

April 1995

## Computer Software Patentability and the Role of Means-Plus-Function Format in Computer Software Claims

Lawrence Kass

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### Recommended Citation

Lawrence Kass, *Computer Software Patentability and the Role of Means-Plus-Function Format in Computer Software Claims*, 15 Pace L. Rev. 787 (1995)

DOI: <https://doi.org/10.58948/2331-3528.1372>

Available at: <https://digitalcommons.pace.edu/plr/vol15/iss3/3>

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# Comment

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"While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be."<sup>1</sup>

Justice Harlan F. Stone  
U.S. Supreme Court

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1. *Mackay Radio & Tel. Co. v. Radio of Am.*, 306 U.S. 86, 94 (1939).

## I. Introduction

The scope of intellectual property protection to be accorded computer programs or algorithms<sup>2</sup> has remained an unsettled question since the advent of the computer.<sup>3</sup> Those favoring and those disfavoring broad protection each warn of potential chil-

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2. The terms, "computer programs" and "software," are interchangeable and are distinguished from algorithms and computer hardware. Note, *Computer Intellectual Property and Conceptual Severance*, 103 HARV. L. REV. 1046 (1990) [hereinafter *Conceptual Severance*].

Hardware consists of the physical devices themselves, the collection of transistors in groups of integrated circuits ("chips") and their wired interconnections. Software, the code that ultimately resides in the memory chips, tells the microprocessor and other hardware what to do. Algorithms are the purely abstract routines for accomplishing certain processing goals . . . .

*Id.* at 1047 (citations omitted). See also Fred E. McKelvey, *Patentable Subject Matter: Mathematical Algorithms and Computer Programs*, 1106 OFF. GAZ. PAT. OFFICE 5 (1989).

A "process" or "algorithm" is a step-by-step procedure to arrive at a given result. In the patent arena, a "computer process" or "computer algorithm" is a process, i.e., a series of steps, which is performed by a computer. A "[computer] program is a sequence of coded instructions for a digital computer." Computer programs are equivalently known as "software."

Unfortunately for discussion in this area, "[b]oth the series of steps performed by a computer, and the software directing those steps, have acquired the name 'computer programs.'" What is sought to be protected by patent is the underlying process. . . .

"Confusion may be avoided if it be realized that what is at issue is not the 'program,' i.e., the software, but the process steps which the software directs the computer to perform."

*Id.* at 10-11 (citations omitted). At the risk of perpetuating this confusion, this Comment uses "computer program" to describe "computer processes" because "process" implies that the subject matter is statutory. See *infra* notes 14-20 and accompanying text. See also John C. Reich, Comment, *Guidelines for Evaluating Whether a Claim That Embodies an Algorithm Constitutes Patentable Subject Matter*, 5 SOFTWARE L.J. 461 (1992) (analyzing the legal definition of "algorithm" and proposing an analytical method for determining whether a claim that recites an algorithm constitutes patentable subject matter).

3. Forms of intellectual property protection for software include patent, trade secret, and copyright. See generally, Scott M. Alter, *Selecting Protection for Computer Programs*, 39 FED. B. NEWS & J. 264 (1992) (describing major characteristics of trade secret, copyright, and patent protection in relation to protecting computer programs and identifying advantages and disadvantages of each). See also James J. Maune, *Computer Software as Property*, 5 J. SUFFOLK ACAD. L. 21 (1988) (discussing patent, copyright, trade secret, trademark, and service mark protection of software and providing guidance for transactions involving the transfer of software intellectual property rights); Frederick K. Longhofer, *Patentability of Computer Programs*, 34 BAYLOR L. REV. 125 (1982).

ling effects on computer software innovation.<sup>4</sup> Overly broad protection may afford protection to ideas and, consequently, foreclose avenues for innovation due to fear of infringement consequences. Overly narrow protection may prove insufficient incentive to motivate innovation. Regardless of which argument one favors, the resulting uncertainty about the scope of protection has spawned ad hoc adjudicatory decisions that are difficult to reconcile, particularly in the area of patent law. Although the Court of Customs and Patent Appeals (C.C.P.A.) and its successor court, the Court of Appeals for the Federal Circuit ("Federal Circuit"),<sup>5</sup> have provided some analytical guidance,

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4. See John M. Griem, Jr., Note, *Against a Sui Generis System of Intellectual Property for Computer Software*, 22 HOFSTRA L. REV. 145, 147 n.8 (1993). For arguments that the absence of patent protection would chill innovation, see Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959, 1020 (1986); David Bender, *Computer Programs: Should They Be Patentable?*, 68 COLUM. L. REV. 241, 248 (1968) ("Although there are methods of protection other than patent laws, none of these methods meets as well as patent protection the needs of the computer industry."). For contrary arguments that the presence of patent protection would chill software innovation, see Pamela Samuelson, *Benson Revisited: The Case Against Patent Protection for Algorithms and Other Computer Program-Related Inventions*, 39 EMORY L.J. 1025, 1031 n.16 (1990); Arthur R. Miller, *Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?*, 106 HARV. L. REV. 977, 1073 (1993) (citing *Against Software Patents: The League for Programming Freedom*, 14 HASTINGS COMM. & ENT. L.J. 297, 297 n.a (1992) ("New monopolies, known as software patents and interface copyrights, have taken away our freedom of expression and our ability to do a good job.")). See also Pamela Samuelson & Robert J. Glushko, *Comparing the Views of Lawyers and User Interface Designers on the Software Copyright "Look and Feel" Lawsuits*, 30 JURIMETRICS J. 121, 140 (1989) (survey demonstrating opposition to computer program patent protection).

5. The Federal Circuit was created by the Federal Courts Improvement Act of 1982, Pub. L. No. 97-164, § 127, 96 Stat. 25, 37 (codified as amended at 28 U.S.C. § 1295 (1988)). The Federal Circuit was granted exclusive jurisdiction over patent appeals. 28 U.S.C. § 1295. Title 28, § 1295, states, in pertinent part:

(a) The United States Court of Appeals for the Federal Circuit shall have exclusive jurisdiction—

(1) of an appeal from a final decision of a district court . . . if the jurisdiction of that court was based, in whole or in part, on section 1338 of this title [with exceptions] . . .

(4) of an appeal from a decision of—

(A) the Board of Patent Appeals and Interferences of the Patent and Trademark Office with respect to patent applications and interferences;

(B) the Commissioner of Patents and Trademarks . . . ; or

(C) a district court to which a case was directed pursuant to section 145 or 146 of title 35.

their piecemeal case-by-case approach has led to a set of legal standards that are sometimes inconsistent and are often confusing.

This Comment examines the various attempts to delimit the scope of mathematical algorithm and computer software patentability. As background, Part II.A provides an overview of patent law. Parts II.B and C then review the Supreme Court's substantive and the C.C.P.A.'s analytical approaches to mathematical algorithm patentability. Part II.D introduces means-plus-function claim format. Part II.E contrasts the C.C.P.A.'s and the Federal Circuit's treatment of means-plus-function claims and discusses how this contrasting treatment has affected software cases. Parts II.F and G discuss the two most recent and important cases, in which the Federal Circuit established how means-plus-function claims must be interpreted—generally, and in computer software patent applications.

Part III analyzes the case law discussed in Part II. Part III.A examines Congress' silence regarding computer software patentability and how that silence has affected software patentability jurisprudence. Part III.B addresses some problems with judicially created frameworks for analyzing software claims. Part III.C examines the premise that, under the current frameworks, software claims drafted as machines may be more patentable than those drafted as processes. Part III.D examines whether the Federal Circuit correctly ascertained the role of means-plus-function claims—generally, and in software claims. Parts III.D and III.E collectively postulate that the two most recent cases demonstrate that the Federal Circuit is cautiously eroding early software patentability doctrine to allow for broader software patent protection. Finally, this comment cautions that the current status of the law requires patent practitioners to be particularly artful in drafting software patent applications, to engage in limited legal fiction in certain in-

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28 U.S.C. § 1295. Section 1338 confers original jurisdiction on the district courts in civil actions related to patents. 28 U.S.C. § 1338(a) (1988). Patent appeals, which, prior to 1982, were made to the Court of Customs and Patent Appeals and federal courts of appeals in the individual states, were consolidated in the Federal Circuit to "provide nation-wide uniformity in patent law, . . . make the rules applied in patent litigation more predictable and . . . eliminate the expensive, time-consuming, and unseemly forum-shopping that characterizes litigation in the field." H.R. REP. NO. 312, 97th Cong., 1st Sess. 20 (1981).

stances, and to inform their clients of the uncertainty that still exists in this area of patent law.

## II. Background

### A. Overview of Patent Law

#### 1. Constitutional Basis and Historical Perspective

The basis of United States patent law is Article 1, Section 8, Clause 8 of the United States Constitution, which states that "The congress shall have power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries."<sup>6</sup> The Constitution thereby guaranteed rights to the inventor and set the limits of protection in a single provision.<sup>7</sup>

The Constitution ostensibly allows the states to exercise patent-granting power. As stated by Chief Justice John Marshall in *Gibbons v. Ogden*,<sup>8</sup> the power:

[H]as frequently been exercised by the State of New-York, and by other States, before the adoption of the constitution. It is not granted exclusively to Congress. No exclusive terms are used. The grant is affirmative and general, like all the other powers. There is no express prohibition upon the States against the exercise of it.<sup>9</sup>

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6. U.S. CONST. art. I, § 8, cl. 8. The provision was both a patent and a copyright provision. The framers, in speaking of "Science," were referring to the work of authors, and in referring to "useful Arts," meant the work of inventors. John V. Orth, *Thinking About Law Historically: Why Bother?* 70 N.C. L. REV. 287, 291 (1991); PAUL GOLDSTEIN, COPYRIGHT, PATENT, TRADEMARK AND RELATED STATE DOCTRINES 20-21 (3d ed. 1993). Removing the copyright provision, the text would read: "The congress shall have power . . . To promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries." U.S. CONST. art. I, § 8, cl. 8.

7. According to Kenneth Burchfiel, while Thomas Jefferson was in France during the summer of 1787, the provision was drafted and unanimously approved with no recorded debate. Kenneth Burchfiel, *Revising the "Original" Patent Clause: Pseudohistory in Constitutional Construction*, 2 HARV. J. LAW & TECH. 163, 165-66 (1989). However, Jefferson was skeptical that the scientific progress benefits of granting exclusive rights would overcome the hazards of granting monopolies even for limited times. *Id.*

8. 22 U.S. 1 (1824).

9. *Id.* at 45.

For a short time after the adoption of the Constitution, the states exercised this power to protect inventors by issuing several patents.<sup>10</sup> However, most inventors wanted broader protection than the territorial limits of a single state, and the constitutional provision provided nation-wide coverage.<sup>11</sup> The geographically broader federal protection, combined with the supremacy of federal law when state laws conflicted with federal law, effectively led to the extinction of state patent law soon after the adoption of the Constitution.<sup>12</sup>

## 2. *Modern Patent Law*

Federal patent law is embodied in Title 35 of the United States Code.<sup>13</sup> In § 101,<sup>14</sup> Congress identified patentable subject matter:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.<sup>15</sup>

Patentable subject matter thereby included processes, methods, machines, and compositions of matter.<sup>16</sup> The term, "process," is used interchangeably with the term, "method," and the term, "machine," is likewise used interchangeably with the term, "ap-

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10. See generally BRUCE W. BUGBEE, *THE GENESIS OF AMERICAN PATENT AND COPYRIGHT LAW* 84-103 (1967). The states granted patents at least as late as 1815, when Massachusetts granted John L. Sullivan a patent on a tug boat invention, geographically limited to the Connecticut river. Pasquale J. Federico, *State Patents*, J. PAT. OFF. SOC'Y, July 1936, at 43, 53.

11. Federico, *supra* note 10, at 53-54.

12. *Id.*

13. 35 U.S.C. §§ 101-376 (1988).

14. 35 U.S.C. § 101 (1988).

15. *Id.*

16. *Id.* Machine has been distinguished from process:

The term machine includes every mechanical device or combination of mechanical powers and devices to perform some function and produce a certain effect or result. But where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations, are called processes.

Corning v. Burden, 56 U.S. (15 How.) 252, 267-68 (1854).



paratus.”<sup>17</sup> The Supreme Court has declared that, in § 101,<sup>18</sup> “Congress intended statutory subject matter to ‘include anything under the sun that is made by man.’”<sup>19</sup> Judicially identified exceptions include ideas, expression, natural phenomena, and methods of doing business.<sup>20</sup>

To merit a patent, an invention must satisfy “positive” patentability requirements—the invention must be new, useful, and advance the state of technology.<sup>21</sup> The “new” requirement is otherwise termed “novelty”; an invention lacks novelty if all of its elements may be found in a single prior art source.<sup>22</sup> An

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17. McKelvey, *supra* note 2, at 6. See also *Cochrane v. Deener*, 94 U.S. 780 (1877) (defining “process” in a patent infringement action regarding a high-quality flour manufacturing process).

18. 35 U.S.C. § 101.

19. *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (ultimately declaring that, although mathematical algorithms are themselves unpatentable, the use of such algorithms does not render otherwise patentable subject matter unpatentable) (quoting S. Rep. No. 1979, 82d Cong., 2d Sess. 5 (1952); H.R. Rep. No. 1923, 82d Cong., 2d Sess. 6 (1952)). The term, “statutory subject matter,” refers herein to that subject matter that fulfills the requirements of 35 U.S.C. § 101, without falling within a judicially identified exception.

20. *Diehr*, 450 U.S. at 185. “Excluded from such patent protection are laws of nature, natural phenomena, and abstract ideas.” *Id.* See also *In re Chatfield*, 545 F.2d 152, 157 (C.C.P.A. 1976), *cert. denied*, 434 U.S. 875 (1977).

Some inventions, however meritorious, do not constitute patentable subject matter, e. g., printed matter, *In re Miller*, 418 F.2d 1392 (1969); methods of doing business, *In re Wait*, 73 F.2d 982 (1934); purely mental steps, *In re Prater*, 415 F.2d 1393 (1969), *In re Musgrave*, 431 F.2d 882 (1970); naturally occurring phenomena or laws of nature, *O'Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853); a mathematical formula and the algorithm therefor, *Gottschalk v. Benson*, 409 U.S. 63 (1972).

*Id.* at 157.

21. 35 U.S.C. §§ 101-103 (1988). Section 101 allows patents for “any new and useful” process, machine, manufacture, or composition of matter. 35 U.S.C. § 101. See also *infra* notes 22-24 and accompanying text.

22. 35 U.S.C. § 102 (1988). Section 102, entitled “Conditions for patentability; novelty and loss of right to patent,” states:

A person shall be entitled to a patent unless— (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States.

*Id.* The novelty standard of § 102 precludes patent issuance only when a single prior art source contains every element of the claimed invention. *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 715 (Fed. Cir. 1986). “This court

invention must also advance the state of technology, and to do so it must be nonobvious to one possessing ordinary skill in the art.<sup>23</sup> This requirement has also been referred to as a minimum level of inventiveness.<sup>24</sup>

A patent confers the right to exclude others.<sup>25</sup> Just as in

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has repeatedly stated that the defense of lack of novelty (i.e., 'anticipation') can only be established by a single prior art reference which discloses each and every element of the claimed invention." *Id.* (citations omitted).

23. 35 U.S.C. § 103 (1988). Section 103 states:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in § 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

*Id.* The nonobviousness test requires comparing the claimed invention to the prior art and considering secondary factors. *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background, the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented.

*Id.* at 17-18. See also NONOBVIOUSNESS—THE ULTIMATE CONDITION OF PATENTABILITY 5:101-5:111 (J. Witherspoon ed., 1980); see also ROBERT P. MERGES, PATENT LAW AND POLICY: CASES AND MATERIALS 32-33 (1992).

24. Unlike the novelty and utility (usefulness) requirements, which were imposed by the Patent Act of 1836, ch. 357, § 6, 5 Stat. 117, the "nonobviousness" requirement was not codified until as recently as 1952 in the Patent Act of 1952, Pub. L. No. 593, 66 Stat. 792 (codified as amended in scattered sections of 35 U.S.C. (1988 & Supp. II 1990)). Prior to 1952, it was the judicially imposed requirement of "inventiveness." See generally Edmund W. Kitch, *Graham v. John Deere Co.: New Standards for Patents*, 1966 SUP. CT. REV. 293.

25. 35 U.S.C. § 154 (1988). Section 154 states:

Every patent shall contain a short title of the invention and a grant to the patentee, his heirs or assigns, for the term of seventeen years, subject to the payment of fees as provided for in this title, of the right to exclude others from making, using, or selling the invention throughout the United States, and, if the invention is a process, of the right to exclude others from using or selling throughout the United States, or importing into the United States, products made by that process, referring to the specification for the particulars thereof. A copy of the specification and drawings shall be annexed to the patent and be a part thereof.

*Id.*

property law,<sup>26</sup> the right to exclude others may be enforced and/or remedied by injunction and damages.<sup>27</sup> Consistent with the constitutional "limited times" provision, patents are granted for the limited time of seventeen years.<sup>28</sup> Finally, the modern pat-

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26. For an argument that intellectual property law should use the property law bundle-of-rights and market-based concepts, see *Conceptual Severance*, *supra* note 2.

27. Injunctions are available under 35 U.S.C. § 283, which states that "[t]he several courts having jurisdiction of cases under this title may grant injunctions in accordance with the principles of equity to prevent the violation of any right secured by patent, on such terms as the court deems reasonable." 35 U.S.C. § 283 (1988). Because the essence of the patent right is the right to exclude others, injunctions are liberally granted. See, e.g., *Smith Int'l v. Hughes Tool Co.*, 718 F.2d 1573, 1581 (Fed. Cir. 1983) (setting a low burden of proof for preliminary injunctions, declaring that, "where validity and continuing infringement have been clearly established . . . immediate irreparable harm is presumed. To hold otherwise would be contrary to the public policy underlying the patent laws.") (citation omitted), *cert. denied*, 464 U.S. 996 (1983). Damages are available under 35 U.S.C. § 284, which states that, "[u]pon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court." 35 U.S.C. § 284 (1988). Damages take the form of reasonable royalties, at a minimum, or lost profits upon overcoming substantial evidentiary hurdles. *Panduit Corp. v. Stahl Bros. Fibre Works*, 575 F.2d 1152 (6th Cir. 1978) (footnote omitted).

To obtain as damages the profits on sales he would have made absent the infringement, i.e., the sales made by the infringer, a patent owner must prove: (1) demand for the patented product, (2) absence of acceptable noninfringing substitutes, (3) his manufacturing and marketing capability to exploit the demand, and (4) the amount of the profit he would have made. . . .

When actual damages, e.g., lost profits, cannot be proved, the patent owner is entitled to a reasonable royalty. A reasonable royalty is an amount "which a person, desiring to manufacture and sell a patented article, as a business proposition, would be willing to pay as a royalty and yet be able to make and sell the patented article, in the market, at a reasonable profit."

*Id.* at 1156, 1157-58 (citations omitted). In appropriate circumstances, a court may award treble damages under 35 U.S.C. § 284 and attorney fees under 35 U.S.C. § 285. 35 U.S.C. §§ 284-285 (1988). See generally Robert Neuner, *The Law of Damages in Patent Cases*, in *PATENT LITIGATION 1991* (PLI Pat. Copyrights Trademarks & Literary Prop. Course Handbook Series No. G4-3873, 1991). For a history of patent damages, see Timothy J. Malloy et al., *The Ongoing Evolution of the Law of Patent Damages*, in *PATENT LITIGATION 1992*, at 279, 284-86 (PLI Pat. Copyrights Trademarks & Literary Prop. Course Handbook Series No. G-350, 1992).

28. 35 U.S.C. § 154 (1988). After the expiration of a patent, the invention becomes part of the public domain. See *Bonito Boats v. Thunder Craft Boats*, 489 U.S. 141, 152 (1989) ("We have long held that after the expiration of a federal patent, the subject matter of the patent passes to the free use of the public as a

ent grant is not free—it requires full disclosure of the invention.<sup>29</sup> Full disclosure assures that the public can exercise its right to freely use the invention after the expiration of the patent monopoly and serves as the patentee's consideration for the government's exclusive rights guarantee.<sup>30</sup> Failure to fully disclose the invention renders the patent invalid.<sup>31</sup>

The term, "specification," refers to the body of the patent application, which contains, *inter alia*, the title, a description of prior art, a summary, and a detailed description of the invention, and is contrasted with the claims, which are concise statements that point out the precise metes and bounds of the invention.<sup>32</sup> The clause that requires patent claims is 35 U.S.C. § 112, paragraph 2, which states that "[t]he specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention."<sup>33</sup> After the applicant submits the speci-

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matter of federal law.") (citations omitted). Effective June 8, 1995, the patent term will be 20 years from the patent filing date. Uruguay Rounds Agreements Act, Pub. L. 103-465, §§ 532(a)(1), 534, 108 Stat. 4983, 4990 (1994) (to be codified at 35 U.S.C. § 154(a)(2)). See also Lawrence Rosenthal, *The TRIPs Provisions of the Uruguay Round Agreements Act, Now Approved by Congress, Will Bring About Significant Changes as U.S. Patent Law Goes Global*, NAT'L L.J., Dec. 26, 1994-Jan. 2, 1995, at B4, B8.

29. 35 U.S.C. § 112, paragraph 1, states:

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

35 U.S.C. § 112 (1988). See generally Thomas L. Irving et al., *The Significant Federal Circuit Cases Interpreting Section 112*, 41 AM. U. L. REV. 621 (1992).

30. Irving et al., *supra* note 29, at 623.

[T]he patent system's quid pro quo nature . . . is a social contract or franchise. Disclosure by the inventor, then, is the consideration in the social contract between the inventor and the government. [Section 112] sets forth the requirements of disclosure. If the disclosure is insufficient to enable a skilled person to make and use the claimed invention, then there is a failure of consideration, and the patent is invalid.

*Id.* (footnotes omitted).

31. *Id.*

32. See generally RONALD B. HILDRETH, *PATENT LAW: A PRACTITIONER'S GUIDE* (1988) (providing, *inter alia*, a structural outline of patent applications and a guide to preparing specifications and claims).

33. 35 U.S.C. § 112.

fication and claims to the Patent and Trademark Office (PTO), the PTO issues either a notice of allowance or an office action, which would contain rejections or objections.<sup>34</sup> The applicant may respond to an office action by filing an amendment.<sup>35</sup> Correspondence to and from the PTO, called "patent prosecution,"<sup>36</sup> continues until the claims are allowed or until the examiner issues a "final office action."<sup>37</sup> If the application is rejected in a final office action, the applicant may appeal to the PTO Board of Patent Appeals and Interferences (B.P.A.I. or "Board").<sup>38</sup> Subsequent appeal, if any, is to the Federal Circuit.<sup>39</sup>

## B. *Supreme Court Analysis of Mathematical Algorithm Claims*

### 1. *Gottschalk v. Benson*:<sup>40</sup> *The First Supreme Court Decision on the Patentability of Mathematical Algorithms*

During the 1960s, the PTO and the courts were faced with the question of whether the patent laws might protect computer hardware or software.<sup>41</sup> Computers and computer hardware

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34. See HILDRETH, *supra* note 32, at 189. Responses from the PTO are called "office actions," and may include claim rejections, a list of defects in the specification and figures, prior art that may render the invention obvious or not novel, and other objections. DAVID PRESSMAN, *PATENT IT YOURSELF: A COMPLETE LEGAL GUIDE FOR INVENTORS* 13/3-13/4 (2d ed. 1988).

