[288] To further an earlier example,[289] consider the following claim format:

16. A noise-tolerant address transmission system for a digital telecommunications network, stored on a floppy diskette having a programmed surface, the diskette comprising:

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281. *In re Neugebauer,* 330 F.2d at 357.

282. *See In re* Hirao, 535 F.2d 67, 70 (C.C.P.A. 1976).

283. JAMES A. O'BRIEN, COMPUTERS AND INFORMATION PROCESSING 18 (2d ed. 1986).

284. *See In re* Mayne, 104 F.3d 1339, 1343 (Fed. Cir. 1997).

285. *See In re* Vaeck, 947 F.2d 488, 496 (Fed. Cir. 1991).

286. *In re Ochiai,* 71 F.3d at 1571.

287. *See In re* O'Farrell, 853 F.2d 894 (Fed. Cir. 1988).

288. *See* Witek, *supra* note 139, at 405.

289. *See supra* note 140 and accompanying text.

> a first plurality of magnetic media formed within a first portion of said programmed surface which are spatially configured to provide a first set of binary values for detecting a maintenance code; and
>
> a second plurality of magnetic media formed within a second portion of said programmed surface which are spatially configured to provide a second set of binary values for introducing a responsive communication signal into a stream of encoded data.

This claim arguably comports with *Neugebauer* by reciting structure within the body of the claim, as opposed to its preamble. However, the difficulty with such a tortured claim style has already been exposed.[290] A computer must read, translate and implement the "binary values" preserved on the medium before any claimed activity may be actualized. Indeed, this claim format makes all the more apparent the fact that the recited information does not itself provide the functionality recited in the claim.

This brief look at the *Ochiai* line of cases indicates that nonobviousness may well comprise a useful tool for courts and the PTO to assess the propriety of claims formatted in the *Beauregard* style. More to the point, cases such as *Neugebauer* also offer a convenient mechanism for rejecting such claims in a regime where direct pleas to the integrity of the patent code are less legally cognizable. Unless and until Congress is willing to enact a § 103(b)-like standard for computer instruction,[291] then the claiming of the placement of novel, nonobvious computer instruction on a prior art media should not result in a Notice of Allowability.

IV. CONCLUSION

Current claim drafting presents a language game of proportions that would delight any postmodernist.[292] Yet so long as differences persist between artifact and technique within the patent law, applicants will possess strong incentives to contort claim formats in order to expand the market power of their patents. This Article has called for the identification and reasoned application of the opinions that have led to the current claim drafting environment, the two lines of authority that culminated in *Tarczy-Harnoch* and *Ochiai*. By applying the tools of ontology and obvi-

290. *See supra* notes 270-74 and accompanying text.

291. Professor Stern's Symposium Paper asserts that the PTO Commissioner possesses the authority to promulgate regulations supporting such claims. *See* Richard H. Stern, *An Attempt to Rationalize Floppy Disk Claims* 32-36 (1998). This Article's reasoning that *Beauregard*-style claims are legally improper mandates the result that the only legitimate action to the contrary would emanate from Congress, a conclusion buttressed by the recent creation of § 103(b). *See supra* notes 124-26 and accompanying text.

292. *See* COSTAS DOUZINAS, ET AT., POSTMODERN JURISPRUDENCE, THE LAW OF TEXT IN THE TEXTS OF LAW (1991).

ousness that were suggested by these decisions, the patent system can ensure the integrity not only of individual claims, but ultimately its own corpus of statutory and judicially expressed principles.