35. PRESSMAN, *supra* note 34, at 13/4, 13/30-13/39. See also HILDRETH, *supra* note 32, at 189-203 (teaching how to prepare an amendment); Richard G. Berkley, *Some Practical Aspects of Amendment Practice in the Electro-Mechanical Arts*, in *ADVANCED CLAIM DRAFTING AND AMENDMENT WRITING WORKSHOP* 1992 (Pat. Copyrights Trademarks & Literary Prop. Course Handbook Series No. G4-3889, 1994) (substantive advice in overcoming examiners' objections without unduly narrowing patent protection).

36. PRESSMAN, *supra* note 34, at 13/4.

37. *Id.* An amendment may be filed even after a final office action. *Id.* at 13/42. If the examiner agrees with the amendment, the examiner will allow the claims; otherwise the examiner will issue an "advisory action" reiterating the examiner's former position." *Id.*

38. *Id.* See also HILDRETH, *supra* note 32, at 221-28 (explaining how to prepare an appeal brief).

39. HILDRETH, *supra* note 32, at 189 (1992).

40. 409 U.S. 63 (1972).

41. See, e.g., PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, "TO PROMOTE THE PROGRESS OF . . . USEFUL ARTS" IN AN AGE OF EXPLODING TECHNOLOGY 13 (1966).

were deemed squarely within § 101<sup>42</sup> machines and articles of manufacture and, therefore, were considered patentable subject matter.<sup>43</sup> However, software was a more complex issue because computer programs and mathematical algorithms closely resemble the mental process required to solve a problem.<sup>44</sup>

Although the expression of mental processes or steps in software has been held copyrightable,<sup>45</sup> the first statement by the Supreme Court regarding patentability was in *Gottschalk v. Benson*,<sup>46</sup> where the Court held that such mental steps, at least as embodied in mathematical algorithms, are unpatentable.<sup>47</sup> Benson had submitted patent claims that asserted a method for converting binary coded decimal numerals into binary numerals.<sup>48</sup> The claims were not limited to any particular apparatus

The Patent Office now cannot examine applications for programs because of the lack of a classification technique and the requisite search files. Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent.

*Id.* See also *Diamond v. Diehr*, 450 U.S. 175, 194-205 (1981) (Stevens, J., dissenting) (tracing the history of the PTO's and the courts' widely varying treatment of computer programs during the 1960s and 1970s).

42. 35 U.S.C. § 101 (1988).

43. See *Conceptual Severance*, *supra* note 2 (discussing the differing protection accorded computer hardware, software, and algorithms; arguing for the abandonment of the patentable subject matter physicality requirement and for the extension of patentability to software and algorithms; and further recommending a high standard of innovation as the means to avoid overprotection).

44. *Benson*, 409 U.S. at 63, 67. One commentator has urged that the interdependence of hardware and software, especially in computer chip design, has rendered any legal distinction between the two components of computers meaningless. See *Conceptual Severance*, *supra* note 2, at 1055.

45. See, e.g., *Whelan Assocs. v. Jaslow Dental Lab.*, 797 F.2d 1222, 1242-45 (3d Cir. 1986) (holding that a computer program for managing a dental office was protected as a copyrightable expression of an idea, although the idea itself was not protectable).

46. 409 U.S. 63 (1972).

47. *Id.*

48. Claim 8 read:

The method of converting signals from binary coded decimal form into binary which comprises the steps of

- (1) storing the binary coded decimal signals in a reentrant shift register,
- (2) shifting the signals to the right by at least three places, until there is a binary '1' in the second position of said register,
- (3) masking out said binary '1' in said second position of said register,
- (4) adding a binary '1' to the first position of said register,

or machinery.<sup>49</sup> The Court questioned whether a mathematical formula, having no substantial practical application except in connection with a digital computer, could be patented.<sup>50</sup> It declared that such mathematical formulas were unpatentable, reasoning that algorithms are ideas, which are unpatentable under § 101,<sup>51</sup> and merely implementing the algorithm on a computer does not make it a patentable "process."<sup>52</sup> The Court further reasoned that if algorithms were deemed processes, it would be impossible to canvass prior art, which, for computer programs, is vast and documented poorly.<sup>53</sup> The Court concluded that the problems relating to software patentability could only be solved by Congress.<sup>54</sup> However, because the Court in *Benson* narrowed its holding to a proscription against patenting mathematical algorithms, doubt remained whether the *Ben-*

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(5) shifting the signals to the left by two positions,

(6) adding a '1' to said first position, and

(7) shifting the signals to the right by at least three positions in preparation for a succeeding binary '1' in the second position of said register.

*Id.* at 73-74. Claim 13 read:

A data processing method for converting binary coded decimal number representations into binary number representations comprising the steps of

(1) testing each binary digit position '1,' beginning with the least significant binary digit position, of the most significant decimal digit representation for a binary '0' or a binary '1';

(2) if a binary '0' is detected, repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(3) if a binary '1' is detected, adding a binary '1' at the (i+1)th and (i+3)th the least significant binary digit positions of the next lesser significant decimal digit representation, and repeating step (1) for the next least significant binary digit position of said most significant decimal digit representation;

(4) upon exhausting the binary digit positions of said most significant decimal digit representation, repeating steps (1) through (3) for the next lesser significant decimal digit representation as modified by the previous execution of steps (1) through (3); and

(5) repeating steps (1) through (4) until the second least significant decimal digit representation has been so processed.

*Id.* at 74.

49. *Id.* at 64.

50. *Id.* at 71-72.

51. 35 U.S.C. § 101.

52. *Benson*, 409 U.S. at 71-72.

53. *Id.* at 71 (citing PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, *supra* note 41, at 13).

54. *Id.* at 73.

son logic, if not the holding, prohibited computer program patenting generally.<sup>55</sup>

## 2. *Requiring Physical Transformation for Processes Involving Mathematical Algorithms*

The Supreme Court elaborated on the *Benson* proscription against patenting pure mathematical algorithms in *Parker v. Flook*<sup>56</sup> and *Diamond v. Diehr*,<sup>57</sup> which collectively circumscribed what may be termed a "physicality requirement"<sup>58</sup> for processes that contain mathematical algorithms. In *Parker v. Flook*,<sup>59</sup> Flook had applied for a patent on a "Method for Updating Alarm Limits," the only novel feature of which was a mathematical formula.<sup>60</sup> The issue was whether the claim escaped the *Benson* result by virtue of subsequently using the computerized results to set alarm limits—a "practical application."<sup>61</sup> Justice Stevens, writing for the majority, declared that post-solution application of algorithms, such as the subsequent application of the algorithm to the catalytic process in *Flook*, does not constitute patentable "inventive application."<sup>62</sup>

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55. See, e.g., *In re Pardo*, 684 F.2d 912 (C.C.P.A. 1982) (discussing an application to patent a computer program that changes the input mode from sequential to one that does not depend on the input order). "There is no indication that 'algorithm,' as used by appellants, means 'mathematical algorithm' as that term has been used by the Supreme Court. Therefore, appellants' use of the term to describe their invention is not an admission that they are claiming nonstatutory subject matter." *Id.* at 915-16.

56. 437 U.S. 584 (1978).

57. 450 U.S. 175 (1981).

58. The requirement of physical transformation for processes involving mathematical algorithms has been termed the "physicality requirement." *Conceptual Severance*, *supra* note 2, at 1058. See generally Jur Strobos, *Stalking the Elusive Patentable Software: Are There Still Diehr or Was it Just a Flook?*, 6 HARV. J.L. & TECH. 363 (1993) (examining the roots of the physicality requirement for software patentability and suggesting the abandonment of the requirement in favor of a normative approach that considers software execution speed and performance). See also *Conceptual Severance*, *supra* note 2, at 1064 (urging the abandonment of the physicality requirement and suggesting broader patent protection for software).

59. 437 U.S. 584 (1978).

60. *Id.* at 585. An "alarm limit" is a number which corresponds to conditions that could lead to problems during catalytic conversion processes. *Id.*

61. *Id.*

62. *Id.* at 594.



The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. . . .

. . . .

. . . Whether the algorithm was in fact known or unknown at the time of the claimed invention . . . , it is treated as though it were a familiar part of the prior art. . . .<sup>63</sup>

According to Justice Stevens and the majority, the discovery of a well-known phenomenon of nature or mathematical formula "cannot support a patent unless there is some other inventive concept in its application."<sup>64</sup> Justice Stevens' approach was criticized in a dissent by Justice Stewart, who recognized that the prior art issue, i.e., the inventiveness inquiry, was separate and distinct from, and irrelevant to, the patentable subject matter issue.<sup>65</sup> "[The Court's opinion strikes a] damaging blow at basic principles of patent law by importing the criteria of novelty and inventiveness which require examination of the prior art into considerations of subject matter patentability."<sup>66</sup>

In contrast to *Flook*, the Court declared a claim, which asserted a computer-implemented mathematical formula, patentable in *Diamond v. Diehr*.<sup>67</sup> In *Diehr*, the patent applicant sought to patent a process for curing synthetic rubber.<sup>68</sup> The Court was confronted with deciding whether the novel and non-obvious combination of a well known mathematical formula with a computer and well known manufacturing process steps could constitute patentable subject matter.<sup>69</sup> The Court held that, although mathematical formulas are not themselves patentable, a claim nevertheless asserts patentable subject matter if it implements or applies a mathematical formula in a structure or process that, as a whole, performs a function the patent laws were designed to protect.<sup>70</sup>

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63. *Id.* at 590-92.

64. *Id.* at 594.

65. *Id.* at 599-600 (Stewart, J., dissenting, joined by Burger, C.J., and Rehnquist, J.).

66. *Id.*

67. 450 U.S. 175 (1981).

68. *Id.* at 175.

69. *Id.* at 188.

70. *Id.* at 191-92.

That respondents' claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing cannot be disputed. . . . Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws. . . .

Our conclusion . . . is not altered by the fact that in several steps of the process a mathematical equation and a programmed digital computer are used.<sup>71</sup>

In combination with *Benson* and *Flook*, the Court thereby established that processes comprising the transformation of something physical into a different state or thing constitute patentable subject matter, and the inclusion of a mathematical formula does not necessarily render such a process unpatentable.<sup>72</sup>

### C. *The Freeman*<sup>73</sup>-*Walter*<sup>74</sup>-*Abele*<sup>75</sup> *Mathematical Algorithm Analysis*

Concurrent with the Supreme Court's *Flook*<sup>76</sup> and *Diehr*<sup>77</sup> decisions, the C.C.P.A. developed an approach to mathematical algorithm patentability analysis consisting of a two-part test

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71. *Id.* at 184-85.

72. *Id.* A four member dissent was not satisfied with the guidance given by the majority and was concerned that the majority's language might cause processes to be improperly denominated unpatentable algorithms. *Id.* at 219 (Stevens, J., dissenting). In his dissent, in which Justices Brennan, Marshall, and Blackmun joined, Justice Stevens declared:

First, the cases considering the patentability of program-related inventions do not establish rules that enable a conscientious patent lawyer to determine with a fair degree of accuracy which, if any, program-related inventions will be patentable. Second, the inclusion of the ambiguous concept of an "algorithm" within the "law of nature" category of unpatentable subject matter has given rise to the concern that almost any process might be so described and therefore held unpatentable.

*Id.* Some commentators have focused on the industrial application aspect of the Court's holding. See, e.g., *The Case Against Patent Protection*, *supra* note 4, at 1094-1102. "From the opening sentence of Justice Rehnquist's opinion in the *Diehr* case, the industrial nature of the *Diehr* process is repeatedly hammered home." *Id.* at 1094. However, the transformative aspect of the invention and the industrial aspect substantially overlapped. See *id.* at 1089.

73. *In re Freeman*, 573 F.2d 1237 (C.C.P.A. 1978).

74. *In re Walter*, 618 F.2d 758 (C.C.P.A. 1980).

75. *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982).

76. *Parker v. Flook*, 437 U.S. 584 (1978).

77. *Diamond v. Diehr*, 450 U.S. 175 (1981).

based on a series of three cases.<sup>78</sup> In *In re Freeman*,<sup>79</sup> the patent applicant appealed a B.P.A.I. rejection of claims that recited a computer-based control system for a conventional phototypesetter.<sup>80</sup> The C.C.P.A. promulgated a two-part test for determining whether an algorithm in the claims preempted nonstatutory subject matter.<sup>81</sup>

First, it must be determined whether the claim directly or indirectly recites an 'algorithm' in the *Benson* sense of that term, for a claim which fails even to recite an algorithm clearly cannot wholly preempt an algorithm. Second, the claim must be further analyzed to ascertain whether in its entirety it wholly preempts that algorithm.<sup>82</sup>

Applying the first part of the test,<sup>83</sup> the court determined that algorithms were not recited in the method or apparatus claims.<sup>84</sup> Because the claims did not "satisfy" the first part of the test, which required that the claim directly or indirectly recite an algorithm, the court did not reach the second part of the test, which would have required the court to determine whether there was improper preemption.<sup>85</sup> As a result, the court reversed the PTO rejection.<sup>86</sup>

The court's language in *Freeman*, stating the test in terms of "preemption," was questioned in *In re Walter*,<sup>87</sup> where the applicant had claimed an invention for cross-correlating and unscrambling jumbled signals returning from the transmission of

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78. *Arrhythmia Research Technology v. Corazonix Corp.*, 958 F.2d 1053, 1058 (Fed. Cir. 1992).

Determination of statutory subject matter has been conveniently conducted in two stages, following a protocol initiated by the Court of Customs and Patent Appeals in *In re Freeman*, 573 F.2d 1237 (C.C.P.A. 1978); modified after the Court's *Flook* decision by *In re Walter*, 618 F.2d 758 (C.C.P.A. 1980); and again after the Court's *Diehr* decision by *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982).

*Arrhythmia*, 958 F.2d at 1058 (parallel citations omitted).

79. 573 F.2d 1237 (C.C.P.A. 1978).

80. *Id.* at 1238-40, 1242.

81. *Id.* at 1245.

82. *Id.*

83. *Id.*

84. *Id.* at 1246-47.

85. *Id.*

86. *Id.*

87. 618 F.2d 758 (C.C.P.A. 1980).

seismic chirps into the earth during surveying.<sup>88</sup> The court applied both parts of the *Freeman* test and declared the subject matter of the application unpatentable.<sup>89</sup> Applying the first part of the *Freeman* test, the claims were held to recite a mathematical algorithm because "correlation or cross-correlation is a mathematical exercise which relates two mathematical functions."<sup>90</sup> The court then clarified or modified the second part of the test by stating:

If it appears that the mathematical algorithm is implemented in a specific manner to define structural relationships . . . the claim being otherwise statutory, the claim passes muster under § 101. If, however, the mathematical algorithm is merely presented and solved by the claimed invention, as was the case in *Benson* and *Flook*, and is not applied in any manner to physical elements or process steps, no amount of post-solution activity will render the claim statutory; nor is it saved by a preamble merely reciting the field of use of the mathematical algorithm.<sup>91</sup>

The court concluded that the claims did not recite methods or apparatus for seismic prospecting, but rather they recited mathematical methods for interpreting seismic prospecting results.<sup>92</sup> Just as in *Flook*, the end use of the results did not save the claims from a subject matter rejection.<sup>93</sup> Furthermore, the court echoed *Freeman* in stating that means-plus-function language would not overcome a § 101<sup>94</sup> subject matter rejection simply by virtue of describing the invention as a "physical" apparatus.<sup>95</sup> The claims were rejected because they recited mathematical algorithms under the first step of the test and because the claims did not implement the algorithms to define structural relationships or physical process steps as required by the second step of the test.<sup>96</sup>

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88. *Id.* at 760-62.

89. *Id.* at 767-71.

90. *Id.* at 769.

91. *Id.* at 767.

92. *Id.* at 769.

93. *Id.*

94. 35 U.S.C. § 101.

95. *Walter*, 618 F.2d at 768. "If the functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the recited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself." *Id.*

96. *Id.* at 768-71.

The second part of the two-part test was further modified or explained in *In re Abele*.<sup>97</sup> In that case, the applicant's claims asserted a computed tomography improvement that reduced exposure to x-rays and improved the reliability of the resulting image.<sup>98</sup> The applicants criticized the *Walter* formulation as presenting opposite ends of a patentable subject matter spectrum, while providing little guidance as to determinations within the vast gray area between those opposite ends.<sup>99</sup> The court conceded the force of the argument and endeavored to further clarify the second part of the test, declaring:

*Walter* should be read as requiring no more than that the algorithm be "applied in any manner to physical elements or process steps," provided that its application is circumscribed by more than a field of use limitation or non-essential post-solution activity. Thus, if the claim would be "otherwise statutory," . . . albeit inoperative or less useful without the algorithm, the claim likewise presents statutory subject matter when the algorithm is included.<sup>100</sup>

The court asserted that this view was consistent with the Supreme Court's *Benson* and *Diehr* decisions and with earlier C.C.P.A. decisions,<sup>101</sup> particularly *Freeman*.<sup>102</sup> After concluding that the claims satisfied the first part of the test by reciting an algorithm, the court applied the second part of the test and rejected the claims that were not "applied in any manner to physical elements"<sup>103</sup> while allowing the "production, detection, and display steps,"<sup>104</sup> which were not dictated by the algorithm.<sup>105</sup>

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97. 684 F.2d 902 (C.C.P.A. 1982).

98. *Id.* at 903.

99. *Id.* at 906-07.

100. *Id.* at 907 (citing *Walter*, 618 F.2d at 769).

101. *Id.*

102. *Abele*, 684 F.2d at 905.

103. *Id.* at 907.

104. *Id.* at 908.

105. *Id.*

D. *"Means-Plus-Function" Claims—The Drafting Tool Provided in Title 35, United States Code, § 112, Paragraph 6,<sup>106</sup> and Its Interpretation by the C.C.P.A.<sup>107</sup>*

Practitioners and commentators have developed several approaches to satisfying the *Benson*, *Flook*, and *Diehr* requirement of physical transformation for processes that involve mathematical algorithms. Such approaches usually entail linking the algorithm or program with otherwise patentable subject matter to pigeon-hole the invention into a statutory category, including a "machine" or a physical "process."<sup>108</sup> The most prominent approach is to define programs as "computer means for" performing operations, using "means-plus-function" claims.<sup>109</sup> Title 35, United States Code, § 112, paragraph 6 states:

An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.<sup>110</sup>

The type of claim that uses the form sanctioned by 35 U.S.C. § 112 is called a "means-plus-function" claim because a "means"

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106. 35 U.S.C. § 112.

107. See generally R. Carl Moy, *The Interpretation of Means Expressions During Prosecution*, 68 J. PAT. & TRADEMARK OFF. SOC'Y 246 (1986) (describing how the C.C.P.A. interpreted 35 U.S.C. § 112, paragraph 6).

108. Stephen A. Becker, *Drafting Patent Applications on Computer-Implemented Inventions*, 4 HARV. J.L. & TECH. 237 (1991). Computer program claim forms have included means-plus-function claims, hardware-specific claims, method claims, and the inclusion of flowcharts or pseudo-code. *Id.* at 255-56. Compare the protection offered by the Semiconductor Chip Protection Act of 1984, 17 U.S.C. §§ 901-914 (Supp. III 1985). See also Scott M. Alter & Victor W. Marton, *The Rebirth of the Semiconductor Chip Protection Act: An analysis of Brooktree Corp. v. Advanced Micro Devices*, 40 FED. B. NEWS & J. 222 (1993) (discussing the first decision of the Federal Circuit concerning infringement under the Semiconductor Chip Protection Act, rendered on October 9, 1992, and opining that the decision increased the status of the Act as a means of protecting semiconductor chips).

109. 35 U.S.C. § 112; see *infra* parts II.D and III.D for discussion of means-plus-function claim format and its effect on computer software patentability. See also McKelvey, *supra* note 2; Becker, *supra* note 108.

110. 35 U.S.C. § 112.

is recited in the claim and is defined within the claim by how it functions, rather than by its structure.<sup>111</sup>

Until recently, considerable doubt existed about whether the PTO must construe means-plus-function claims to cover structures in the specification and their equivalents when making patentability determinations.<sup>112</sup> The C.C.P.A. left a legacy of several decisions involving means-plus-function claims in which the court may have declined to seek structure in the specification despite the applicant's urging after a PTO patentability rejection.<sup>113</sup> However, the C.C.P.A. also left a seemingly contrary legacy of several patentability decisions in which the court did construe "means" in means-plus-function claims to cover the structure in the specification.<sup>114</sup> A review of this

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111. See *MERGES*, *supra* note 23, at 79. For example, "means for fastening . . . would include nails, scotch tape, screws, glue, Velcro, and any other 'means for' attaching one thing to another. In this claim, the 'function' is fastening, and the 'means for fastening' element of the claim therefore includes many means for doing this task." *Id.*

112. See *infra* part II.E.2.

113. *In re Maucorps*, 609 F.2d 481 (C.C.P.A. 1979). See also *infra* notes 180-87 and accompanying text; *In re Sweet*, 393 F.2d 837 (C.C.P.A. 1968), *infra* notes 144-50 and accompanying text; *In re Lundberg*, 244 F.2d 543 (C.C.P.A. 1957), *infra* notes 134-43 and accompanying text. See also, e.g., *In re Meyer*, 688 F.2d 789 (C.C.P.A. 1982) (means-plus-function claims asserting an apparatus for determining malfunction probabilities in complex systems rejected under § 101 as asserting a mathematical algorithm without the court addressing the 35 U.S.C. § 112, paragraph 6, direction to reference structures in the specification); *In re Mott*, 1557 F.2d 266, 267, 269 (C.C.P.A. 1976) (declining to survey the specification for structure corresponding to "locking means" for a ball valve, stating that such an inquiry "misses the point" of whether a prior art structure is encompassed by the function recited in the claims for purposes of a § 102 novelty inquiry); *In re Margaroli*, 318 F.2d 348, 349-51 (C.C.P.A. 1963) (in affirming a § 103 obviousness rejection of a machine that oriented dates on a conveyer belt for subsequent pitting, the C.C.P.A. refused to import limitations from the specification to narrow the claimed "vibration means" and avoid the prior art).

114. *In re Freeman*, 573 F.2d 1238-40, 1242 (C.C.P.A. 1978); see *supra* notes 79-86 and accompanying text. See also *In re Noll*, 545 F.2d 141, 149 (C.C.P.A. 1976) (finding structure in the specification determinative in concluding that means-plus-function claims sufficiently pointed out and distinctly claimed the invention, as required by 35 U.S.C. § 112, paragraph 2, although unclear whether the structure in the specification supported the court's finding of statutory subject matter); *In re Bernhart*, 417 F.2d 1395, 1396, 1399 (C.C.P.A. 1969) (asserting that the PTO erred in declaring means-plus-function claims, which asserted a device to automatically create a two-dimensional display of a three-dimensional object, unpatentable subject matter when the specification revealed structure in the form of mechanical drafting machines, which were within the prior art); *In re Henatsch*, 298 F.2d 954, 954-55, 958 (C.C.P.A. 1962) (looking to the specification of a side-

C.C.P.A. precedent is appropriate because C.C.P.A. decisions are binding on the Federal Circuit, which can overrule C.C.P.A. precedent only by sitting en banc.<sup>115</sup>

Prior to 1946, the courts regularly referred to patent specifications when interpreting claims, in part because the requirement of adequate disclosure in the specification had developed long before the requirement of claims had developed.<sup>116</sup> In *Pennwalt Corp. v. Durand-Wayland, Inc.*,<sup>117</sup> Judge Newman cited several representative cases, including *The Corn-planter Patent*,<sup>118</sup> which far predated the enactment of 35 U.S.C. § 112, paragraph 6 in the Patent Act of 1952<sup>119</sup> and which illustrated the trend toward greater reliance on the claims.<sup>120</sup>

The Court explained in *The Corn Planter Patent* that a clause such as "substantially as set forth" throws us back to the specification for a qualification of the claim, and the several elements of which the combination is composed. To this extent early claim form was a precursor of the "means-plus-function" form of today, in that they both incorporate by reference the description in the specification and equivalents thereof.<sup>121</sup>

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walk canopy invention for structure that would limit the corresponding means-plus-function claims to avoid reading on the prior art, but finding no such means that would distinguish the invention).

115. *South Corp. v. United States*, 690 F.2d 1368, 1370-71 (Fed. Cir. 1982) (en banc) (Federal Circuit, en banc, announcing in its first case that the precedent of the C.C.P.A. would be binding on the Federal Circuit and that any conflict with such precedent could be resolved by the court sitting en banc). To the extent that conflict exists within C.C.P.A. precedent, later C.C.P.A. decisions *sub silentio* overrule previous inconsistencies because the C.C.P.A. always sat en banc. *In re Gos-telti*, 872 F.2d. 1008, 1009, 1011 (Fed. Cir. 1989) (regarding a § 102 anticipation rejection of a patent for chemical intermediates used in antibiotics synthesis).

116. For a general history of 35 U.S.C. § 112, see Irving et al., *supra* note 29. See also *Pennwalt Corp. v. Durand-Wayland, Inc.*, 833 F.2d 931 (Fed. Cir. 1987) (Newman, J., commenting) (reviewing the historical development of the doctrine of equivalents, the reverse doctrine of equivalents, and 35 U.S.C. § 112). The claim requirement is 35 U.S.C. § 112, paragraph 2. See *supra* text accompanying note 33 for further discussion of the claim requirement.

117. 833 F.2d 931 (Fed. Cir. 1987).

118. *Brown v. Guild* (*The Corn-planter Patent*), 90 U.S. (23 Wall.) 181 (1874).

119. Pub. L. No. 593, 66 Stat. 792 (codified as amended in scattered sections of 35 U.S.C. (1988 & Supp. II 1990)).

120. *Pennwalt*, 833 F.2d at 958 (Newman, J., commenting).

121. *Id.* (citations and footnote omitted).



Section 112, paragraph 6<sup>122</sup> was enacted partially in response to the 1946 patent infringement case, *Halliburton Oil Well Cementing Co. v. Walker*.<sup>123</sup> In *Halliburton*, the Supreme Court reviewed functional claims of an acoustical resonator that facilitated the determination of oil well depths by, in effect, counting regularly spaced oil tubing joints between the surface and a subterranean point on the oil tube to yield a distance that served as a reference for further measurements.<sup>124</sup> The Court examined one of the functional claims<sup>125</sup> and observed that "[t]he language of the claim thus describes [a] most crucial element . . . in terms of what it will do rather than in terms of its own physical characteristics or its arrangement in the new combination apparatus."<sup>126</sup> Despite the presence of a specific apparatus in the specification, the Court rejected the functional claims, asserting that they made the patent rights broader than those which would have resulted had the applicant claimed the invention in structural terms.<sup>127</sup> The Court found significant that the functional language occurred at "the point of nov-

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122. 35 U.S.C. § 112.

123. 329 U.S. 1 (1946). See also Paul M. Janicke, *Means-Plus-Function Claims in Modern Patent Law*, C785 A.L.I.-A.B.A. 297, 301-08 (1992) (providing thorough analysis of *Halliburton* as the origin of 35 U.S.C. § 112, paragraph 6).

124. *Halliburton*, 329 U.S. at 12.

125. The Court examined the first claim, which it deemed typical of the remaining claims. In pertinent part, claim 1 stated:

In an apparatus for determining the location of an obstruction in a well having therein a string of assembling tubing sections inter-connected with each other by coupling collars, *means* . . . for creating a pressure impulse in said well, *echo receiving means* . . . for receiving pressure impulses from the well . . . and *means* . . . for tuning said receiving means to the frequency of echoes from the tubing collars of said tubing sections to clearly distinguish the echoes from said couplings from each other.

*Id.* at 9 (emphasis added).

126. *Id.*

127. The Court stated:

[I]f Walker's blanket claims be valid, no device to clarify echo waves, now known or hereafter invented, whether the device be an actual equivalent of Walker's ingredient or not, could be used in a combination such as this, during the life of Walker's patent. Had Walker accurately described the machine he claims to have invented, he would have had no such broad rights to bar the use of all devices now or hereafter known which could accent waves. . . . [A] patentee cannot obtain greater coverage by failing to describe his invention than by describing it as the statute commands.

*Id.* at 12-13. The Court has been criticized for its characterization of the claims as "inaccurate" descriptions. See Janicke, *supra* note 123, at 306-07.

elty."<sup>128</sup> The phrase, "point of novelty," is shorthand for that aspect of the invention that is different from the prior art.<sup>129</sup>

Congress responded to the *Halliburton* decision by enacting what is now Title 35, United States Code, § 112, paragraph 6 in the Patent Act of 1952,<sup>130</sup> which states that "[a]n element in a claim for a combination may be expressed as a means or step for performing a specified function . . . , and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof."<sup>131</sup>

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[T]he problem [in *Halliburton*] was unfortunately obscured by the Court's grounding of its decision on a supposed indefiniteness of functional language. There was no sound reason to think that Walker's phrasing was indefinite, whether at the "point of novelty" or anywhere else. What made it seem indefinite was the inability of the law to address adequately the question of how much scope a patent claim should have.

*Id.* at 307. In addition, the Court overlooked the patentee's express argument that the "means" in the claims referred to structures in the specification and their equivalents, a more narrow interpretation than the Court's ultimate interpretation that the claims asserted rights over all structure capable of performing the recited function. *Id.*

128. *Halliburton*, 329 U.S. at 8. The Court phrased the issue of the case: "We must, however, determine whether, as petitioner charges, the claims here held valid run afoul . . . because they do not describe the invention but use 'conveniently functional language at the exact point of novelty.'" *Id.* (quoting General Elec. Co. v. Wabash Appliance Corp., 304 U.S. 364, 372 (1938) (further explaining that "Congress requires, for the protection of the public, that the inventor set out a definite limitation of his patent; that condition must be satisfied before the monopoly is granted")).

129. See generally Comment, 35 U.S.C. 101 Claim Analysis—The Point of Novelty Approach, 62 J. PAT. OFF. SOC'Y 521 (1980). See also Irah H. Donner, *Two Decades of Gottschalk v. Benson: Putting the "Rithm" Back Into the Patenting of Mathematical Algorithms*, 5 SOFTWARE L.J. 419 (1992) (describing the turbulent history of the point of novelty approach prior to its ultimate rejection in *Diamond v. Diehr*, 450 U.S. 175 (1981)); *In re Freeman*, 573 F.2d 1237, 1244 (C.C.P.A. 1978) (rejecting the point of novelty approach in relation to obviousness under § 103, as well as patentable subject matter under § 101).

130. Pub. L. No. 593, 66 Stat. 792 (codified as amended in scattered sections of 35 U.S.C. (1988 & Supp. II 1990)).

131. 35 U.S.C. § 112. The reference to "equivalents thereof" seemed to invoke the doctrine of equivalents, a judge-made equitable doctrine under which claims are interpreted beyond their literal meaning to encompass that which "performs substantially the same function in substantially the same way to obtain [substantially] the same result." *Graver Tank & Mfg. Co. v. Linde Air Prods.*, 339 U.S. 605, 607 (1950) (quoting *Sanitary Refrigerator Co. v. Winters*, 280 U.S. 30, 42 (1929)). The doctrine was created to balance the public interest in knowing the precise limits of an invention against the applicant's interest in obtaining a fair reading of claims, where a literal reading would produce an inequitable result. See generally William E. Eshelman, Comment, *The Doctrine of Equivalents in Patent Law: Post-*

Congress thereby clearly sanctioned the increasing use of means-plus-function format, which was viewed as particularly necessary in complex mechanical claims,<sup>132</sup> and effectively overruled the Court's decision in *Halliburton*.<sup>133</sup>

In the 1957 patentability case, *In re Lundberg*,<sup>134</sup> the C.C.P.A. promulgated a constructional rule for interpreting means-plus-function claims that seemingly contradicted Congress' intent, as expressed through 35 U.S.C. § 112, paragraph 6.<sup>135</sup> The C.C.P.A. affirmed the B.P.A.I.'s prior art<sup>136</sup> rejection of an apparatus and method for performing geophysical exploration by airplane.<sup>137</sup> The claims had described the invention in terms of conventional equipment "adapted" to perform allegedly

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*Pennwalt Developments*, 65 TUL. L. REV. 883 (1991). The doctrine of equivalents existed long before the Patent Act of 1952. Sean T. Moorhead, Note, *The Doctrine of Equivalents: Rarely Actionable Non-Literal Infringement or the Second Prong of Patent Infringement Charges?*, 53 OHIO ST. L.J. 1421, 1425-26 (1992) (citing *Winans v. Denmead*, 56 U.S. (15 How.) 330 (1853), as the origin of the doctrine of equivalents). However, it has been asserted that the 35 U.S.C. § 112, paragraph 6 doctrine of equivalents analysis differs from the original "equitable" doctrine in that 35 U.S.C. § 112 equivalency requires that the accused device perform literally the same function, whereas the equitable doctrine requires that the accused device perform substantially the same function. See Janicke, *supra* note 123, at 318, 325 (citing *Pennwalt*, 833 F.2d 931, as suggesting the difference in the two doctrine of equivalents analyses and citing *Laitram Corp. v. Rexnord, Inc.*, 939 F.2d 1533, 1536 (Fed. Cir. 1991), as suggesting that the equitable doctrine of equivalents might permit a finding of infringement by allowing the patentee "in the right circumstances . . . to go outside the recited function"). The Federal Circuit warned against an overly expansive equivalency reading of claims in *Greiner & Co. v. Mari-Med Mfg.*, 962 F.2d 1031, 1036 (Fed. Cir. 1992) (asserting that the doctrine of equivalents is the exception, not the rule).

132. Irving et al., *supra* note 29, at 626. "The last paragraph, which is the current section's sixth paragraph, did not have statutory precedent. Rather, it reflected a growing use of 'means-plus-function' language in claims involving complex mechanical devices. For these complex inventions, requiring structural recital proved to be too confining." *Id.*

133. Pasquale J. Federico, COMMENTARY ON THE NEW PATENT ACT, 35 U.S.C.A. §§ 1, 25 (West 1954), reprinted in 75 J. PAT. & TRADEMARK OFF. SOC'Y 161 (1993).

134. 244 F.2d 543 (C.C.P.A. 1957).

135. *In re Lundberg*, 244 F.2d 543 (C.C.P.A. 1957). See also *Pennwalt*, 833 F.2d at 959 (Newman, J., commenting) (citing *In re Lundberg* as a transition to stricter reliance on the claims in defining the limits of inventions).

136. See *supra* notes 22-24 and accompanying text (explaining that the novelty and nonobviousness patentability inquiries call for comparison to prior art).

137. *Lundberg*, 244 F.2d at 543.

novel and nonobvious functions.<sup>138</sup> The applicants argued that the claims' format was analogous to the means-plus-function format sanctioned by 35 U.S.C. § 112, paragraph 6, under which such claims were to be construed "to cover the corresponding structure . . . described in the specification and equivalents thereof."<sup>139</sup> Accepting the analogy but observing that the prior art suggested both the structure and function described in the claims, the court declared that the only way the invention could overcome the prior art would be if the court were to interpret 35 U.S.C. § 112, paragraph 6 as directing the court to read limitations from the specification into the claims.<sup>140</sup> The court refused.<sup>141</sup>

[N]otwithstanding the third [now sixth] paragraph of section 112, it is the language itself of the claims which must particularly point out and distinctly claim the subject matter which the applicant regards as his invention, without limitations imported from the specification, whether such language is couched in terms of

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138. *Id.* at 544-45. Claim 54 is an example of how the invention was claimed as conventional equipment "adapted" to perform novel functions:

Apparatus for geophysical exploration from the air comprising, the combination with a maneuverable airplane adapted to transport an operating crew and the hereinafter recited equipment, of a magnetic detecting instrument carried by the airplane and adapted while in the air automatically to receive and respond to with a sensitivity of one gamma or less magnetic effects of earth anomalies related to mineral deposits, a support for said detecting instrument carried by the airplane in operative association with the detecting instrument and adapted automatically to stabilize the latter in relation to level and orientation regardless of motions of the airplane, and a record making device also carried by the airplane in operative association with the detecting instrument and adapted simultaneously to make a record of the said effects of the said anomalies to which the detecting instrument responds.

*Id.*

139. 35 U.S.C. § 112; see also *Lundberg*, 244 F.2d at 546. The applicants offered to substitute "means" for "adapted" in the claims, but the court assumed without deciding that they were analogous. *Lundberg*, 244 F.2d at 546.

140. *Lundberg*, 244 F.2d at 547. The court stated:

[U]nless the above recited clause in the third paragraph of section 112 is to be construed to mean that, though the claims as drawn read on the prior art, both as to function and structure, the claims may, through the medium of a "means" clause, be held to include the limitations which . . . are set forth in the disclosure, we must reject appellants' contentions as to the effect of section 112 on the claims in this case.

*Id.*

141. *Id.* at 548.

means plus function or consists of a detailed recitation of the inventive matter. Limitations in the specification not included in the claim may not be relied upon to impart patentability to an otherwise unpatentable claim.<sup>142</sup>

The court continued with its analysis by comparing the prior art only to the applicant's claims and ultimately declared that the prior art suggested the invention, rendering it unpatentable.<sup>143</sup>

The C.C.P.A. again refused to import limitations from the specification in the 1968 case, *In re Sweet*,<sup>144</sup> which was an appeal from a § 103<sup>145</sup> obviousness rejection of means-plus-function claims directed to lathe tandem cutting tools that could be simultaneously adjusted for varying diameters.<sup>146</sup> The turning apparatus combination claim recited, *inter alia*, "means to simultaneously change the position of said cutting elements for cutting a different size diameter whereby said cutting elements will cut at substantially the same distance from the center of rotation on said different size diameter."<sup>147</sup> The court stated that "a recitation of 'means' for performing a function is inter-

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142. *Id.*

143. *Id.* at 549-51. In *Pennwalt*, Judge Newman observed that the *Lundberg* court's refusal to include limitations from the specification was part of a trend toward greater reliance on the claims as complete declarations of the patent rights. *Pennwalt*, 833 F.2d at 959 (Newman, J., commenting).

This practice is in sharp contrast with that of the 19th and early 20th centuries. There was a gradual, erratic, but inexorable transition to the requirement that the claims contain sufficient detail so that they can stand alone, without reliance on the specification to show distinctions from the prior art.

*Id.*

144. 393 F.2d 837 (C.C.P.A. 1968).

145. 35 U.S.C. § 103.

146. *Sweet*, 393 F.2d at 841. The court analyzed claim 1 as a representative claim, which read:

In a turning apparatus combination having a workpiece center of rotation and a cross slide; a tandem cutting tool, comprising a tool holder, at least two cutting elements carried by said holder in closely spaced relation one above the other to cut simultaneously at substantially the same distance from the lathe's center of rotation, each successive cutting element being offset from the one immediately thereabove in the direction of tool feed to provide a total cut per revolution of the workpiece corresponding to the sum of the cuts of the cutting elements and *means* to simultaneously change the position of said cutting elements for cutting a different size diameter whereby said cutting elements will cut at substantially the same distance from the center of rotation on said different size diameter.

*Id.* at 839 (emphasis added).

147. *Id.*

preted broadly to cover all means capable of performing the stated function and is not limited to the particular structure which the application may disclose."<sup>148</sup> The court agreed with the B.P.A.I. that, construed broadly, the claims recited matter that was obvious in light of prior art.<sup>149</sup> Accordingly, the patent was rejected as obvious under § 103.<sup>150</sup>

In the 1973 case, *In re Knowlton*,<sup>151</sup> the court scrutinized an application for a computer-based invention that determined commonality and correlated a data list.<sup>152</sup> The court sought to determine whether the structures in the specification that corresponded to a "means" in the claim satisfied the disclosure requirements of 35 U.S.C. § 112, paragraph 1.<sup>153</sup> Without citing *Lundberg* or *Sweet*, the C.C.P.A. held that 35 U.S.C. § 112, paragraph 6 was binding on the PTO.<sup>154</sup> The court stated that, "[i]f the applicant chooses to use such language, the statute instructs the interpreter of the claims, e.g., the Patent Office or the courts, as to how such language shall be interpreted."<sup>155</sup>

The C.C.P.A. interpreted 35 U.S.C. § 112, paragraph 6<sup>156</sup> even more liberally in the 1980 action, *Hale Fire Pump Co. v. Tokai, Ltd.*<sup>157</sup> In *Hale*,<sup>158</sup> a patentee claimed infringement of his centrifugal trash pump patent.<sup>159</sup> The court found that the invention's "releasable means" for the suction and discharge sec-

148. *Id.* at 841-42.

149. *Id.* at 842.

150. *Id.*; 35 U.S.C. § 103.

151. 481 F.2d 1357 (C.C.P.A. 1973).

152. *Id.* at 1366.

153. *Id.*

154. *Id.*

155. *Id.*

156. 35 U.S.C. § 112.

157. 614 F.2d 1278 (C.C.P.A. 1980).

158. *Id.*

159. *Id.* at 1279. The court focused on claim 1, which stated:

A centrifugal pump comprising a casing having an intake side with at least one inlet port and a discharge side with a discharge port, a unitary volute assembly consisting of a suction volute section and a discharge volute section, an impeller mounted for rotation about a predetermined axis and *releasable means* having means for moving said volute assembly into an assembled position interiorly of the casing and for moving said volute assembly into a disassembled position whereby on releasing of said releasable means alone permitting complete disassembly of said volute assembly from said casing and any other interior parts of said pump.

*Id.* at 1280 (emphasis added).

tion assembly was a key feature of the invention.<sup>160</sup> The court sought the structure in the specification corresponding to the releasable means for the purpose of determining whether the alleged infringer's pump was covered by the patent claims.<sup>161</sup> The court stated that, "according to section 112, 'means for' claims are not to be read in a vacuum and can only be construed by reference to the specification . . . . Here, the determinant for the coverage of claim 1 is the structure shown in the specification which corresponds to a releasable means, and any 'equivalents thereof.'"<sup>162</sup> Finding that the structure in the specification narrowed the reach of the claims, the court declared that the accused pumps did not infringe the patent.<sup>163</sup>

E. *The Treatment of Means-Plus-Function Format in Computer Program and Mathematical Algorithm Claims*<sup>164</sup>

1. *C.C.P.A. Analysis*

In the 1960s and 1970s, while several C.C.P.A. decisions variously upheld the patentability of means-plus-function claims directed to physical apparatus,<sup>165</sup> inventors began using means-plus-function claims to link software to generic computer hardware, making the claims appear to recite structure or machine.<sup>166</sup> In early response, the President's Commission on the Patent System, which was formed in 1965 to review the is-

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160. *Id.* at 1279.

161. *Id.* at 1283.

162. *Id.* at 1283 n.5.

163. *Id.* at 1283-84.

164. See also generally Moy, *supra* note 107.

165. *E.g.*, *Hale Fire Pump Co. v. Tokai, Ltd.*, 614 F.2d 1278 (C.C.P.A. 1980) (indefiniteness rejection of a centrifugal trash pump). See also *In re Farrow*, 554 F.2d 468, 472-73 (C.C.P.A. 1977) (indefiniteness rejection of a filter assembly with "means to introduce a fluid to be filtered or withdraw a filtered fluid . . . [and] means to place the aperture of at least one element in a fluid-tight manner within the external housing"); *In re Mott*, 539 F.2d 1291, 1293, 1299 (C.C.P.A. 1976) (enablement inquiry regarding a ball-type valve tool with a "locking means" to releasably hold the valve open); *In re Engler*, 371 F.2d 508, 510-11 (C.C.P.A. 1967) (drawbar improvement for connecting a tractor to traction apparatus with "means engaging [a rod and clevis] to urge the drawbar downwardly with respect to said traction apparatus"); *Santini v. Burgy*, 318 F.2d 344, 347 (C.C.P.A. 1963) (infringement action of a "motor means" and "control means" for stopping and reversing elevator cars).

166. See *infra* notes 167-69 and accompanying text.

sue of computer program patentability, condemned the use of "means for" language as adding confusion to computer program patentability determinations.<sup>167</sup>

Indirect attempts to obtain patents [on computer programs] and avoid [a § 101] rejection, by drafting claims as . . . a machine or components thereof programmed in a given manner, rather than as a program itself, have confused the issue further and should not be permitted.<sup>168</sup>

Subsequently, the 1968 PTO Guidelines claimed that, consistent with regarding substance over form, the PTO would require some physical transformation or manipulation as a patentable subject matter requirement.<sup>169</sup> As a talisman to combat the liberal construction of mathematical algorithm and computer program means-plus-function claims, the PTO wielded the *Benson*<sup>170</sup> precedent that formulas or algorithms lacking substantial practical application except in conjunction with a computer are unpatentable.<sup>171</sup> The C.C.P.A. seemed convinced despite its own concurrent trend toward searching the specification for means-plus-function structure in mechanical apparatus applications.<sup>172</sup>

The C.C.P.A. most prominently analyzed computer means-plus-function claims in *In re Freeman*.<sup>173</sup> In *Freeman*, the B.P.A.I. had rejected computer-related claims as unpatentable

167. PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, *supra* note 41, at 14.

168. *Id.*

169. Examination of Patent Applications on Computer Programs: Notice of Issuance of Guidelines, 33 Fed. Reg. 15609 (1968).

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

171. *Id.* at 71-72; see also *supra* notes 41-55 and accompanying text.

172. See *supra* notes 151-63 and accompanying text.

173. 573 F.2d 1237, 1243 (C.C.P.A. 1978). *Freeman* was discussed in reference to the *Freeman-Walter-Abele* two-part test. See *supra* notes 79-86 and accompanying text. The first claim is representative:

1. In a computer display system comprising
  - (A) a display device for generating relatively-positioned symbol images in response to applied sequences of signals specifying the shape and position of said images,
  - (B) a data processor comprising
    - (1) means for storing a first plurality of data sequences, each describing individual symbols, and a second plurality of data sequences corresponding to a control program,
    - (2) means responsive to said control program for nondestructively reading from said means for storing and transferring to said display device selected ones of said first plurality of data sequences,



"mental steps" under *Benson*.<sup>174</sup> On appeal, the B.P.A.I. defended its *Benson*-based rationale to the C.C.P.A. and further argued that the novelty of the invention impermissibly resided in the computer program.<sup>175</sup> The court rejected the B.P.A.I.'s argument as improperly applying the point of novelty approach to statutory subject matter, stating that the court had "indicated the inappropriateness of the 'point of novelty' approach in determining whether a claimed invention is statutory subject matter under 35 U.S.C. § 101."<sup>176</sup> The court concluded that the apparatus claims were distinguishable from method claims and that they indeed recited patentable subject matter.<sup>177</sup> However, the court emphasized that the claims were saved from a *Benson* rejection, not by the means-plus-function form, but by virtue of bona fide apparatus and the absence of a nonstatutory algorithm.<sup>178</sup> The court cautioned that, "[t]hough a claim expressed in 'means for' (functional) terms is said to be an apparatus claim, the subject matter as a whole of that claim may be indistinguishable from that of a method claim drawn to the steps performed by the 'means.'"<sup>179</sup>

The reasoning of the court in *Freeman* was subsequently followed, but to an opposite result, in *In re Maucorps*,<sup>180</sup> in which the C.C.P.A. rejected an applicant's claims of a "Computing System for Optimizing Sales Organizations and Activities."<sup>181</sup> The invention used computer modeling to determine

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(3) means responsive to said control program for generating and transferring to said display device data sequences specifying the desired position of at least a first one of said selected data sequences, the improvement comprising means for storing additional information specifying spatial coordinate positions, relative to a reference point on a corresponding symbol, of a plurality of concatenation points associated with said corresponding symbol, and means responsive to said control program for generating and transferring to said display device data signals specifying the coincidence of at least one specified concatenation points on adjacent symbols.

*Freeman*, 573 F.2d at 1240-41.

174. *Freeman*, 573 F.2d at 1242.

175. *Id.* at 1243.

176. *Id.* (citations omitted).

177. *Id.* at 1247.

178. *Id.*

179. *Id.*

180. 609 F.2d 481 (C.C.P.A. 1979).

181. *Id.* at 481.

the optimum number of sales representatives and managers required for a particular marketing area.<sup>182</sup> Although the applicant described the invention as an apparatus, using means-plus-function form, the only physical "means" in the invention was the reference to a general purpose computer, specified as a "means . . . including electric circuits," to run the program.<sup>183</sup> The court relied on *Freeman* in declaring that the 35 U.S.C. § 112, paragraph 6 authorization of means-plus-function format "cannot rescue appellant's claims from the requirements of § 101."<sup>184</sup> Stating that the means-plus-function claims enveloped "each and every means for carrying out a solution technique,"<sup>185</sup> the court declared that the claims preempted mathematical algorithms, rendering the claims unpatentable subject matter under *Benson*<sup>186</sup> and *Flook*.<sup>187</sup>

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182. *Id.* at 482.

183. *Id.* at 483. The first claim is illustrative and was the only independent claim:

1. A computing system for processing data to determine an optimum "coding," defined as the number of regular visits over a predetermined period of time, Pd, by a business representative to a client, to be selected for such client, comprising:

(a) means for calculating for each different value of x representing the coding of clients, a value for y representing the sales arising over said predetermined period of time . . . ;

(b) means for calculating, for the value of x = 1 representing the coding of clients, a value for y representing the sales arising over said predetermined period of time . . . ;

(c) means for calculating for the value of x = 2 representing the coding of clients, a value for y representing the sales arising over said predetermined period of time from the representative's activity . . . ;

(d) means for calculating for each different value of x a value for y . . . ; and

(e) means responsive to the output of said calculating means . . . , each of said calculating means including electric circuits constituted so that when said electric circuits are in an activated state, values of y are automatically calculated upon receiving the necessary input data regarding the above-defined variables, and . . . value selecting means likewise including electric circuits constituted so that, when said selecting means is in an activating state, a value of x will be automatically selected upon said means receiving the necessary minimum sales line and saturation curve data.

*Id.* at 482-83.

184. *Id.* at 486.

185. *Id.*

186. *Maucorps*, 609 F.2d at 486. "[A]ppellant's claimed invention as a whole comprises each and every means for carrying out a solution technique for a set of

## 2. Federal Circuit Decisions

Unlike the C.C.P.A., the Federal Circuit has consistently interpreted 35 U.S.C. § 112<sup>188</sup> as requiring the claim interpreter to determine the statutory nature of the “means” claims with reference to the specification.<sup>189</sup> In *In re Iwahashi*,<sup>190</sup> the Federal Circuit reversed a PTO § 101<sup>191</sup> patentable subject matter rejection of an “Auto-Correlation Unit,” which performed recognition of signals such as voices, and which was claimed by a combination of elements stated in means-plus-function form in addition to one element directed to Read Only Memory (ROM).<sup>192</sup> The PTO Solicitor had argued that the means-plus-function claim at issue must be read to encompass every means capable of performing the recited function.<sup>193</sup> This argument paralleled an argument that the Solicitor had made in an article just prior to the case, in which he: (1) cited *Maucorps* as authority for the proposition that subject matter expressed in means-plus-function apparatus form may be indistinguishable from method claims; and (2) cited *In re Walter*<sup>194</sup> as “[t]he test for determining whether ‘means for’ apparatus claims should be treated as method claims.”<sup>195</sup> The cited passage from *Walter* read, in pertinent part:

If the functionally-defined disclosed means and their equivalents are so broad that they encompass any and every means for performing the recited functions, the apparatus claim is an attempt to exalt form over substance since the claim is really to the method or series of functions itself.<sup>196</sup>

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equations wherein one number is computed from a set of numbers. Thus, appellant's claims wholly preempt the recited algorithms.” *Id.* (citing *Benson*, 409 U.S. at 71-72).

187. *Maucorps*, 609 F.2d at 485.

188. 35 U.S.C. § 112 (1988).

189. See *infra* notes 190-238 and accompanying text.

190. 888 F.2d 1370 (Fed. Cir. 1989).

191. 35 U.S.C. § 101.

192. *Iwahashi*, 888 F.2d at 1371-72.

193. *Id.* at 1375.

194. 618 F.2d 758 (C.C.P.A. 1980).

195. McKelvey, *supra* note 2, at 8.

196. *Walter*, 618 F.2d at 768.

The Federal Circuit in *Iwahashi* replied by stating that the claims were subject to construction in accordance with 35 U.S.C. § 112.<sup>197</sup>

We point out that the claim is a combination of means all but one of which is a means-plus function limitation, the one exception being the ROM, clause [d], which is a specific piece of apparatus. The claim is therefore subject to the limitation stated in 35 U.S.C. § 112 ¶ 6.<sup>198</sup>

The court refused to hold that the means-plus-function claim encompassed each and every means for performing the recited functions and, consequently, refused to treat the claim as indistinguishable from method claims.<sup>199</sup> The court addressed its seeming contradiction with the passage in *In re Sweet*,<sup>200</sup> in which the C.C.P.A. stated that means-plus-function claims are interpreted broadly to cover every means capable of performing the recited function and is not limited to the structures in the specification.<sup>201</sup> The Federal Circuit stated that the passage in *Sweet* was, considered *en vacuo*, only partly true and that it must be considered in the context of the previous two paragraphs, where, the Federal Circuit asserted, the C.C.P.A. had in fact construed the means in the claims to cover structure in the specification and their equivalents.<sup>202</sup> The court concluded that, the claim as a whole having asserted apparatus and not a method, the invention was patentable subject matter under § 101.<sup>203</sup>

Within four months of the *Iwahashi* decision, the PTO issued a notice, authored by Acting Assistant Commissioner James E. Denny, declaring that the PTO's "policy on the patentability of claims reciting mathematical [sic] algorithms and computer programs . . . is unaffected by *In re Iwahashi*."<sup>204</sup> The

197. *Iwahashi*, 888 F.2d at 1375.

198. *Id.*

199. *Id.*

200. *Id.* at 1370 (interpreting *In re Sweet*, 393 F.2d 837 (C.C.P.A. 1968)).

201. *Sweet*, 393 F.2d at 841-42. The C.C.P.A. stated in *Sweet* that "a recitation of 'means' for performing a function is interpreted broadly to cover all means capable of performing the stated function and is not limited to the particular structure which the application may disclose." *Id.*

202. *Iwahashi*, 888 F.2d at 1375.

203. *Id.*

204. James E. Denny, *Notice Interpreting In Re Iwahashi*, 1134 OFF. GAZ. PAT. OFFICE 474, 474 (1992) (citations omitted).

Acting Assistant Commissioner stated that the statutory subject matter in *Iwahashi* had resided in the single ROM element of the claim, and not in the "apparatus" recited by the means-plus-function language.<sup>205</sup>

Later that year, in *In re Bond*,<sup>206</sup> the Federal Circuit reversed and remanded another PTO means-plus-function claim rejection, the claim in this case reciting a telephone answering device remote turn-on mode.<sup>207</sup> The B.P.A.I. had based its rejection of the first claim on § 102<sup>208</sup> anticipation,<sup>209</sup> which requires an element-by-element comparison of the claimed invention to the prior art,<sup>210</sup> and based its rejection of the second claim on § 103<sup>211</sup> obviousness.<sup>212</sup> Observing that the B.P.A.I. had not suggested that the specification and prior art structures were structurally equivalent, the court declared the § 102 rejection in error.<sup>213</sup> The court further said that the presence of a microcomputer structure in the specification overcame the obviousness rejection.<sup>214</sup> The court remanded the case and instructed the PTO to interpret the "means-plus-function" claims with reference to the structures in the specification and their equivalents.<sup>215</sup>

In a notice to the Official Gazette, published in January, 1992,<sup>216</sup> then-PTO Commissioner Harry F. Manbeck stated that the PTO's position was that, despite *Bond*,<sup>217</sup> 35 U.S.C. § 112, paragraph 6<sup>218</sup> does not apply to patentability determinations by the PTO<sup>219</sup> and, therefore, the PTO need not consider the equivalents of structures in the specification when construing

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205. *Id.* at 474.

206. 910 F.2d 832 (Fed. Cir. 1990).

207. *Id.* at 832.

208. 35 U.S.C. § 102.

209. *Bond*, 910 F.2d at 832.

210. *See supra* note 22 and accompanying text.

211. 35 U.S.C. § 103.

212. *Bond*, 910 F.2d at 834.

213. *Id.* at 832-33.

214. *Id.* at 834-35.

215. *Id.* at 835.

216. Harry F. Manbeck, Jr., *Notice for the Official Gazette: Applicability of the Last Paragraph of 35 U.S.C. § 112 to Patentability Determinations Before the Patent and Trademark Office*, 1134 OFF. GAZ. PAT. OFFICE 631 (1992).

217. *Id.* at 633.

218. 35 U.S.C. § 112 (1988).

219. Manbeck, *supra* note 216, at 631.

"means-for" claims.<sup>220</sup> The PTO's primary authority for this proposition was *In re Lundberg*,<sup>221</sup> in which the C.C.P.A. affirmed a PTO rejection by the B.P.A.I. of claims directed to an apparatus and method for performing geophysical exploration by airplane.<sup>222</sup> The commissioner relied in part on the *Lundberg* court's statement that, even under 35 U.S.C. § 112, paragraph 6, "[l]imitations in the specification not included in the claim may not be relied upon to impart patentability to an otherwise unpatentable claim."<sup>223</sup> The commissioner also considered Congress' subsequent reenactment, in light of *Lundberg*, of paragraph 6 as tacit agreement with the interpretation that paragraph 6 does not apply to patentability determinations by the PTO.<sup>224</sup>

In the subsequent infringement action, *Arrhythmia Research Technology v. Corazonix Corp.*,<sup>225</sup> the Federal Circuit reversed a district court's failure to find statutory subject matter in a method claim and an apparatus claim.<sup>226</sup> Both claims re-

220. *Id.* at 633.

221. 244 F.2d 543 (C.C.P.A. 1957).

222. *Id.* at 552.

223. Manbeck, *supra* note 216, at 634 (citing *Lundberg*, 244 F.2d at 548). The Commissioner pointed out two Federal Circuit decisions that declared past C.C.P.A. decisions binding on the Federal Circuit and insusceptible to overruling by the Federal Circuit except when sitting en banc. *Id.* (citing *Capital Elec. v. United States*, 729 F.2d 743, 746 (Fed. Cir. 1984); *South Corp. v. United States*, 690 F.2d 1368 (Fed. Cir. 1982)). See also *supra* note 115.

224. Manbeck, *supra* note 216, at 631. The commissioner also relied on: (1) the PTO's history of disregarding paragraph 6 in patentability determinations, *id.* at 632; (2) his opinion that the words "cover" and "construe" implicated court, not agency, action or interpretation when 35 U.S.C. § 112 was enacted in 1952, *id.* at 633-34; and, *inter alia*, (3) policy considerations such as PTO workload and the difficulty of making equivalency determinations without expert testimony, *id.* at 635.

225. 958 F.2d 1053 (Fed. Cir. 1992).

226. *Id.* at 1053. Claim 1 is the broadest method claim:

1. A method for analyzing electrocardiograph signals to determine the presence or absence of a predetermined level of high frequency energy in the late QRS signal, comprising the steps of:

converting a series of QRS signals to time segments, each segment having a digital value equivalent to the analog value of said signals at said time;

applying a portion of said time segments in reverse time order to high pass filter means;

determining an arithmetic value of the amplitude of the output of said filter; and

comparing said value with said predetermined level.

quired the use of mathematical manipulations to arrive at the result.<sup>227</sup> Although the district court held that the invention was a mathematical algorithm, the Federal Circuit declared that, as a whole, the first claim was a process for detecting the risk of a heart attack and the second was an apparatus for the same.<sup>228</sup> The Federal Circuit applied the *Freeman*<sup>229</sup>-*Walter*<sup>230</sup>-*Abele*<sup>231</sup> test to the process claim,<sup>232</sup> with the result that the claim was upheld as patentable by analogy to "those upheld in *Diehr*, wherein the Court remarked that the applicants 'do not seek to patent a mathematical formula . . . . [T]hey seek only to foreclose from others the use of that equation in conjunction with all of the other steps in their claimed process.'"<sup>233</sup> In considering the apparatus claim, the court explicitly followed the 35 U.S.C. § 112, paragraph 6<sup>234</sup> mandate to interpret each claim by reference to the specification.<sup>235</sup> As a result, the court found the "means . . . described in the specification as a specific electronic device, a conventional analog-to-digital converter."<sup>236</sup> Accordingly, the invention was deemed an "apparatus of practical

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*Id.* at 1055. Claim 7 is a representative apparatus claim:

7. Apparatus for analyzing electrocardiograph signals to determine the level of high frequency energy in the late QRS signal comprising:

means for converting X, Y, and Z lead electrocardiographic input signals to digital valued time segments;

means for examining said X, Y, and Z digital valued time segments and selecting therefrom the QRS waveform portions thereof;

means for signal averaging a multiplicity of said selected QRS waveforms for each of said X, Y, and Z inputs and providing composite, digital X, Y, and Z QRS waveforms;

high pass filter means;

means for applying to said filter means, in reverse time order, the anterior portion of each said digital X, Y, and Z waveform; and

means for comparing the output of said filter means with a predetermined level to obtain an indication of the presence of a high frequency, low level, energy component in the filter output of said anterior portions.

*Id.*

227. *Id.* at 1058-60.

228. *Id.* at 1066.

229. *In re Freeman*, 573 F.2d 1237 (C.C.P.A. 1978).

230. *In re Walter*, 618 F.2d 758 (C.C.P.A. 1980).

231. *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982).

232. *Arrhythmia*, 958 F.2d at 1058-59.

233. *Id.* at 1059 (quoting *Diamond v. Diehr*, 450 U.S. 175, 187, 209 (1980)).

234. 35 U.S.C. § 112 (1988).

235. *Arrhythmia*, 958 F.2d at 1060.

236. *Id.*

utility and specified application,"<sup>237</sup> which was subject to protection under the patent laws.<sup>238</sup>

F. *In re Donaldson*:<sup>239</sup> *Requiring the PTO to Follow 35 U.S.C. § 112, Paragraph 6.*

In the Federal Circuit's en banc February 1994 decision, *In re Donaldson*,<sup>240</sup> the court conclusively settled that the PTO must construe means-plus-function claims to cover structures in the specification and their equivalents.<sup>241</sup> In *Donaldson*, the applicant had sought to patent a self-cleaning air filter assembly that contained an interior wall which flexed in response to pressure pulses.<sup>242</sup> Such pressure pulses had been commonly used in the art to dislodge dust from filters; the flexure in the interior walls helped the dislodged dust to migrate downward into the assembly's bottom hopper.<sup>243</sup> The applicant had described the wall as "means, responsive to pressure increases in said chamber caused by said [pressure pulsation] cleaning means, for moving particulate matter in a downward direction."<sup>244</sup> The PTO examiner rejected the application and the B.P.A.I. affirmed because, in the B.P.A.I.'s view, a prior patent

237. *Id.* at 1061.

238. *Id.*

239. 16 F.3d 1189 (Fed. Cir. 1994). See also R. Carl Moy, *Means Expressions in the USPTO: the Effect of In re Donaldson*, 63 PATENT WORLD 31 (1994). Mr. Moy was Counsel of Record to the Donaldson Company in the case under discussion. *Id.* at 35.

240. 16 F.3d 1189 (Fed. Cir. 1994). Although the Federal Reporter does not designate the decision as en banc, all of the judges on the Federal Circuit at the time participated in the decision. *Id.* at 1189.

241. *Id.* at 1193.

242. *Id.* at 1191.

243. *Id.*

244. *Id.* The entire claim on appeal read:

An air filter assembly for filtering air laden with particulate matter, said assembly comprising:

a housing having a clean air chamber and a filtering chamber, said housing having an upper wall, a closed bottom, and a plurality of side walls depending from said upper wall;

a clean air outlet from said clean air chamber in one of said side walls; a dirty air inlet to said filtering chamber positioned in a wall of said housing in a location generally above said clean air outlet;

means separating said clean air chamber from said filtering chamber including means mounting a plurality of spaced-apart filter elements within said filtering chamber, with each of said elements being in fluid communication with said air outlet;



had already disclosed a "means" for moving the dust downward.<sup>245</sup>

The Federal Circuit reversed, stating that the B.P.A.I. had improperly failed to construe the means recited in the claims to cover the structure disclosed in the specification, as required by 35 U.S.C. § 112, paragraph 6.<sup>246</sup> The court declared that paragraph 6 must be applied regardless of context, and the court expressly overruled Federal Circuit and C.C.P.A. precedent, including *In re Lundberg*, to the extent that such precedent held otherwise.<sup>247</sup> The court then applied the paragraph 6 mandate and came to the "inescapable conclusion" that the applicant had adequately defined the means by providing specific characteristics and embodiments in the specification.<sup>248</sup> Next, the court compared the specification-defined means with the patent cited in the Board's obviousness rejection and found that the cited patent neither taught nor suggested the flexible wall claimed by the applicant.<sup>249</sup> Accordingly, the court concluded that the cited patent neither anticipated nor rendered obvious the applicant's invention.<sup>250</sup>

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pulse-jet cleaning means, intermediate said outlet and said filter elements, for cleaning each of said filter elements; and

a lowermost portion in said filtering chamber arranged and constructed for the collection of particulate matter, said portion having means, responsive to pressure increases in said chamber caused by said cleaning means, for moving particulate matter in a downward direction to a bottommost point in said portion for subsequent transfer to a location exterior to said assembly.

*Id.*

245. *Donaldson*, 16 F.3d at 1191. The court noted that, although the PTO commissioner relied on § 103 obviousness, the commissioner's arguments sounded more like § 102 anticipation. *Id.* at 1197.

246. *Id.* at 1192.

247. *Id.* at 1193-94.

248. *Id.* at 1196. The court pointed to the applicant's description of a "sloping surface constructed of a material which flexes in response to the pressure differentials created within the chamber during the operation of the pulse-jet cleaning means." *Id.* at 1195. The court also pointed to other details, such as the applicant's statement that the wall was "preferably made from a flexible, reinforced rubber sheet material." *Id.* at 1196.

249. *Id.* at 1196. The court explicitly noted that the PTO commissioner had failed to show that the interior walls disclosed in the cited patent inherently vibrated in response to pressure pulsations and thereby accomplished the same result. *Id.* at 1197. Furthermore, the court rejected the notion that such vibrations would have constituted an equivalent to the flexible, diaphragm-like walls described by the applicant. *Id.*

250. *Id.* at 1197.

In arriving at its conclusion that the PTO was bound by the terms of 35 U.S.C. § 112, paragraph 6, the court cited the "plain and unambiguous meaning of paragraph six"<sup>251</sup> and the absence of any PTO exemption in the statute's language or legislative history.<sup>252</sup> The court rejected the argument that Congress knew of, and acquiesced to, a contrary PTO interpretation when twice reenacting paragraph 6.<sup>253</sup> Furthermore, the court rejected deference to longstanding PTO practice, stating: "The fact that the PTO may have failed to adhere to a statutory mandate over an extended period of time does not justify its continuing to do so."<sup>254</sup>

The court explained that paragraph 6 did not alter the principle of according claims their broadest reasonable interpretation.<sup>255</sup> Rather, paragraph 6 merely limited "how broadly the PTO may construe means-plus-function language under the rubric of 'reasonable interpretation.'"<sup>256</sup> The court asserted that such claim construction did not conflict with the principle that limitations from the specifications may not be incorporated into the claims.<sup>257</sup>

The Commissioner confuses impermissibly imputing limitations from the specification into a claim with properly referring to the specification to determine the meaning of a particular word or phrase recited in a claim. What we are dealing with in this case is the construction of a limitation already in the claim in the form of a means- plus-function clause and a statutory mandate on how that clause must be construed.<sup>258</sup>

On May 17, 1994, the PTO published its response in the Official Gazette, stating that "effective immediately, examiners shall interpret a § 112, 6th paragraph 'means or step plus function' limitation in a claim as limited to the corresponding struc-

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251. *Id.* at 1193.

252. *Id.*

253. *Id.* at 1194.

254. *Id.*

255. *Id.*

256. *Id.*

257. *Id.* at 1195.

258. *Id.* (citations omitted). The court stated that its holding did not conflict with the 35 U.S.C. § 112, paragraph 2 mandate to particularly point out and distinctly claim the subject matter of the invention. *Id.* (citing 35 U.S.C. § 112). The applicant must still comply with paragraph 2 by indicating in the specification what is meant by the "means" recited in the claims. *Id.*

ture, materials or acts described in the specification and equivalents thereof in accordance with the following guidelines."<sup>259</sup> The subsequent guidelines stated that the examiner carries an initial burden of proving that the claimed invention is the same as, or equivalent to, a functionally identical prior art structure.<sup>260</sup> However, the guidelines also stated that the burden of proving non-equivalence shifts back to the applicant if the prior art structure "is not excluded by any explicit definition provided in the specification for an equivalent."<sup>261</sup> The guidelines also emphasized that, even if the applicant meets its burden and thereby overcomes a § 102 anticipation rejection, the examiner could still find the invention obvious under § 103 by also considering elements from other prior art structures.<sup>262</sup>

The guidelines also: (1) identified three ways of proving non-equivalence to avoid a § 102 anticipation rejection;<sup>263</sup> (2) emphasized that the scope of equivalents would depend on the breadth of the corresponding description in the specification;<sup>264</sup> and (3) listed several inquiries helpful for making equivalency

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259. *Means or Step Plus Function Limitation Under 35 U.S.C. § 112, 6th Paragraph*, 1162 OFF. GAZ. PAT. OFFICE 59, 59 (1994) [hereinafter *PTO Guidelines for § 112*].

260. *Id.* According to the guidelines, the invention is anticipated under § 102 if a prior art structure performs the claimed function and is structurally equivalent to the applicant's invention. *Id.* at 59-60.

261. *Id.*

262. *Id.*

263. *Id.* at 60. According to the guidelines, at least three "reasons" might be advanced to show non-equivalence:

Such reasons may include, but are not limited to:

- 1) teachings in the specification that particular prior art is not equivalent,
- 2) teachings in the prior art reference itself that may tend to show non-equivalence, or
- 3) Rule 132 affidavit evidence of facts tending to show non-equivalence.

*Id.*

264. *Id.* at 60.

If the disclosure is so broad as to encompass any and all structure, material or acts for performing the claimed function, the claims must be read accordingly . . . . On the other end of the spectrum, the "equivalents" limitation as applied to a claim may also operate to constrict the claim scope to the point of covering virtually only the disclosed embodiments. This can happen in circumstances where the specification describes the invention only in the context of a specific structure, material or act that is used to perform the function specified in the claim.

*Id.*

determinations.<sup>265</sup> Finally, the PTO encouraged a restrictive view of means-plus-function claims by suggesting more stringent application of other patentability requirements.<sup>266</sup> Noting that the *Donaldson* decision might cause "some uncertainty as to what applicant regards as the invention,"<sup>267</sup> the guidelines suggested that means-plus-function claims might be rejected under 35 U.S.C. § 112, paragraph 1, 35 U.S.C. § 112, paragraph 2, 35 U.S.C. § 102, or 35 U.S.C. § 103, if "not supported by corresponding structure, material or acts in the specification disclosure."<sup>268</sup>

#### G. *In re Alappat*:<sup>269</sup> Applying *Donaldson* to Computer Inventions

The Federal Circuit issued another opinion addressing the role of means-plus-function claims several months after issuing the *Donaldson* decision.<sup>270</sup> The court had considered the cases so closely related that it had combined the oral arguments from both cases into one hearing.<sup>271</sup> However, the second case, *In re Alappat*,<sup>272</sup> contained several issues which complicated its disposition.

265. Most of the PTO's inquiries derived directly from the Supreme Court's test in *Graver Tank & Mfg. Co. v. Linde Air Prods.*, 339 U.S. 605, 607 (1950). See *supra* note 131 and accompanying text (describing the doctrine of equivalents and providing the *Graver Tank* test). However, R. Carl Moy notes that one of the inquiries appears more similar to the Japanese test for equivalency. *Means Expressions in the USPTO*, *supra* note 239, at 34, 35 n.21. That inquiry was "[w]hether a person of ordinary skill in the art would have recognized the interchangeability of the element shown in the prior art for the corresponding element disclosed in the specification." *PTO Guidelines for § 112*, *supra* note 259, at 60.

266. *PTO Guidelines for § 112*, *supra* note 259, at 61.

267. *Id.*

268. *Id.* See also *supra* notes 21-33 and accompanying text (summarizing 35 U.S.C. §§ 102, 103, and 112 patentability requirements).

269. 33 F.3d 1526 (Fed. Cir. 1994).

270. The *Donaldson* opinion issued February 14, 1994. *In re Donaldson*, 16 F.3d 1189, 1189 (Fed. Cir. 1994). The *Alappat* decision issued July 29, 1994. *Alappat*, 33 F.3d at 1526.

271. *En Banc Federal Circuit Hears Arguments on Board Independence and Section 112 ¶ 6*, 45 Pat. Trademark & Copyright J. (BNA) No. 1122, at 412 (March 18, 1993) [hereinafter *Federal Circuit Hears Arguments*]. The Federal Circuit heard the appeal en banc. *Id.* Briefs by appellant and amicus curi were accepted. *Id.* at 412-13.

272. 33 F.3d 1526 (Fed. Cir. 1994).

In *Alappat*, a patent applicant contested an examiner's rejection of means-plus-function claims directed to a "rasterizer"—a mathematical algorithm-based invention for displaying smooth waveform data.<sup>273</sup> A three member B.P.A.I. panel reversed the examiner after applying the *Freeman-Walter-Abele* two-part test.<sup>274</sup> Under the first step of the test, the three member panel concluded that the claims recited a mathematical algorithm.<sup>275</sup> Accordingly, the panel applied the second step of the test, inquiring whether the claims recited merely the mathematical algorithm or whether they also recited statutory subject matter.<sup>276</sup> In analyzing the claims, the panel emphasized the means-plus-function claim format.<sup>277</sup> "The distinguishing feature of the claims on appeal . . . is that they set forth structure utilizing a 'means for' performing a specified function claim approach permitted by 35 U.S.C. 112, paragraph six."<sup>278</sup> The panel found that the means recited in the claims corresponded to structure in a figure provided in the specification<sup>279</sup> and could not be described so broadly as to encompass every means for performing the specified function.<sup>280</sup> Because the claims thereby recited apparatus, the panel concluded that the invention was statutory subject matter.<sup>281</sup>

The PTO Commissioner responded by ordering a rehearing after reconstituting the panel with five additional members of his own choosing.<sup>282</sup> Because claims 15-19 were stated to stand or fall together, the expanded panel considered only claim 15.<sup>283</sup>

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273. Examiner's Action, U.S. Pat. Application, Ser. No. 07/149,792, 2 (P.T.O. 1988); *Alappat*, 33 F.3d at 1537-39.

274. *Ex parte Alappat*, Appeal No. 91-1277 (Bd. Pat. App. & Int'f. June 26, 1991), in Joint Appendix for Appellants Kuriappan P. Alappat, Edward E. Averill and James G. Larsen, *In re Alappat*, 33 F.2d 1526 (Fed. Cir. 1994).

275. *Id.* at 241-42.

276. *Id.* at 243.

277. *Id.*

278. *Id.*

279. *Id.*

280. *Id.* at 247.

281. *Id.* at 248.

282. Reply to Examiner's Request for Reconsideration, U.S. Pat. Application, Ser. No. 07/149,792 (P.T.O. 1991); *Federal Circuit Hears Arguments*, *supra* note 271, at 412.

283. *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) 1341 (Bd. Pat. App. & Int'f. Apr. 22, 1992).

15. A rasterizer for converting vectors in a data list representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) means for determining a vertical distance between the endpoints of each of the vectors in the data list;

(b) means for determining an elevation of a row of pixels that is spanned by the vector;

(c) means for normalizing the vertical distance and elevation; and

(d) means for outputting illumination intensity data as a pre-determined function of the normalized vertical distance and elevation.<sup>284</sup>

The expanded panel, which had adjudicated the matter prior to *Donaldson*, cited *Walter* and *Maucorps* for the rejection of form, i.e., "means-plus-function" form,<sup>285</sup> over § 101 subject matter substance.<sup>286</sup> The expanded panel declared that it was not bound to presume that a means-plus-function claim is directed to a specific apparatus in the specification.<sup>287</sup> Instead, the panel reasoned that § 112, paragraph 2<sup>288</sup> requires that any claimed apparatus must be determinable from the claim.<sup>289</sup> Applying this rationale to claim 15, the expanded panel found that the claims cited no specific apparatus, but instead read on any and every means for performing the recited function.<sup>290</sup> Due to the lack of structural limitations, the panel found the claim indistinguishable from a method claim, which, in turn, failed as being directed to a nonstatutory method or algorithm.<sup>291</sup>

On appeal to the Federal Circuit, the en banc court identified two main issues.<sup>292</sup> The first issue was whether the PTO

284. *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) at 1341.

285. 35 U.S.C. § 112.

286. *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) at 1341-42 (citing *In re Walter*, 618 F.2d 758 (C.C.P.A. 1980); *In re Maucorps*, 609 F.2d 481 (C.C.P.A. 1979)).

287. *Id.* at 1343.

288. Paragraph 2 directs applicants to provide "claims particularly pointing out and distinctly claiming" what the applicant regards as the subject matter of the invention. 35 U.S.C. § 112, para. 2.

289. *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) at 1343.

290. *Id.* at 1345. A claim "reads on" a reference when every element in the claim may be found in the reference. 1 IRVING R. KAYTON, PATENT PRACTICE 2-13 to 2-14 (4th ed. 1989).

291. *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) at 1345-46.

292. *Federal Circuit Hears Arguments*, *supra* note 271, at 412-13.

commissioner acted within the scope of his authority in reconstituting the panel and whether the court could reach the merits of such an improperly constituted panel's decision.<sup>293</sup> The second issue inquired whether Alappat's claims were directed to 35 U.S.C. § 101 subject matter in view of 35 U.S.C. § 112.<sup>294</sup> While the appeal was pending, the court issued the *Donaldson* opinion.<sup>295</sup> Four months later, on July 29, 1994, the court issued the *Alappat* decision.<sup>296</sup> A majority of the court<sup>297</sup> concluded that the court possessed jurisdiction to reach the merits, although two of the judges refrained from ruling on the commissioner's conduct in reconstituting the panel.<sup>298</sup> On the merits, a different majority declared that the expanded panel erroneously failed to apply 35 U.S.C. § 112, paragraph 6 when construing Alappat's means-plus-function claims;<sup>299</sup> as a result, the expanded panel erred in declaring that Alappat's claims were unpatentable as directed to nonstatutory subject matter under 35 U.S.C. § 101.<sup>300</sup>

The majority's discussion of the merits began with a review of Alappat's application and the PTO proceedings.<sup>301</sup> The ma-

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293. *Id.*

294. *Id.*

295. *Donaldson*, 16 F.3d at 1189. The Federal Circuit issued *Donaldson* on February 14, 1994. *Id.*

296. *Alappat*, 33 F.3d at 1526.

297. Seven separate opinions were written by the judges in *Alappat*, representing divergent views on the PTO commissioner's actions and on the merits of the case. Judge Rich wrote the majority opinion and was joined by Judges Newman, Lourie, and Rader on the issue of jurisdiction, and by Judges Newman, Lourie, Michel, Plager, and Rader on the merits. *Id.* at 1530-45. Judges Archer and Nies dissented on the merits. *Id.* at 1545-68 (Archer, C.J. and Nies, J., concurring in part and dissenting in part). Judge Newman wrote a separate opinion, concurring on the merits. *Id.* at 1568-71 (Newman, J., concurring). Judges Meyer & Michel dissented on the grounds of lack of jurisdiction. *Id.* at 1571-77 (Meyer and Michel, JJ., dissenting). Judge Plager wrote a separate opinion concurring on the issue of jurisdiction. *Id.* at 1577-81 (Plager, J., concurring). Judge Rader wrote a separate opinion, concurring on the merits. *Id.* at 1581-83 (Rader, J., concurring). Judges Schall and Cleverger dissented on the issue of jurisdiction. *Id.* at 1583-85 (Schall & Cleverger, JJ., dissenting). They expressed no view on the merits. *Id.*

298. Chief Judge Archer and Circuit Judge Nies declined to rule on the commissioner's conduct. *Id.* at 1545-51. The other concurring judges agreed that the commissioner validly exercised his authority in reconstituting the panel. *Id.* at 1530-45, 1568-71, 1577-83.

299. *Id.* at 1540.

300. *Id.* at 1544-45.

301. *Id.* at 1536-40.

jority continued by noting without comment that the expanded panel had dismissed the Federal Circuit's statements in *In re Iwahashi*<sup>302</sup> as dicta and had dismissed *Arrhythmia Research Technology v. Corazonix Corp.*<sup>303</sup> as inapplicable to PTO proceedings.<sup>304</sup> The majority then cited the recent *Donaldson* decision as conclusively binding authority that the PTO is not exempt from 35 U.S.C. § 112, paragraph 6.<sup>305</sup> The panel "therefore erred as a matter of law in refusing to apply § 112 ¶ 6 in rendering its § 101 patentable subject matter determination."<sup>306</sup> After dismissing the Commissioner's reliance on cases such as *Walter* and *Maucorps* as either inapplicable in view of *Donaldson* or distinguishable on other grounds,<sup>307</sup> the majority demonstrated its claim interpretation under paragraph 6 by literally incorporating elements from Alappat's specification into Alappat's claims.<sup>308</sup> The majority's formulation of claim 15 was as follows:

A rasterizer [a "machine"] for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the vertical distance between the endpoints of each of the vectors in the data list;

(b) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the elevation of a row of pixels that is spanned by the vector;

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302. 888 F.2d 1370 (Fed. Cir. 1989). See also *supra* notes 190-205 and accompanying text (discussing *Iwahashi* and the PTO response).

303. 958 F.2d 1053 (Fed. Cir. 1992). See also *supra* notes 225-38 and accompanying text (discussing *Arrhythmia*).

304. *Alappat*, 33 F.3d at 1539. The panel had stated that *Arrhythmia* was inapplicable because it was an infringement action, not an *ex parte* PTO proceeding. *Id.*

305. *Id.* at 1540 (citing *Donaldson*, 16 F.3d at 1193).

306. *Id.*

307. *Id.* at 1540-41. For example, the majority distinguished the claims in *Walter* as having lacked supporting structure in the specification and dismissed *Maucorps* in view of *Donaldson*. *Id.* Furthermore, the majority asserted that the claims in *Maucorps* had been directed to a business methodology, which was non-patentable subject matter. *Id.*

308. *Id.* at 1541. The elements extracted from the specification were provided in brackets. *Id.*



(c) [a pair of barrel shifters, or equivalents thereof] for normalizing the vertical distance and elevation; and

(d) [a read only memory (ROM) containing illumination intensity data, or an equivalent thereof] for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation.<sup>309</sup>

According to the majority, this reformulation illustrated the statutory subject matter contained in Alappat's "means-plus-function" claims.<sup>310</sup>

The majority responded to the expanded panel's argument that Alappat's invention fell within the "mathematical algorithm" exception to 35 U.S.C. § 101, as enunciated in *Gottschalk v. Benson*,<sup>311</sup> *Parker v. Flook*,<sup>312</sup> and *Diamond v. Diehr*.<sup>313</sup> The majority opined that the "Supreme Court never intended to create an overly broad, fourth category of subject matter excluded from § 101."<sup>314</sup> Rather, the Supreme Court only meant that mathematical subject matter is, until reduced to practical application, no more than a collection of abstract ideas.<sup>315</sup> According to the majority, the appropriate inquiry is whether the invention "as a whole" is directed to statutory subject matter or whether it is instead directed to an abstract mathematical concept.<sup>316</sup> If directed to an abstract mathematical concept, the invention "represents nothing more than a 'law of nature,' 'natural phenomenon,' or 'abstract idea,'"<sup>317</sup> which would be precluded by *Diehr*.<sup>318</sup> The majority determined that Alappat's invention as a whole was not directed to an abstract mathematical concept, but instead was directed to statutory subject matter because it combined interrelated elements into a rasterizer machine, which converts waveform data into antialiased pixel

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309. *Id.* The claims, including the bracketed expressions, are reproduced as provided in the court's opinion. *Id.*

310. *Id.* at 1541-45.

311. 409 U.S. 63 (1972). *See also supra* notes 41-55 and accompanying text.

312. 437 U.S. 584 (1978). *See also supra* notes 56-66 and accompanying text.

313. 450 U.S. 175 (1981); *Alappat*, 33 F.3d at 1542-43. *See also supra* notes 67-72 and accompanying text.

314. *Alappat*, 33 F.3d at 1543.

315. *Id.*

316. *Id.* at 1543-44.

317. *Id.* at 1544.

318. *Id.*

illumination data for displaying on a display means.<sup>319</sup> The majority stated that “[t]his is not a disembodied mathematical concept which may be characterized as an ‘abstract idea,’ but rather a specific machine to produce a useful, concrete, and tangible result.”<sup>320</sup>

Although the majority acknowledged that Alappat’s invention transformed data, arguably through mathematical equations, the majority asserted that Alappat’s claim 15 was not so broadly drawn as to wholly preempt all apparatus employing such equations.<sup>321</sup> The majority stated that claim 15 instead comprised “a particularly claimed combination of elements” which collectively formed a patentable machine.<sup>322</sup> Acknowledging Alappat’s admission that properly programmed general purpose computers could conform to claim 15, the majority rejected the expanded panel’s argument that such an admission precluded patentability.<sup>323</sup> “We have held that such programming creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software.”<sup>324</sup> The majority criticized the expanded panel’s contrary view as improperly dismissing all programmed general purpose computers from the realm of statutory subject matter.<sup>325</sup> Citing *Benson*, the majority stated that “a computer operating pursuant to software *may* represent patentable subject matter, provided, of course, that the claimed subject matter meets all of the other requirements of Title 35.”<sup>326</sup> Having determined that Alappat’s invention met those requirements, the majority declared Alappat’s invention patentable and reversed the expanded panel’s subject matter rejection.<sup>327</sup>

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319. *Id.*

320. *Id.*

321. *Id.*

322. *Id.*

323. *Id.* at 1545.

324. *Id.*

325. *Id.*

326. *Id.* (citing *Benson*, 409 U.S. at 71).

327. *Id.*

### III. Analysis

#### A. Congressional Silence and the Supreme Court's Reluctance to Address Software Patentability

Insight into the Federal Circuit's views on software patentability and into its decision in *In re Alappat*<sup>328</sup> may be gained by considering Congress' failure to enact *sui generis* legislation, despite prompting by the Supreme Court and some commentators, led by Pamela Samuelson.<sup>329</sup> Samuelson had supported her position by calling for a close look at the Court's language in *Gottschalk v. Benson*,<sup>330</sup> *Parker v. Flook*,<sup>331</sup> and *Diamond v. Diehr*<sup>332</sup> to discern the Court's intent and goals.<sup>333</sup> Those goals were

328. 33 F.3d 1526 (1994).

329. See *supra* notes 53-54 and accompanying text; Samuelson, *supra* note 4, at 1132 n.426, 1148-53. See generally Pamela Samuelson et al., *A Manifesto Concerning the Legal Protection of Computer Programs*, 94 COLUM. L. REV. 2308 (1994) (arguing that, compared to other intellectual property, computer programs are distinguished by their capacity to exhibit behavioral characteristics, and advocating *sui generis* legislation to protect against "cloning" and to require contributions for reimplementing protected software); Alan D. Minsk, *The Patentability of Algorithms: A Review and Critical Analysis of the Current Doctrine*, 8 SANTA CLARA COMPUTER & HIGH TECH. L.J. 251 (1992) (urging an alternative protection scheme to current software patentability doctrine); John Swinson, *Copyright or Patent or Both: An Algorithmic Approach to Computer Software Protection*, 5 HARV. J.L. & TECH. 145 (1991) (advocating a modified version of copyright protection); Randall M. Whitmeyer, Comment, *A Plea for Due Processes: Defining the Proper Scope of Patent Protection for Computer Software*, 85 NW. U. L. REV. 1103 (1991) (urging Congress to modify the current mathematical algorithm software patentability doctrine). For extensive criticism of these views and of Samuelson's arguments in particular, see Paul Heckel, *The Software-Patent Controversy*, COMPUTER LAW., Dec. 1992, at 13; John M. Griem, Jr., Note, *Against a Sui Generis System of Intellectual Property for Computer Software*, 22 HOFSTRA L. REV. 145 (1993).

330. 409 U.S. 63 (1972).

331. 437 U.S. 584 (1978).

332. 450 U.S. 175 (1981).

333. Samuelson argued that courts should reject patents for computer programs unless and until Congress enacts *sui generis* legislation. See Samuelson, *supra* note 4, at 1148. Samuelson found "substantial basis in patent law for *Benson*'s ruling that computer program algorithms are unpatentable and for rejection of patents for many other program-related innovations." *Id.* at 1030.

[T]he issue has a more legislative tone, as though the patentability of computer programs and algorithms is an open issue about which it would be appropriate to ask if patents are "good" or "bad" for the industry and for society. Predictions that patents may be harmful to the software industry, computer science, mathematics, or society as a whole have been quite frequent, even from some of the most well-known people in the software and computer science fields.

stated most prominently in *Benson*, where the Court, refraining from granting patent protection to a computerized method for converting BCD to binary numerals, cited a presidential commission report documenting the lack of PTO search facilities for computer programs and the absence of a classification technique.<sup>334</sup> The Court stated that considerable problems would be associated with holding such programs patentable, and that such problems could be managed only by congressional committees.<sup>335</sup>

If these programs are to be patentable, considerable problems are raised which only committees of Congress can manage, for broad powers of investigation are needed, including hearings which canvass the wide variety of views which those operating in this field entertain. The technological problems tendered in the many briefs before us indicate to us that considered action by the Congress is needed.<sup>336</sup>

These points were emphasized by antagonists of granting patent protection in the absence of *sui generis* legislation.<sup>337</sup> However, the Court based its ultimate holding on the well-settled

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*Id.* at 1133. Although Samuelson has recently recognized that the judicial system may have developed sufficient legal doctrine to allow the software industry to survive the law's inadequacies, she still advocates a *sui generis* system of software protection. Samuelson, et al., *supra* note 329, at 2420-21. "While doing nothing is not the option we recommend, it is worth noting that existing law does provide meaningful protection to some commercially valuable aspects of programs." *Id.*

334. *Benson*, 409 U.S. at 72 (citing PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, *supra* note 41, at 13).

335. *Id.* at 73 (citing, *inter alia*, Robert W. Wild, *Computer Program Protection: The Need to Legislate a Solution*, 54 CORNELL L. REV. 586, 604-09 (1969)). See also *The Case Against Patent Protection*, *supra* note 4, at 1133.

336. *Benson*, 409 U.S. at 73.

337. See, e.g., Samuelson, *supra* note 4, at 1058 n.114. However, at least one commentator has taken the position that the PTO now possesses sufficient search capabilities and that, as a result, *Benson* should be narrowly construed. Kenneth C. Brooks, *Human Ingenuity: A Novel Standard for Patenting Algorithms*, 22 GOLDEN GATE U. L. REV. 455, 478 (1992).

The Commission's concern that patenting would become mere registration is understandable considering the 1793 Act was such a system and proved unworkable. . . . However, the problems raised by the Commission are no longer present today.

The Patent Trademark Office recently completed an automated patent search system as a part of an automation effort begun in 1980. They have taken steps to facilitate searching for prior art by reclassifying subclasses of computer-related technology so that people with computer related backgrounds can explore prior art more proficiently. Because the problems that

rule against patenting ideas,<sup>338</sup> rather than on a broad proscription against computer program patents. The Court thereby demonstrated its reluctance to suggest that computer programs were undeserving of patent protection. Indeed, proponents of judicially extending patent protection to software emphasized a passage in *Benson* that seemed to express that the Court might advocate software patents in proper circumstances:<sup>339</sup>

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a "different state or thing." We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents. It is said that the decision precludes a patent for any program servicing a computer. We do not so hold.<sup>340</sup>

By issuing a narrow holding and admonishing Congress to act, the Court avoided super-legislating the computer program patentability issue at an early stage of software jurisprudence. The Court may have hoped that the lower courts would follow its lead in avoiding the software issue, but lower courts are

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were present when the Court rendered its *Benson* decision are no longer present, the Court should limit *Benson* to the facts of that case.

*Id.* (citations omitted).

338. In the following passage, the Court limited its holding by basing its conclusion on the narrow judicial exception that proscribes patenting an "idea."

It is conceded that one may not patent an idea. But in practical effect that would be the result if the formula for converting BCD numerals to pure binary numerals were patented in this case. The mathematical formula involved here has no substantial practical application except in connection with a digital computer, which means that if the judgment below is affirmed, the patent would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself.

*Benson*, 409 U.S. at 71-72.

339. See, e.g., Chisum, *supra* note 4, at 988, 1010-19 (arguing that case law has appropriately imposed a burden of proving the excludability of algorithms from patentable subject matter and that Congress should not legislate against algorithm patentability); Irah H. Donner and J. Randall Beckers, *Throwing Out Baby Benson with the Bath Water: Proposing a New Test for Determining Statutory Subject Matter*, 33 JURIMETRICS J. 247, 248 (1993); Lance L. Vietzke, Note, *Software Patent Protection: A Problem-Solution Theory for Harmonizing the Precedent*, 12 COMPUTER/L.J. 25, 30 (1993); Jerome T. Tao, Comment, *Theories of Computer Program Patentability*, 7 SANTA CLARA COMPUTER & HIGH TECH. L.J. 291, 297, 297 n.30 (1991).

340. *Benson*, 409 U.S. at 71.

much more frequently faced with intellectual property litigation and must ultimately address the issues with judicial candor.

The problems identified by the Supreme Court in *Benson* may have indeed been more suited to congressional committees with the support of experts in the technology.<sup>341</sup> Such legislation is not entirely without precedent. The Patent Act of 1836<sup>342</sup> is an example of legislation where the concerns were similar to the Court's concern that extending patent protection to software would be tantamount to mere registration.<sup>343</sup> In that case, Congress enacted much more sweeping changes to patent law, form-

341. *Benson*, 409 U.S. at 73. See also Samuelson, *supra* note 4, at 1105.

Even if policy reasons were to favor the patenting of program algorithms, it may be more appropriate for such a decision to be made by Congress than by an appellate court or an administrative agency like the Patent Office because the patenting of computer program algorithms represents a significant departure from patent tradition.

*Id.*

342. Act of July 4, 1836, ch. 357, § 6, 5 Stat. 117 (amended 1870).

343. *Benson*, 409 U.S. at 72. The Supreme Court in *Benson* echoed the Presidential Commission's concern that allowing software patenting would be tantamount to mere registration. *Id.*

The Patent Office now cannot examine applications for programs because of a lack of a classification technique and the requisite search files. Even if these were available, reliable searches would not be feasible or economic because of the tremendous volume of prior art being generated. Without this search, the patenting of programs would be tantamount to mere registration and the presumption of validity would be all but nonexistent.

*Id.* (citing PRESIDENT'S COMMISSION ON THE PATENT SYSTEM, *supra* note 41, at 13). The Patent Act of 1836 was enacted because patenting under the previous patent act was also tantamount to mere registration. Under the 1793 Act, "patents were granted almost automatically, and . . . the patent business of the State Department was handled almost entirely by a clerk of the Department." Kendall J. Dood, *Patent Models and the Patent Law: 1790-1880*, 65 J. PAT. OFF. SOC'Y 187, 201 (1983); FLOYD L. VAUGHAN, *THE UNITED STATES PATENT SYSTEM: LEGAL AND ECONOMIC CONFLICTS IN AMERICAN PATENT HISTORY* 19 (1970). Congress enumerated the following shortcomings of the patent system that existed prior to the Patent Act of 1836:

1. A considerable portion of all the patents are worthless and void, as conflicting with, and infringing upon one another, or upon, public rights not subject to patent privileges; arising either from a want of due attention to the specifications of claim, or from the ignorance of the patentees of the state of the arts and manufactures, and of the inventions made in other countries, and even in our own.
2. The country becomes flooded with patent monopolies. . . .
3. Out of this interference and collision of patents and privileges, a great number of lawsuits arise, which are daily increasing in an alarming degree, onerous to the courts, ruinous to the parties, and injurious to society.

ing the foundation upon which the patent system is based today.<sup>344</sup> Furthermore, Congress has recently set a precedent for enacting computer-related *sui generis* legislation in the Semiconductor Chip Protection Act of 1984,<sup>345</sup> which protects mask works of read only memory (ROM) chips.<sup>346</sup>

In addition to the prior art searching concerns cited by the Court in *Benson*,<sup>347</sup> congressional committees would have been better able to elicit the assistance of the computer industry. The Committees could then set the scope of protection, more rationally establishing clearer lines between a sufficiently complex, inventive and, therefore, patentable combination of computer-implemented steps and those that fall under the long established proscription against patenting "mental steps."<sup>348</sup> Congress might have also determined whether patent protection should cover "source" code, "object" code, flowcharts, or some combination of each.<sup>349</sup> Similarly, Congress would have been better suited to set the appropriate disclosure requirements, and to decide whether applicants should disclose the "source" code, "object" code, flowcharts, or some combination of

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4. It opens the door to frauds . . . . [I]t is not uncommon for persons to copy patented machines . . . and having made some slight immaterial alterations, they apply in the next room for patents . . . .

Senate Committee Report Accompanying Senate Bill No. 239, 24th Cong., 1st Sess. (April 28, 1836), reprinted in DONALD S. CHISUM, PATENTS 6 app., at 12-4 (1985). See also *supra* note 337.

344. See generally Dood, *supra* note 343, at 234. Among the changes to patent law were the incorporation of the novelty and utility requirements. See Vaughan, *supra* note 343, at 19.

345. 17 U.S.C. §§ 901-914 (1988 & Supp. V 1993).

346. *Id.* Congress is also considering *sui generis* legislation in the similarly new and expanding area of biotechnology innovation. See H.R. 5664, 101st Cong., 2d Sess. (1990). See also Isabelle McAndrews, *Removing the Burden of Durden Through Legislation: H.R. 3957 and H.R. 5664*, 72 J. PAT. & TRADEMARK OFF. SOC'Y 1188 (1990); Louis S. Sorell & Susan K. Lehnhardt, Current State of Law Regarding Biotechnology Process Patents V-1 (April 16, 1991) (unpublished material from the Seventh Annual Joint Patent Seminar, Philadelphia Patent Law Ass'n, on file with author).

347. See *supra* notes 335-36 and accompanying text.

348. See *supra* notes 20, 45-55 and accompanying text. See also *Theories of Computer Program Patentability*, *supra* note 339, at 307. "The Mental Steps doctrine is particularly important in the context of computer program patentability. At some level, all programs are 'mental steps' in that they represent a logical process." *Id.*

349. See Tao, *supra* note 339, at 312-15.

each.<sup>350</sup> Are computer programs "processes?" If so, Congress could have determined whether all products made by an infringing process could be foreclosed from entering the country.<sup>351</sup> All of these questions might have been addressed by Congress, but Congress remained silent.

Although *Flook* and *Diehr* affirmed the Court's approach in *Benson*, their narrow language was no more helpful to the lower courts in daily decision-making. The Supreme Court in *Flook* extensively cited *Benson*<sup>352</sup> and expanded on the policy arguments that drove the Court to issue a narrow, but negative holding in *Benson*. In *Flook*, the Court cited the PTO acting commissioner's fear that, if not reversed, the C.C.P.A. decision upholding patentability would have "a debilitating effect on the . . . computer 'software' industry" and would result in a flood of additional patent applications.<sup>353</sup> The Court agreed to hear the case because of the "importance of the question."<sup>354</sup> However, the Court again issued a narrow proscription against patenting mathematical algorithms<sup>355</sup> to avoid super-legislating on the larger question of computer program patentability. Although the Court conceded that certain computer programs would certainly advance the objectives of the patent system, the Court emphasized that software patentability involved complex issues more appropriately addressed by Congress.<sup>356</sup>

Neither the dearth of precedent, nor this decision, should therefore be interpreted as reflecting a judgment that patent protection of certain novel and useful computer programs will not promote the progress of science and the useful arts, or that such protection

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350. *Id.* See also Michael Bondi, Comment, *Upholding the Disclosure Requirements of 35 U.S.C. § 112 Through the Submission of Flow Charts with Computer Software Patent Applications*, 5 SOFTWARE L.J. 635, 639 (1992) (analyzing the "controversy over submission of flow charts versus source code to fulfill the disclosure requirement").

351. A similar controversy has arisen in the context of obtaining protection against importing biotechnology products created from infringing starting materials. See *supra* note 346.

352. *Flook*, 437 U.S. at 585-87, 589-91, 593.

353. *Id.* at 587-88.

354. *Id.* at 588.

355. *Id.* at 594. "Respondent's process is unpatentable under § 101, not because it contains a mathematical algorithm as one component, but because once that algorithm is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention." *Id.*

356. *Id.* at 595-96.



is undesirable as a matter of policy. Difficult questions of policy concerning the kinds of programs that may be appropriate for patent protection and the form and duration of such protection can be answered by Congress on the basis of current empirical data not equally available to this tribunal.<sup>357</sup>

Although common law had developed in the past to fill gaps of congressional silence, the gap in this instance was so wide, and growing with every technological innovation, that the Court apparently felt it beyond the capacity of the properly cautious judiciary to keep pace. The Court stated, "[i]t is our duty to construe the patent statutes as they now read, in light of our prior precedents, and we must proceed cautiously when we are asked to extend patent rights into areas wholly unforeseen by Congress."<sup>358</sup> Although the Court reversed the C.C.P.A.'s finding of patentable subject matter, the Court narrowly based its holding on the "mathematical algorithm" exception.<sup>359</sup>

In *Diehr*, the Court extensively cited its prior decisions<sup>360</sup> and rendered another narrow decision which avoided either sanctioning or discouraging computer program patents.<sup>361</sup> However, by that time, nine years had passed since the Court had asked Congress to enact *sui generis* legislation in *Benson*. It was under these circumstances that the *Diehr* Court implied that software aspects might be treated as mathematical algorithms—programs would neither impart patentability nor de-

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357. *Id.* at 595. Just as it had done in *Benson*, the Court noted that the threshold merits and demerits of software patentability were still being debated and that those who favored software patentability could not even agree on whether the patent term should be 17 years. *Id.* at 595 n.19.

358. *Id.* at 596. The Court cited Mr. Justice Byron White for support in requiring Congressional response:

We would require a clear and certain signal from Congress before approving the position of a litigant who, as respondent here, argues that the beach-head of privilege is wider, and the area of public use narrower, than courts had previously thought. No such signal legitimizes respondent's position in this litigation.

*Id.* (citing *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 531 (1971)).

359. *Id.*

360. *Diehr*, 450 U.S. at 179-80, 184-89, 191 (citing *Benson*); *Id.* at 185-87, 189, 191-92 (citing *Flook*).

361. *Id.* at 192-93. "Because we do not view respondents' claims as an attempt to patent a mathematical formula, but rather to be drawn to an industrial process for the molding of rubber products, we affirm the judgment of the Court of Customs and Patent Appeals." *Id.*

feat patentability. The Court began its decision by recognizing that the patent had been rejected for the computer-control aspect of the invention.<sup>362</sup> "[The examiner] determined that those steps . . . that are carried out by a computer under control of a stored program constituted nonstatutory subject matter under this Court's decision in [*Benson*]."<sup>363</sup> Although the Court limited its rationale to mathematical equations,<sup>364</sup> the Court implied an extension to computer programs.<sup>365</sup> "Our earlier opinions lend support to our present conclusion that a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, computer program, or digital computer."<sup>366</sup> The Court also implicated computer programs by highlighting the distinction that the applicant's claims were "not limited to the isolated step of 'programming a digital computer,'"<sup>367</sup> but, rather, asserted a physical rubber curing process, which rendered the claims patentable subject matter.<sup>368</sup> This holding, in which the Court arguably imposed a requirement of some physical transformation for software-related processes, provided little guidance regarding computer programs in which no physical transformation occurred.<sup>369</sup> Finally, the Court may have said most by saying

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362. *Id.* at 179-80.

363. *Id.* at 179-80.

364. *Id.* at 192.

[W]hen a claim containing a mathematical formula implements or applies that formula in a structure or process which, when considered as a whole, is performing a function which the patent laws were designed to protect (e.g., transforming or reducing an article to a different state or thing), then the claim satisfies the requirements of § 101.

*Id.*

365. *Id.* at 187.

366. *Id.* The Court made this statement just after separately considering the role of the computer. *Id.* "Obviously, one does not need a 'computer' to cure natural or synthetic rubber, but if the computer use incorporated in the process patent significantly lessens the possibility of 'overcuring' or 'undercuring,' the process as a whole does not thereby become unpatentable subject matter." *Id.*

367. *Id.* at 193 n.15.

368. *Id.* at 187-88, 193 n.15.

369. See also Samuelson, *supra* note 4, at 1101-02 (arguing that *Diehr* provides only weak support for the patentability of computer algorithms in general, and the Karmarkar algorithm in particular).

[If] one remembers that *Diehr* was a five-to-four decision, that more dissenters than members of the majority are still on the Court, that the Court in *Diehr* repeatedly emphasized that *Diehr's* process was traditionally indus-

least—the Court cited none of the policy arguments made in *Benson* and *Flook* against patenting computer programs, leaving the lower courts to infer that these arguments were no longer very persuasive.

The Court's reluctance to explicitly rule on computer program patentability in *Benson*, *Flook*, and *Diehr* was no endorsement of judicially extending broad patent protection to software. However, after nine years of legislative silence in the face of rapid software industry growth, the Court was understandably hesitant to argue against limited judicial expansion. Although the Court's implied suggestion that software should neither impart nor defeat patentability was consistent with the structure of the *Freeman-Walter-Abele* test, the Federal Circuit has not applied this test to non-algorithm software claims.

B. *The Problem with Applying the Freeman-Walter-Abele Analytical Test to Software Inventions*

Through *In re Freeman*,<sup>370</sup> *In re Walter*,<sup>371</sup> and *In re Abele*,<sup>372</sup> the C.C.P.A. developed a consistent, coherent approach to determining whether a claim asserts a mathematical algorithm.<sup>373</sup> "First, it must be determined whether the claim directly or indirectly recites an 'algorithm' in the *Benson* sense of that term."<sup>374</sup> If it is determined that the claim does not assert an algorithm, then the inquiry is at an end. If the claim does assert an algorithm, then the second part of the test is whether the claim would assert patentable subject matter absent the algorithm.<sup>375</sup> If the claim would assert patentable subject matter absent the algorithm, then the claim, as a whole, asserts patentable subject matter when the algorithm is included.<sup>376</sup> "[I]f

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trial in nature and transformed matter, and that the Court cited *Benson* and *Flook* approvingly throughout the *Diehr* opinion, it is clear that *Diehr* provides a fragile base for supporting the patentability of the Karmarkar algorithm. Unless and until *Benson* is overruled, patents on algorithms such as Karmarkar's are suspect.

*Id.* at 1102. See also *id.* at 1131-32.

370. 573 F.2d 1237 (C.C.P.A. 1978).

371. 618 F.2d 758 (C.C.P.A. 1980).

372. 684 F.2d 902 (C.C.P.A. 1982).

373. See *supra* part II.C.

374. *Freeman*, 573 F.2d at 1245.

375. See *supra* part II.C.

376. See *supra* part II.C.

the claim would be 'otherwise statutory,' . . . albeit inoperative or less useful without the algorithm, the claim likewise presents statutory subject matter when the algorithm is included."<sup>377</sup>

The distinction between patentable and unpatentable claims in *In re Abele*<sup>378</sup> illustrates the proper mathematical algorithm analysis, as applied to process claims. In that case, the applicant's claims 5 and 6 were:

5. A method of displaying data in a field comprising the steps of calculating the difference between the local value of the data at a data point in the field and the average value of the data in a region of the field which surrounds said point for each point in said field, and displaying the value of said difference as a signed gray scale at a point in a picture which corresponds to said data point.
6. The method of claim 5 wherein said data is X-ray attenuation data produced in a two dimensional field by a computed tomography scanner.<sup>379</sup>

The court concluded that claim 5 was "directed solely to the mathematical algorithm."<sup>380</sup> Accordingly, claim 5 "satisfied" both steps of the test in that, under the first step, the claim recited an algorithm and, under the second step, it was not applied in any manner to physical elements.<sup>381</sup> Consequently, the court declared claim 5 nonstatutory subject matter under § 101.<sup>382</sup> By virtue of dependence on claim 5, claim 6 also recited a mathematical algorithm.<sup>383</sup> Therefore, step one was satisfied. However, the court found that claim 6 required x-ray attenuation data, which is only available through the use of a computerized axial tomography (CAT) scanner.<sup>384</sup> Referring to the physical CAT scanner element, claim 6 would be "otherwise statutory,' . . . albeit inoperative or less useful without the

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377. *Abele*, 684 F.2d at 907.

378. 684 F.2d 902 (C.C.P.A. 1982).

379. *Abele*, 684 F.2d at 908.

380. *Id.*

381. *Id.* at 908-09.

382. *Id.* at 909; 35 U.S.C. § 101.

383. *Abele*, 684 F.2d at 908.

384. *Id.*

algorithm."<sup>385</sup> Therefore, the court declared that claim 6 recited statutory subject matter under part two of the test.<sup>386</sup>

As *Abele* demonstrated, the patentable subject matter analysis of mathematical algorithm claims is straightforward. This analysis could have been readily extended to computer program claims by modifying the test slightly. Step one would have inquired whether the claim was directed to a mathematical algorithm or computer program. If the claim recited neither a mathematical algorithm nor computer program, then the inquiry would be at an end, just as it would end under the mathematical algorithm test. If the claim did recite either a mathematical algorithm or computer program, then the inquiry would be whether the claim would be otherwise statutory, albeit inoperative, absent the algorithm or program. This modified *Freeman-Walter-Abele* test would have had the advantage of the mathematical algorithm test's precedent and analytical structure. Also, by encompassing both software and algorithms, the modified test would have diminished the arbitrary line drawing and addressed the concern that all software is ultimately mathematics and that the distinction between mathematical and nonmathematical algorithms has an extremely fragile basis.<sup>387</sup> Finally, the modified test would have adopted the Supreme Court's implied suggestion that computer programs neither impart nor defeat patentability.

The Federal Circuit has not yet extended the *Freeman-Walter-Abele* mathematical algorithm test to computer programs.

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385. *Id.* at 907 (citing *In re Walter*, 618 F.2d 758, 767 (C.C.P.A. 1980)).

The method of claim 6, unlike that of claim 5, requires "X-ray attenuation data." The specification indicates that such attenuation data is available only when an X-ray beam is produced by a CAT scanner, passed through an object, and detected upon its exit . . . . Were we to view the claim absent the algorithm, the production, detection and display steps would still be present and would result in a conventional CAT-scan process.

*Id.* at 908.

386. *Id.* at 908-09.

387. See, Allen Newell, *Response: The Models Are Broken, The Models Are Broken*, 47 U. PITT. L. REV. 1023, 1024 (1986) (responding to Donald S. Chisum, *The Patentability of Algorithms*, 47 U. PITT. L. REV. 959 (1986) (arguing for reversal of *Benson*)). "[A]ny attempt to find a helpful or cutting distinction between mathematics and nonmathematics . . . is doomed." *Id.* Professor Newell is an author of several books on computer software. Samuelson, *supra* note 4, at 1031 n.15. For further discussion of the difficulties identified by Newell, see Samuelson, *supra* note 4, at 1123-25.

In considering software patentability, perhaps the Federal Circuit is trying to separate and thereby escape some of the jurisprudence arising from mathematical algorithm analysis, especially the so-called physicality requirement. In *Benson*, *Flook*, and *Diehr*, the Supreme Court had required mathematical algorithm-containing processes to cause some physical transformation, explaining that a process is statutory only if it "either be tied to a particular machine or apparatus or . . . [operates] to change articles or materials to a 'different state or thing.'"<sup>388</sup> In *Abele*, the C.C.P.A. emphasized that this requirement was part of the *Freeman-Walter-Abele* mathematical algorithm test by stating that "*Walter* should be read as requiring . . . that the algorithm be 'applied in any manner to physical elements or process steps.'"<sup>389</sup> Thus, an extension of the *Freeman-Walter-Abele* analytical test to software might impose substantive physicality requirements that had previously been only applied explicitly to mathematical algorithms. For example, the *Freeman-Walter-Abele* includes a physicality requirement. The courts would have to delineate those software applications that would satisfy this requirement. Furthermore, the courts would have to determine the proper effect of claim drafting. For example, under a *Freeman-Walter-Abele* analysis, a software claim might fail if drafted as a process claim, due to the absence of a physical transformation, whereas a software machine claim might succeed by virtue of the presence of a general purpose computer as structure in the specification, satisfying the subject matter requirements of 35 U.S.C. § 101.

### C. Why Software "Machine" Claims May Be More Patentable Than Software "Process" Claims

The distinction between a machine or apparatus claim and a process or method claim is important because true machines and apparatus are, without exception, patentable subject matter under § 101.<sup>390</sup> "Once it is determined that the claim is

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388. *Benson*, 409 U.S. at 71. Although the Court disclaimed the rigid view that "no process patent could ever qualify if it did not meet the requirements of our prior precedents," *id.*, prior precedent is controlling until the Court or Congress establishes an exception.

389. *Abele*, 684 F.2d at 907.

390. 35 U.S.C. § 101.

truley [sic] drawn to specific apparatus, it necessarily follows that the apparatus is statutory subject matter under § 101.”<sup>391</sup> In contrast, some processes or methods have been judicially excluded from patentable subject matter.<sup>392</sup> *Gottschalk v. Benson* and its progeny have suggested that, when claims are drawn to a method or process, some patentable physical transformation must take place, as opposed to mere data transformation. In *Benson*,<sup>393</sup> where the Court scrutinized claims for a method of converting BCD to binary numerals, the Court cited the definition given in *Cochrane v. Deener*:<sup>394</sup>

A process is a mode of treatment of certain materials to produce a given result. It is an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing. . . . The machinery pointed out as suitable to perform the process may or may not be new or patentable; . . . The process requires that certain things should be done with certain substances, and in a certain order; but the tools to be used in doing this may be of secondary consequence.<sup>395</sup>

A process was thereby defined by the transformation of materials or substances.<sup>396</sup> In *Benson*, the conversion of BCD data into binary data was merely a data transformation, which could not save the claims from a subject matter rejection that the claims asserted merely an “idea.”<sup>397</sup>

The *Benson* Court highlighted the distinction between the “process” and “machine” patentability inquiries by stating that

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391. Denny, *supra* note 204, at 474-75. “Apparatus” is equivalent to “machine,” which is specifically patentable subject matter under § 101. 35 U.S.C. § 101.

392. Examples are the “mental steps,” “method of doing business,” and “mathematical algorithm” exceptions. See *supra* note 20 and accompanying text.

393. 409 U.S. 63 (1972).

394. *Id.* at 64 (citing *Cochrane v. Deener*, 94 U.S. 780, 788 (1877)).

395. *Cochrane v. Deener*, 94 U.S. 780, 788 (1877). The Court cited this definition again in *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978), and again in *Diamond v. Diehr*, 450 U.S. 175, 183 (1981). The Court in *Flook* stated that, “[a]s in *Benson*, we assume that a valid process patent may issue even if it does not meet one of these qualifications of our earlier precedents.” *Flook*, 437 U.S. at 588 n.9. However, the Court gave no indication of a process that would qualify for patent protection without qualifying under this definition. Accordingly, the definition is controlling until the Court carves out an exception.

396. “[A]cts, performed upon the subject-matter to be transformed and reduced to a different state or thing.” *Cochrane*, 94 U.S. at 788 (emphasis added).

397. *Id.* at 71; see also *supra* note 388 and accompanying text.

the "[t]ransformation . . . is the clue to the patentability of a process claim that does not include particular machines."<sup>398</sup> The Court further highlighted the distinction by reviewing several process claim cases, demonstrating that the disposition of the process claims were based on the quality of the transformations, including chemical, mechanical, and biological transformations.<sup>399</sup> Similarly, the claims in *Parker v. Flook*<sup>400</sup> and *Diamond v. Diehr*<sup>401</sup> were also drawn to processes or methods, rather than machines.<sup>402</sup> As a result, the patentable subject matter inquiry turned on the transformations. In *Flook*, the process transformed data (process conditions data into alarm limit data), just like the process in *Benson* (B.C.D. data into binary data), and data transformation again failed to save the claims from a patentable subject matter rejection.<sup>403</sup> In *Diehr*, even though part of the invention was data transformation (process conditions data into rubber cure time data),<sup>404</sup> an integral part of the invention was the physical transformation of uncured physical material or chemical compounds into cured rubber.<sup>405</sup> It was this physical transformation that the Court found dispositive in rendering the process or method claims patentable.<sup>406</sup>

In none of the three Supreme Court cases was the Court faced with interpreting machine claims and, consequently, the Court has not demonstrated whether machine or apparatus claims should be treated differently from process or method claims. If inventions which transform only data but are imple-

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398. *Benson*, 409 U.S. at 70.

399. *Id.* at 70-71. The Court left room for fact specific exceptions. *Id.* at 71.

It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a 'different state or thing.' We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.

*Id.* When such a process or method claim that did not meet the prior precedent requirements could ever qualify for patentability, the Court did not say. Instead, the Court limited its inquiry to the specific process claims in question, which were unpatentable as drawn to an "idea." *Id.* at 71-72.

400. 437 U.S. 584 (1978).

401. 450 U.S. 175 (1981).

402. See *supra* notes 56-72 and accompanying text.

403. *Flook*, 437 U.S. at 594.

404. *Diehr*, 450 U.S. at 178-79.

405. *Id.* at 184. See also *supra* notes 67-72 and accompanying text.

406. *Diehr*, 450 U.S. at 184.



mented by general purpose computers do not, as methods, satisfy patentable subject matter requirements, one might argue that drafting such inventions as machine claims should not make them patentable. However, confidence in this assertion might be undermined if the applicant used means-plus-function terms,<sup>407</sup> particularly in view of the Federal Circuit's decision *In re Alappat*,<sup>408</sup> in which the Federal Circuit held that a software means-plus-function machine claim satisfied the subject matter requirements of 35 U.S.C. § 101.<sup>409</sup> The impact of according claim language substantive effect is enlarged by the Federal Circuit's recent *In re Donaldson*<sup>410</sup> decision, which now requires the PTO also to apply 35 U.S.C. § 112, paragraph 6 when construing means-plus-function claims. Due to the effect of this decision on software claims, the propriety of the *Donaldson* decision must be examined.

D. *The Effect of Means-Plus-Function Claims on Computer Program and Mathematical Algorithm Patentability*

The 35 U.S.C. § 112, paragraph 6<sup>411</sup> mandate to construe means-plus-function claims to cover structures in the specification and their equivalents has bred confusion and controversy, particularly with regard to computer program and mathematical algorithm inventions.<sup>412</sup> If this claim format is accorded substantive effect, a software or mathematical algorithm "process" claim, phrased as a "computer means for" accomplishing the software or algorithm's function, becomes a "machine" claim, so long as the specification recites a computer. As a result, the claim would be automatically deemed patentable subject matter under § 101.<sup>413</sup>

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407. Cf. *Freeman*, 573 F.2d at 1247 ("Though a claim expressed in 'means for' (functional) terms is said to be an apparatus claim, the subject matter as a whole of that claim may be indistinguishable from that of a method claim drawn to the steps performed by the 'means.'"); *Benson*, 409 U.S. at 67-68 (citing *Funk Bros. Seed Co. v. Kalo Co.*, 333 U.S. 127, 130 (1948)) (comparing the patentable subject matter scrutiny of a "product" claim to the scrutiny of a process claim, stating, "we think the same principle applies").

408. 33 F.3d 1526 (Fed. Cir. 1994).

409. See *supra* part II.G.

410. 16 F.3d 1189 (Fed. Cir. 1994).

411. 35 U.S.C. § 112 (1988).

412. See *supra* part II.E.

413. See 35 U.S.C. § 101 (1988).

Relying on its position that § 112, paragraph 6 did not apply to the PTO,<sup>414</sup> the PTO argued that means-plus-function claims capable of being read so broadly as to encompass every means capable of performing the recited function were really method claims, not machine claims.<sup>415</sup> To avoid the Federal Circuit's contrary position that the claim interpreter must construe the "means" to cover structure in the specification for substantive purposes,<sup>416</sup> the PTO argued that § 112, paragraph 6 did not apply to the PTO.<sup>417</sup> By declining to follow the Federal Circuit's interpretation and in refusing to construe claims to cover the structures and equivalents listed in specifications, the PTO became the most salient and potent antagonist of the Federal Circuit's interpretation. Due to these conflicting views, patent attorneys were subjected to substantial uncertainty regarding software patentability and the effect of means-plus-function claims. In *In re Donaldson*<sup>418</sup> and *In re Alappat*,<sup>419</sup> the Federal Circuit correctly resolved its basic conflict with the PTO, but some confusion still remains.

1. *In re Donaldson*:<sup>420</sup> *The Federal Circuit's Cursory But Correct Conclusion that the PTO Must Construe Means-Plus-Function Claims to Cover Structures in the Specification and Their Equivalents*

To the extent that PTO policy conflicts with the patent statute, the statute must prevail. In *In re Donaldson*,<sup>421</sup> the court pointed out that § 112, paragraph 6<sup>422</sup> appears to be clear on its face—means-plus-function claims must be construed to cover structures in the specification and their equivalents.<sup>423</sup> The Federal Circuit adequately refuted Commissioner Manbeck's

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414. See *supra* notes 216-24 and accompanying text.

415. *Federal Circuit Hears Arguments*, *supra* note 271, at 412; *Ex parte Alappat*, 23 U.S.P.Q.2d (BNA) 1340, 1344 (Bd. Pat. App. & Int'f. 1992).

416. See *In re Bond*, 910 F.2d 831, 833 (Fed. Cir. 1990).

417. Manbeck, *supra* note 216, at 631.

418. 16 F.3d 1189 (Fed. Cir. 1994).

419. 33 F.3d 1526 (Fed. Cir. 1994).

420. 16 F.3d 1189 (Fed. Cir. 1994).

421. *Id.*

422. 35 U.S.C. § 112, para. 6 (1988).

423. *Donaldson*, 16 F.3d at 1193.

emphasis on the value of longstanding PTO precedent.<sup>424</sup> However, Commissioner Manbeck had also argued that: (1) in 1952, when 35 U.S.C. § 112 was enacted, the usage of terms in paragraph 6 corresponded to infringement actions before the courts, not *ex parte* proceedings before the PTO;<sup>425</sup> (2) if applied to the PTO, 35 U.S.C. § 112, paragraph 6 would effectively narrow the scope of some claims to corresponding structures in the specification, which, in turn, would conflict with the long-standing principle that claims are given their broadest possible interpretation in patentability determinations by the PTO;<sup>426</sup> and (3) early C.C.P.A. jurisprudence holding that 35 U.S.C. § 112, paragraph 6 does not apply to patentability determinations should be accorded substantial weight, particularly because 35 U.S.C. § 112, paragraph 6 was subsequently reenacted without change in the wake of this precedent.<sup>427</sup> These arguments were either ignored or summarily dismissed by the court. Nevertheless, the court was correct in its final conclusions, as indicated by a more in-depth analysis of Commissioner Manbeck's arguments.

a. *The Language of 35 U.S.C. § 112, Paragraph 6*

In his notice to the Official Gazette, Commissioner Manbeck supported his argument against applying 35 U.S.C. § 112, paragraph 6 to the PTO by citing the commentary that P.J. Federico had made shortly after the enactment of paragraph 6:<sup>428</sup>

[Paragraph 6] relates primarily to the construction of such claims for the purpose of determining when the claim is infringed (note the use of the word "cover"), and would not appear to have much, if any, applicability in determining the patentability of such

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424. *Id.* at 1194. See Manbeck, *supra* note 216, at 635 (emphasizing the importance of PTO precedent regarding means-plus-function claims when such precedent has withstood judicial interpretation and in light of which Congress was silent). See also *supra* note 254 and accompanying text (describing the court's response that longstanding failure to comply with the statute does not justify continuing noncompliance).

425. Manbeck, *supra* note 216, at 631, 633-34.

426. *Id.* at 635-36. Commissioner Manbeck points out that the stringent "broadest reasonable interpretation" rule is justified because patents that are ultimately issued enjoy a presumption of validity by the courts in infringement actions. *Id.* at 635.

427. *Id.*

428. *Id.* at 631 (citing Federico, *supra* note 133, at 25-26). Commissioner Manbeck notes that Mr. Federico assisted in drafting the Act. *Id.*

claims over the prior art, that is, the Patent Office is not authorized to allow a claim which "reads on" the prior art.<sup>429</sup>

Commissioner Manbeck's reliance on Mr. Federico's statement was misplaced because Mr. Federico was an employee of the Patent Office and, although working with the House Subcommittee on Patents, Trademarks, and Copyrights, was not a legislator, nor did he speak for any portion of Congress.<sup>430</sup> The Federal Circuit recognized this in *Donaldson*,<sup>431</sup> where the court asserted that Federico was "merely stating his personal views"<sup>432</sup> when he wrote the statement and that such statements did not constitute legislative history.<sup>433</sup> Furthermore, Mr. Federico's statement was equivocal.<sup>434</sup>

Mr. Federico also incorrectly implied that the use of the term, "cover," corresponded only to infringement actions, rather than *ex parte* patentability proceedings before the Patent Office. Contrary to Mr. Federico's implication, the term "cover" had been frequently used in the patentability context contemporaneous with and prior to the enactment of the Patent Act of 1952.<sup>435</sup> Mr. Federico also mistakenly implied that the term

429. *Id.*

430. Moy, *supra* note 107, at 275-76. "The mistaken authority given to Mr. Federico's commentary seems to stem from a confusion between his status as a textual author of the '52 Act's provisions, and the legislator's status as legal authors voting on it." *Id.* at 276.

431. *Donaldson*, 16 F.3d at 1193 n.3.

432. *Id.*

433. *Id.*

434. Mr. Federico used equivocal phrases such as "relates primarily" and "would not appear to have much" applicability. See also Moy, *supra* note 107, at 278-79.

435. See, e.g., *In re Cox*, 198 F.2d 846, 847 (C.C.P.A. 1952) ("The instant claims cover the use (of) not only those solvents illustrated by way of examples but also of others which might be found operative as a result of further experiment."); *In re Ray*, 198 F.2d 831, 834 (C.C.P.A. 1952) ("It will be observed that the Board was of opinion that . . . as the appealed claims were sufficiently broad to cover every possible means of accomplishing the desired purpose, they were broader than appellants' invention.") (quoting *In re Lawson*, 83 F.2d 1001, 1002 (C.C.P.A. 1936)); *In re Coey*, 190 F.2d 347, 348 (C.C.P.A. 1951) ("Claim 17 is directed to the method sought to be patented, and claim 18 covers a machine embodying that method."); *In re Coleman*, 189 F.2d 976, 980 (C.C.P.A. 1951) ("While the patented claims cover methods of protecting certain specified foodstuffs . . . , the appealed claims cover a specific wrapper capable of use in protecting any type of foodstuffs . . . ."); *In re Heltzer*, 189 F.2d 971, 975 (C.C.P.A. 1951) ("Claim 12 recites broadly 'a false-bodying agent,' thus seeking to cover all false-bodying agents whatever their composition."); *In re Muskat*, 187 F.2d 626, 628 ("[A]ppellants have estab-

was used in §§ 102 and 103 of Title 35,<sup>436</sup> relating to novelty and nonobviousness.<sup>437</sup> Therefore, "cover" was consistent with patentability determinations. Commissioner Manbeck raised the related argument that the term, "construed," also implicated an infringement action.<sup>438</sup> However, the term, "construed," was commonly used in the patentability context immediately prior to the enactment of the Patent Act of 1952;<sup>439</sup> its use refutes Mr. Manbeck's assertion that the word implicates infringement, and instead shows that the 35 U.S.C. § 112, paragraph 6 language is consistent with patentability determinations.

Commissioner Manbeck also argued that the reference in 35 U.S.C. § 112, paragraph 6 to the doctrine of equivalents,

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lished that the here allowed species claims, 9 and 10, cover subject matter . . . which is patentably distinct from the species covered by their patents . . ."; *In re Porter*, 184 F.2d 198, 200 (C.C.P.A. 1950) ("In our opinion, appellants were allowed claims broad enough to cover every patentable element which they saw fit to disclose and claim in their application."); *In re Frey*, 182 F.2d 184, 186 (C.C.P.A. 1950) ("The solicitor in his belief concedes that appellant had been asserting claims in his parent patent which cover the subject matter of the Finley patent claims, in that the subject matter of the copied claims are covered . . .").

436. 35 U.S.C. §§ 102, 103 (1988).

437. Moy, *supra* note 107, at 275 (citing 35 U.S.C. §§ 102, 103).

438. Manbeck, *supra* note 216, at 633-34.

439. See, e.g., *In re Taylor*, 193 F.2d 335, 337 (C.C.P.A. 1951) ("[T]he shield 58 of Fig. 12, described in claim 28 as a 'cup-shaped part with an integral base,' must be construed to be a 'tube' within the ordinary meaning of that term."); *In re Tamarin*, 187 F.2d 160, 163 (C.C.P.A. 1951) ("Claim 35 fairly construed specifies such a device."); *In re Kinney*, 168 F.2d 756, 757 (C.C.P.A. 1948) ("We are of opinion that the expression 'mutually reciprocating,' as it must be construed in the light of appellants' application, requires a regular movement of the compressor elements relatively to each other, and that it should not be so broadly construed as to cover two elements which are reciprocated at different rates of speed."); *In re Hatch*, 167 F.2d 1003, 1004 (C.C.P.A. 1948) ("Under such circumstances, it was proper for the examiner and the board to construe the appealed claims in the light of the disclosure of the Greider et al. patent."); *In re Waldie*, 164 F.2d 375, 376 (C.C.P.A. 1947) ("The board held that 'dehydrated castor oil' should be given its usual and ordinary meaning and that, when this term is so construed, the claims read upon the prior art as applied by the examiner."); *In re Haskell*, 157 F.2d 206, 207-08 (C.C.P.A. 1946) ("The issues here are whether or not appellant's original application, which had in it claims 1, 2, 3, and 7, later canceled by appellant, was deliberately confined to an artificial drive, and whether those claims can be construed to include a natural drive as alleged by appellant, and if so whether their cancellation was a deliberate abandonment of the subject matter of the involved claims."); *In re Thompson*, 154 F.2d 189, 192 (C.C.P.A. 1946) ("[T]he Patent Office did not reject the involved claims for the reason that claim 1 might be construed, as pointed out in the brief of the Solicitor, as a Markush claim . . .").

makes sense only in infringement actions.<sup>440</sup> However, C.C.P.A. precedent prior to the enactment of 35 U.S.C. § 112, paragraph 6 again refutes Commissioner Manbeck's assertion.<sup>441</sup> The language of 35 U.S.C. § 112, paragraph 6 is entirely consistent with Congressional intent that paragraph 6 apply to patentability determinations by the PTO.

b. *Structures from the Specification Constitute Elements, Not Limitations*

Commissioner Manbeck's argument that 35 U.S.C. § 112, paragraph 6 conflicts with the principle that claims should be given their broadest reasonable interpretation in patentability determinations before the PTO<sup>442</sup> is also flawed. As indicated by the court in *Donaldson*, the commissioner's argument was based on an erroneous assumption that applying paragraph 6 to the PTO would require the PTO to import limitations into the claim, conflicting with the principle of according claims their broadest reasonable construction.<sup>443</sup> The court provided cursory and inadequate treatment to this argument, but arrived at the correct conclusion. The language of 35 U.S.C. § 112 refers to construing "elements," not "importing limitations."<sup>444</sup> Construing elements to cover structures in the specification does not violate the principle that claims are to be given their broadest interpretation.

Although often overlooked or confused, patent law has generally drawn a distinction between an element and a limitation.<sup>445</sup> In the context of specifically considering the impact of 35 U.S.C. § 112 means-plus-function claims, the Federal Circuit

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440. Manbeck, *supra* note 216, at 634.

441. See, e.g., *In re Dalton*, 183 F.2d 75, 76 (C.C.P.A. 1950) ("The doctrine of equivalents is applied when the words of a claim presented for allowance by an applicant for a patent describe an invention disclosed in a patent previously granted.").

442. Manbeck, *supra* note 216, at 635-36.

443. *Id.* at 633-34. See also *Donaldson*, 16 F.3d at 1195; see also *supra* notes 257-58 and accompanying text.

444. 35 U.S.C. § 112.

445. See *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528, 1533 n.9 (Fed. Cir. 1987). See also Becker, *supra* note 108, at 253-54 (discussing the difference between the "all elements" rule and the "all limitations" rule).

has distinguished between an element and a limitation of a claim.<sup>446</sup>

References to "elements" can be misleading. "Elements" often is used to refer to structural parts of the accused device or of a device embodying the invention. "Elements" is also used in the phrase "[a]n element of a claim" in 35 U.S.C. § 112 ¶ 6. An element of an embodiment of the invention may be set forth in the claim (e.g., "said connecting means" in clause (h) of the present claim). It is the *limitation* of a claim that counts in determining both validity and infringement, and a limitation may include descriptive terms (e.g., "tapped into the coil at a point near, but spaced from, the grounded end thereof" in clause (h)). Because claims are composed of a number of limitations, the limitations have on occasion been referred to as "claim elements" or "elements of the claim," but clarity is advanced when sufficient wording is employed to indicate when "elements" is intended to mean a component of an accused device or of an embodiment of an invention and when it is intended to mean a feature set forth in or as a limitation in a claim.<sup>447</sup>

The Federal Circuit's distinction between elements and limitations is consistent with case law existing prior to the enactment of 35 U.S.C. § 112, paragraph 6, including C.C.P.A. review of patentability determinations by the PTO.<sup>448</sup>

Congress was aware of the legal meaning of the word, "limitations," in the context of 35 U.S.C. § 112. In the directly preceding paragraph, Congress twice used the word consistent with the legal meaning accorded by the courts.

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446. *Perkin-Elmer*, 822 F.2d at 1533 n.9.

447. *Id.*

448. See, e.g., *Dow Chemical Co. v. Skinner*, 197 F.2d 807, 810 (6th Cir. 1952) ("Where the claims of a patent define an element in terms of form, location, or function, thereby creating an express limitation . . . other forms may not be treated as equivalents."); *Charles Peckat Mfg. Co. v. Jacobs*, 178 F.2d 794, 799 (7th Cir. 1949) ("[S]uch language is in words of limitation which express the relationship of the structural elements only, and for this reason such claims are not to be considered as functional."); *In re Hooker*, 175 F.2d 558, 562 (C.C.P.A. 1949) ("Inasmuch as the claim fails to state any cooperative relationship of the 'means for modulating target image light' with any other element of the claim, the board held that element of the claim to be merely additive and not a patentable limitation."); *In re Benner*, 174 F.2d 938, 941 (C.C.P.A. 1949) ("Obviously it was the view of the tribunals of the Patent Office that the introductory phrase, 'A ball mill lining element,' with which each of the appealed claims begins, is not a limitation entering into the structure of the composition of which the lining element is composed.").

A claim in multiple dependent form shall contain a reference, in the alternative only, to more than one claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.<sup>449</sup>

In accordance with the canon of construction, *inclusio unius est exclusio alterius*,<sup>450</sup> one should construe Congress' choice not to use "limitation" in paragraph 6 as evidence that Congress did not envision paragraph 6 as importing limitations into claims. In addition to this basic canon of construction, Congress is presumed to be aware of the judicial interpretations of a statute and to have adopted such interpretations in the reenactment (or enactment) of a statute.<sup>451</sup> Because judicial interpretation drew the distinction between element and limitation at the time 35 U.S.C. § 112, paragraph 6 was enacted (and subsequently reenacted), Congress is presumed to have been aware of the distinction and to have meant "element," not "limitation."

The distinction between elements and limitations is often confusing, particularly with regard to process claims. For example, a process may require the heating of some material at high temperature. "High temperature" may be considered the element, whereas specific temperature ranges, such as 300-400°C, might be considered limitations.<sup>452</sup> The distinction with regard to apparatus claims is often more manageable because an apparatus element is usually a structural component or the structure itself, whereas, by contrast, a limitation describes the

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449. 35 U.S.C. § 112 (1988).

450. *Inclusio unius est exclusio alterius* literally means: "The inclusion of one is the exclusion of another." BLACK'S LAW DICTIONARY 763 (6th ed. 1990). "This doctrine decrees that where law expressly describes [a] particular situation to which it shall apply, an irrefutable inference must be drawn that what is omitted or excluded was intended to be omitted or excluded." *Id.*

451. See Manbeck, *supra* note 216, at 632 (citing *Lorrillard v. Pons*, 434 U.S. 474, 580 (1978); *Atkins v. United States*, 556 F.2d 1028, 1039 (Ct. Cl. 1977)).

452. See MERGES, *supra* note 23, at 676 (providing a similar example, but contrasting by example differing views regarding the distinction between elements and limitations). See also *In re Edwards*, 285 F.2d 811, 812-13 (C.C.P.A. 1961) (holding that temperatures listed in specification examples could not be imported to limit the claim language, "relatively low temperature").



detailed physical attributes of those components.<sup>453</sup> Section 112, paragraph 6 impliedly focuses on apparatus claims because it states that an element must be construed to cover "structure" when means-plus-function claims are used.<sup>454</sup>

Under proper paragraph 6 analysis, elements in means-plus-function claims, not limitations, are construed to cover structure in the specification. Accordingly, if a claim recites a means for sitting, and chairs are described in the specification, then the "means" element should be construed to cover chairs. However, the limitations suggested in the specification regarding the size or strength of the chairs may not be imported because they are not elements of the chair or the chair itself—they characterize the chair. Unless expressly limited within the text of the claims, the claims would be broadly construed to recite chairs of any size, any strength, and any texture.<sup>455</sup> In contrast, to ignore the chair's structure would be to vacate an element of the claim, which would be an "unreasonable" interpretation. Therefore, as stated in *Donaldson*, the application of 35 U.S.C. § 112, paragraph 6 to patentability determinations by the PTO is consistent with giving claims their broadest reasonable interpretation.<sup>456</sup> Although a grey area exists between pure "element" and pure "limitation," such grey areas arise in all conceptual line drawing, and the distinctions provided in longstanding precedent provide guidelines for deciding each case.<sup>457</sup> Although the Federal Circuit may be fairly criticized for using the "element" and "limitation" terms loosely, even in its *Donaldson* decision,<sup>458</sup> this failure does not alter its ultimately correct conclusion.

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453. *Perkin-Elmer*, 822 F.2d at 1533 n.9.

454. 35 U.S.C. § 112.

455. *Manbeck*, *supra* note 216, at 635.

456. *Donaldson*, 16 F.3d at 1194-95.

457. *E.g.*, *Perkin-Elmer Corp. v. Westinghouse Elec. Corp.*, 822 F.2d 1528 (Fed. Cir. 1987).

458. The court stated: "What we are dealing with in this case is the construction of a limitation already in the claim in the form of a means-plus-function clause and a statutory mandate on how that clause must be construed." *Donaldson*, 16 F.3d at 1195. However, the court should have stated that it was dealing with the construction of an element.

c. *C.C.P.A. Precedent as a Basis for Applying 35 U.S.C. § 112, Paragraph 6 to PTO Patentability Determinations*

Commissioner Manbeck also cited C.C.P.A. precedent as binding authority that 35 U.S.C. § 112, paragraph 6 does not apply to PTO patentability determinations. Commissioner Manbeck relied primarily on *In re Lundberg*,<sup>459</sup> which stated:

[N]otwithstanding the [sixth] paragraph of section 112, it is the language itself of the claims which must particularly point out and distinctly claim the subject matter which the applicant regards as his invention, without limitations imported from the specification, whether such language is couched in terms of means plus function or consists of a detailed recitation of the inventive matter. Limitations in the specification not included in the claim may not be relied upon to impart patentability to an otherwise unpatentable claim.<sup>460</sup>

This passage is in no way inconsistent with requiring the PTO to apply 35 U.S.C. § 112, paragraph 6 in patentability determinations. The cited passage states that "limitations in the specification shall not be relied on to impart patentability."<sup>461</sup> This statement is absolutely true—only the elements and limitations in a claim may impart patentability. The court in *Lundberg* recognized the distinction between elements and limitations, as was evident from its discussion of a prior art reference.<sup>462</sup> "While the amendments . . . originally submitted . . . were numerous, there was adequate disclosure in the specification as filed to meet each element as broadly recited . . . (as well as several of the limitations presented by the other claims in this appeal)."<sup>463</sup> The court said nothing inconsistent with assigning structure to elements, which, as demonstrated, is distinguished from importing limitations.<sup>464</sup> Furthermore, the court said nothing to indicate that the PTO was exempt from 35 U.S.C. § 112, paragraph 6.<sup>465</sup> Therefore, it was unnecessary for the

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459. 244 F.2d 543 (C.C.P.A. 1957).

460. *Id.* at 548.

461. *Id.*

462. *Id.* at 549.

463. *Id.*

464. See *supra* notes 442-58 and accompanying text.

465. *Lundberg*, 244 F.2d 543.

Federal Circuit to summarily overrule *Lundberg* to the extent that *Lundberg* diverged from the court's reasoning.<sup>466</sup>

Commissioner Manbeck also relied heavily on *In re Sweet*,<sup>467</sup> where the court stated that "a recitation of 'means' for performing a function is interpreted broadly to cover all means capable of performing the stated function and is not limited to the particular structure which the application may disclose."<sup>468</sup> However, as the Federal Circuit stated in *In re Iwahashi*,<sup>469</sup> the court in *Sweet* did in fact construe the claims to cover structure in the specification in the immediately preceding two paragraphs of the opinion.<sup>470</sup> In addition, the Federal Circuit pointed out that recited means are indeed not limited to a particular structure but, rather, include the permissible range of equivalents, as expressly dictated by 35 U.S.C. § 112, paragraph 6.<sup>471</sup> However, the Federal Circuit failed to note that "means" are not "limited" by the specification, but are structurally identified in accordance with the element-limitation distinction.<sup>472</sup> It is concededly difficult to explain the court's statement in *Sweet* that "a recitation of 'means' for performing a function is interpreted broadly to cover all means capable of performing the stated function,"<sup>473</sup> but in light of the court's correct application of the statute, the clear statutory language, and a fair reconstruction of congressional intent, this statement, by itself, should not dictate the inquiry under 35 U.S.C. § 112.

Finally, Commissioner Manbeck correctly stated that C.C.P.A. precedent is binding on the Federal Circuit, except when the Federal Circuit sits en banc.<sup>474</sup> However, later C.C.P.A. decisions *sub silentio* overrule previous conflicts with

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466. After stating its rationale that 35 U.S.C. § 112, paragraph 6 applies to the PTO, the court simply stated: "To the extent that *In re Lundberg*, *In re Arbeit*, or any other precedent of this court suggests or holds to the contrary, it is expressly overruled." *Donaldson*, 16 F.3d at 1193-94.

467. 393 F.2d 837 (C.C.P.A. 1968).

468. *Id.* at 841-42.

469. 888 F.2d 1370 (Fed. Cir. 1989).

470. *Id.* at 1375 (citing *Sweet*, 393 F.2d at 841-42).

471. *Id.* See also 35 U.S.C. § 112.

472. See *supra* notes 442-58 and accompanying text.

473. *Sweet*, 393 F.2d at 841-42.

474. Manbeck, *supra* note 216, at 634. See also *South Corp. v. United States*, 690 F.2d 1368, 1370-71 (Fed. Cir. 1982) (en banc). See also *supra* note 115.

C.C.P.A. precedents.<sup>475</sup> Any C.C.P.A. precedent prior to 1973 that might have suggested that 35 U.S.C. § 112, paragraph 6 does not apply to PTO patentability determinations was superseded by *In re Knowlton*.<sup>476</sup> Because C.C.P.A. precedent prior to *Knowlton* was consistent with the plain meaning of paragraph 6,<sup>477</sup> and because C.C.P.A. precedent subsequent to *Knowlton*, such as *Hale Fire Pump Co. v. Tokai, Ltd.*,<sup>478</sup> was also consistent with a plain reading of 35 U.S.C. § 112, paragraph 6, without limitation to infringement actions,<sup>479</sup> it can be fairly concluded that C.C.P.A. precedent required that the PTO construe means-plus-function claims to cover structures in the specification and their equivalents in accordance with the plain meaning of the 35 U.S.C. § 112, paragraph 6. Accordingly, the Federal Circuit's ultimate conclusion in *Donaldson* was consistent with prior case law and the court need not have summarily brushed the prior case law aside.

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475. *In re Gostelti*, 872 F.2d 1008, 1011 (Fed. Cir. 1989). See also *supra* note 115.

476. 481 F.2d 1357 (C.C.P.A. 1973). In regard to an application for a computer-based invention for determining commonality and correlating a data list, the C.C.P.A. scrutinized the specification to determine if disclosed means corresponding to a means-plus-function claim satisfied the disclosure requirements of § 112, paragraph 1. *Id.* The court concluded that, "[i]f the applicant chooses to use such language, the statute instructs the interpreter of the claims, e.g., the Patent Office or the courts, as to how such language shall be interpreted." *Id.* at 1366. See also *supra* notes 151-55 and accompanying text.

477. See *supra* notes 459-73 and accompanying text.

478. 614 F.2d 1278 (C.C.P.A. 1980).

479. *Id.* at 1283 n.5. See also *supra* notes 156-63 and accompanying text. See also *In re Henatsch*, 298 F.2d 954 (C.C.P.A. 1962) (patentability case between *Lundberg* and *Sweet* where the C.C.P.A. construed means in the claims to cover structure in the specification).

Construing the "means" specified in appellant's claim 19 to cover the embodiments described in his specification in connection with figures 24-27, on which it reads, in which the "roof coverings may be made of canvas stretched lightly over light frame structure," we find that Pollard also discloses a canopy or awning which provides an "overhead covering of rigid framework." Claim 19 so construed reads directly thereon.

*Id.* at 958.

2. *In re Alappat*:<sup>480</sup> *Applying the Donaldson Decision to Software Claims and Giving Substantive Effect to Means-Plus-Function Claim Drafting*

An analysis of *In re Alappat*<sup>481</sup> suggests that the Federal Circuit is experimenting with broader software patent protection by eroding the physicality requirement in two ways. First, the court is giving substantive effect to means-plus-function claim drafting; and second, the court is moving away from mathematical algorithm jurisprudence, particularly the *Freeman-Walter-Abele* test, to avoid the physicality requirement that such jurisprudence invokes.

By according substantive effect to the means-plus-function claims in *Alappat*, the Federal Circuit helped *Alappat* and subsequent software inventors to effectively circumvent the physicality requirement. The Federal Circuit began in *Alappat* with the noncontroversial statement that the expanded B.P.A.I. panel had erred by failing to construe *Alappat*'s means-plus-function claims to cover structures in the specification and their equivalents.<sup>482</sup> This result was required by *Donaldson*, which had just resolved the PTO's responsibility under 35 U.S.C. § 112, paragraph 6.<sup>483</sup> To the extent that the Federal Circuit's decision to reverse was based on the expanded panel's failure to apply 35 U.S.C. § 112, paragraph 6, the *Alappat* decision was a small step in Federal Circuit jurisprudence. However, the Federal Circuit went beyond this precedent when it actually applied 35 U.S.C. § 112, paragraph 6.

In attempting to illustrate how 35 U.S.C. § 112, paragraph 6 should apply to *Alappat*'s claims, the Federal Circuit grafted phrases allegedly describing structure from the specification onto corresponding means recited in *Alappat*'s claims.<sup>484</sup> The result was a claim that no longer contained means expressions, but instead described either a special purpose computer, configured to perform rasterizer functions, or a general purpose

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480. 33 F.3d 1526 (Fed. Cir. 1994).

481. *Id.*

482. *Alappat*, 33 F.3d at 1540 (citing *Donaldson*, 16 F.3d at 1193). See also *supra* notes 305-06 and accompanying text.

483. See *supra* part II.F.

484. *Alappat*, 33 F.3d at 1541. See also *supra* notes 308-10 and accompanying text.

computer, programmed to do the same. For example, the court's patchwork claim began:

A rasterizer [a "machine"] for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

(a) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the vertical distance between the endpoints of each of the vectors in the data list.<sup>485</sup>

The court's description of the rasterizer as a machine assumed the conclusion that the claim was, in fact, directed to a machine. However, this conclusion was arguable at best.

Although the court correctly attempted to use structure from the specification to define the means element in subsection (a) of the claim,<sup>486</sup> it is questionable whether the bracketed phrases did actually represent true structure. An "an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof"<sup>487</sup> is created in any general purpose computer merely by writing and compiling one or two lines of code. Likewise, the circuits described by the bracketed expressions in subsections (b) and (c) may also be created by one or two lines of code in any general purpose computer.<sup>488</sup> The only bracketed phrase that arguably called for a discreet structural element was in subsection (d), which contained "a read only memory (ROM) containing illumination intensity data, or an equivalent thereof."<sup>489</sup> However, the Federal Circuit stated that this was not an operative distinction—the claims would

485. *Id.*

486. Under 35 U.S.C. § 112, paragraph 6, the court was correct in construing means elements in the claims as corresponding to structure in the specification—in contrast to limitations, which must entirely reside in the claims themselves. See *supra* part III.D.1.b.

487. *Alappat*, 33 F.3d at 1541.

488. Grafted subsections (b) and (c) were:

(b) [an arithmetic logic circuit configured to perform an absolute value function, or an equivalent thereof] for determining the elevation of a row of pixels that is spanned by the vector;

(c) [a pair of barrel shifters, or equivalents thereof] for normalizing the vertical distance and elevation.

*Id.*

489. *Id.*

have described a rasterizer machine even without the ROM element.<sup>490</sup>

By grafting the bracketed expressions into the claims, the court impliedly suggested that these expressions described structure within the meaning of 35 U.S.C. § 112, paragraph 6. However, to suggest that a few lines of computer code may be considered "structure" stretches the meaning of structure beyond any physical boundaries. By so doing, the court advocated an interpretation of means-plus-function claims that allows illusory structure to give mock-physical substance to a "machine" claim.<sup>491</sup> The court further encouraged this legal fiction by stating: "We have held that such programming creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software."<sup>492</sup> Although this legal fiction did not straightfor-

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490. In responding to the expanded panel's attempt to distinguish a prior case on the basis that the claim in the prior case had recited a ROM element, the court stated:

The Board majority's attempts to distinguish *Iwahashi* on the basis that the claim at issue in that case recited a ROM are unavailing. The *Iwahashi* court clearly did not find patentable subject matter merely because a ROM was recited in the claim at issue; rather the court held that the claim as whole, directed to the combination of the claimed means elements, including the claimed ROM as one element, was directed to statutory subject matter. It was not the ROM alone that carried the day.

*Id.* at 1544 n.24 (citing *In re Iwahashi*, 888 F.2d 1370, 1375 (Fed. Cir. 1989)).

491. Without this illusory structure, the applicant would be forced to claim the invention as a method or process, which may be unpatentable subject matter under 35 U.S.C. § 101, particularly if the *Freeman-Walter-Abele* requirement of "application in [some] manner to physical elements or steps," *In re Walter*, 618 F.2d 758, 767 (Fed. Cir. 1980), were applied. See also *supra* part III.C (explaining the importance of distinguishing process from machine claims in the patentable subject matter inquiry).

492. *Alappat*, 33 F.3d at 1545. See also Lee E. Barrett, *PTO Perspective on Recent Developments in Patent Protection for Computer Hardware and Software*, 16 HASTINGS COMM. & ENT. L.J. 627, 655 (1994).

The PTO is in the process of drafting guidelines to follow *Alappat*. One remaining question is whether the court has created a rule that claims in means-plus-function format are statutory subject matter. The court seemed to leave open the possibility that under the appropriate circumstances . . . , where there was "apparent lack of any supporting structure in the specification corresponding to the claimed 'means' elements," it might still be proper to treat claims as "in effect nothing more than process claims in the guise of apparatus claims." . . . It may be that a purely software disclosure (e.g., program code and flowcharts), may be one circumstance where a means-

wardly assault the physicality requirement, the Federal Circuit did erode the requirement, leaving it nominally intact as an avenue of retreat, should the court's position on software patentability later be deemed untenable.

E. *Eroding the Physicality Requirement by Minimizing Mathematical Algorithm Analysis*

The court further eroded the physicality requirement by circumventing mathematical algorithm analysis, and particularly the *Freeman-Walter-Abele* test,<sup>493</sup> in the court's analysis of Alappat's claims. In contrast to the three member B.P.A.I. panel, which had expressly applied the *Freeman-Walter-Abele* test,<sup>494</sup> the Federal Circuit stated that the test may be merely "helpful under some circumstances to more fully understand the claimed subject matter. Nevertheless, even in those cases wherein courts have applied a variant of the two-part analysis . . . , the ultimate issue always has been whether the claim as a whole is drawn to statutory subject matter."<sup>495</sup>

In downplaying the role of the *Freeman-Walter-Abele* test, the court effectively minimized the emphasis placed on physical steps in the patentability inquiry.<sup>496</sup> Instead, the court emphasized that, as a whole, the claims were directed to a machine.<sup>497</sup>

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plus-function claim could be treated as a process claim, but even this is in doubt given the court's reliance on statements that a computer program in effect creates a new machine.

*Id.* (citations and footnotes omitted).

493. See *supra* part II.C for an overview of the *Freeman-Walter-Abele* test and *supra* part III.B for an explanation of how that test implicates a physicality requirement—at least for mathematical algorithm patentability.

494. *Ex parte Alappat*, Appeal No. 91-1277 (Bd. Pat. App. & Int'f. June 26, 1991).

495. *Alappat*, 33 F.3d at 1544.

496. For a discussion of how the *Freeman-Walter-Abele* test emphasizes the importance of physical steps in the patentability inquiry, see *supra* part III.B.

497. The court stated:

Given the foregoing, the proper inquiry in dealing with the so called mathematical subject matter exception to § 101 alleged herein is to see whether the claimed subject matter *as a whole* is a disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a "law of nature," "natural phenomenon," or "abstract idea." If so, *Diehr* precludes the patenting of that subject matter. That is not the case here.



However, this talismanic use of “invention as a whole” language in conjunction with a machine-like description of the software’s functional characteristics did not transform the invention into a new machine. Again, the court succeeded only in eroding the substance of the physicality requirement without dismissing the requirement altogether.

#### F. *Practical Advice for the Practitioner*

The Federal Circuit’s willingness to engage in limited legal fiction in order to find computer-related inventions patentable<sup>498</sup> is both a boon and a curse to the software patent practitioner. The positive aspect is that the legal fiction of attributing physicality to software claims drafted in means-plus-function format creates a relaxed standard for software patentability. This, in turn, may allow software developers to obtain patent protection where none was previously available. The negative aspect is that means-plus-function format limits the scope of the claims to only those structures that are described in the specification, and a potentially narrow range of equivalents.<sup>499</sup> This limitation is the cost that means-plus-function format exacts for providing the drafter with the opportunity to include every envisioned embodiment of the invention in the specification, without having to include those embodiments in the claims.

Because the current relaxed standard is limited to claims drafted in means-plus-function format, the patent practitioner should always claim software inventions as machines or apparatuses in means-plus-function format. Furthermore, each “means” should be capable of being satisfied by computer hardware. For example, the court in *Alappat* defined several of the means in *Alappat*’s ultimately patentable invention as “arith-

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Although many, or arguably even all, of the means elements recited in claim 15 represent circuitry elements that perform mathematical calculations, which is essentially true of all digital electrical circuits, the claimed invention as a whole is directed to a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means.

*Alappat*, 33 F.3d at 1544 (emphasis added).

498. See *supra* parts III.D and E.

499. 35 U.S.C. § 112 (1988). See also *supra* parts II.D, II.E, III.D, and III.E.

metic logic circuits,<sup>500</sup> implying that the means could be interpreted as electrical circuitry hardware. Of course, practitioners should ensure that the means are also capable of being satisfied by software programmed to accomplish the identified function.

Software means-plus-function claims should be divided into several interrelated means because 35 U.S.C. § 112, paragraph 6 allows means-plus-function claims only for combinations.<sup>501</sup> Segregation into several components has the added benefit of facilitating the analogy to hardware circuit components, which tend have more discreet, unique functions. The practitioner may also recite some structure in dependent claims to support a finding of physical apparatus or a finding of application to physical steps.<sup>502</sup>

The specification should be drafted so that the means expressions in the claims correspond to specific hardware circuits or general purpose computer elements, in addition to the desired software embodiments. At least one, and preferably all, of these software embodiments should specifically correspond to the individual hardware elements, because those are the least likely to cause objection as failing to satisfy the 35 U.S.C. § 112, paragraph 6 requirement of structure. Specific software embodiments will also avoid a narrow construction of the claims, which might otherwise limit the invention to a dedicated hardware apparatus for performing the specified function. Furthermore, the practitioner should include a wide range of exemplary software embodiments to protect against a narrow range of equivalents. The practitioner should not assume that the doctrine of equivalents<sup>503</sup> will extend the claims substantially beyond the embodiments in the specification, especially because claiming software is already stretching the boundaries of the current law. This guidance, and careful attention to the court's

500. *Alappat*, 33 F.3d at 1541.

501. 35 U.S.C. § 112 (1988). "An element in a claim for a *combination* may be expressed as a means or step for performing a specified function . . ." *Id.* (emphasis added).

502. See also Peter J. Ayers, *Interpreting In re Alappat With an Eye Towards Prosecution*, 75 J. Pat. & Trademark Off. Soc'y 741, 763-65 (1994) (providing application drafting guidance to the software patent practitioner).

503. See *supra* note 131.

concerns in *Alappat*,<sup>504</sup> should help the practitioner to draft applications that meet the current patentability requirements for software inventions.

#### IV. Conclusion

Computer software patentability jurisprudence is a rapidly evolving area of the law. Beginning with *Gottschalk v. Benson*,<sup>505</sup> the patentable subject matter issue was phrased in terms of preventing an inventor from preempting a mathematical algorithm or a series of abstract ideas—these were exceptions to patentable subject matter and they precluded most software inventions. Providing only narrow, if any, software protection was advisable at the time because computers and software were new, and Congress had not yet had an opportunity to address the issues that this new form of intellectual property presented. In addition, the number of software patent applications must have been small at the outset. However, Congress failed to address software patentability even while software and computers were clearly becoming subjects of a major economic industry, and even after prompting by the courts and commentators. The courts were left to address the issues on a case-by-case basis. Consequently, the courts had to proceed cautiously, carving out larger areas of protection and, conversely, limiting the exceptions that had previously narrowed software protection.

Currently, the Federal Circuit is trying to emaciate the substance of a requirement that had previously been imposed, if indirectly, by the Supreme Court and the lower federal courts. This “physicality” requirement may serve to deny patentability where the invention lacks physical structure or when the only physical substance attributable to an invention resides in a general purpose computer. Conversely, the requirement demands that software inventions possess some physical element—either physical steps or physical structure—to make the invention patentable. As case law has shown, this physicality require-

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504. See *supra* parts II.G and III.D.2. See also Ayers, *supra* note 502, at 763-65 (demonstrating how patent applications may be specifically tailored to meet the court's concerns in *Alappat*).

505. 409 U.S. 63 (1972).

ment has acted as a substantial obstacle to software inventors seeking patent protection.

The Federal Circuit has effectively eroded the physicality requirement and provided software developers with broader patent protection by: (a) allowing the patent applicants to circumvent the physicality requirement with means-plus-function claims; and (b) minimizing the role of the mathematical algorithm line of cases. The patent practitioner should be aware that the Federal Circuit is accomplishing this expansion of software rights by engaging in legal fiction, probably to avoid reversal and, more importantly, to avoid mistakes with costly economic repercussions. For now, this legal fiction may be used to allow inventors to describe software as machine components, thereby satisfying the patentable subject matter requirements of 35 U.S.C. § 101. The patent practitioner should be prepared to engage in this legal fiction to secure maximum client intellectual property rights. Ultimately, the physicality requirement may be so substantially eroded by such legal fiction that the requirement will be discarded altogether. Until then, practitioners should treat software claim drafting as a particularly delicate matter. Finally, the practitioner should caution clients that the law is not yet settled, and that even the best efforts to provide software patent protection may be frustrated by changes in the law.

*Lawrence Kass\**

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\* Thanks to my editorial staff, led by John Braatz and ably advised in substantive patent law by Jay Anderson. Special thanks to my family and friends, especially Lisa Montanaro, for their assistance and comradeship throughout law school and in writing this Comment. Acknowledgement and grateful appreciation to Professor Victoria Lutz for teaching me the art of legal research and writing.