

# Return of the Walter Test: Patentability of Claims Containing Mathematical Algorithms After *In Re Grams*

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THE RETURN OF THE *WALTER* TEST:  
PATENTABILITY OF CLAIMS CONTAINING  
MATHEMATICAL ALGORITHMS AFTER  
*IN RE GRAMS*

For the past twenty years, the federal courts and the Patent Trademark Office (PTO)<sup>1</sup> have struggled with the question of whether claims in a patent application that include a mathematical algorithm recite patentable subject matter under 35 U.S.C. § 101.<sup>2</sup> Historically, courts have held that a mathematical algorithm is not patentable subject matter because it is similar to a law of nature.<sup>3</sup> Thus, granting patent protection to a mathematical algorithm would be like patenting a fundamental truth, such as Einstein's Theory of Relativity.<sup>4</sup> Nevertheless, courts generally have held that an application of a mathematical algorithm to a known structure or process may be patented if that algorithm exists in a particular relationship with the other steps of the claim.<sup>5</sup>

Courts have labored to formulate a test for determining when a claim, part of which is a mathematical algorithm, contains this relationship and thus recites patentable subject matter.<sup>6</sup> For such a test to be valid, it must provide not only correct and consistent results, but also an objective and clear standard with which to reach these results. The courts and the PTO currently use a test which fails to successfully balance these concerns.

Part I of this Note examines what constitutes patentable subject matter under section 101 and explains why courts typically do not

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<sup>1</sup> The Patent and Trademark Office (PTO) and the federal courts exist in a relationship specially created by the patent statute. See 35 U.S.C. §§ 1-376 (1988). Initially, all patent applications are submitted to the PTO for examination. A patent is issued to an applicant only after the PTO determines that it meets substantive and procedural statutory requirements. If the patent application is rejected by the PTO, the applicant may appeal exclusively to the United States Court of Appeals for the Federal Circuit. If a patent is granted by the PTO, the patent owner may subsequently enforce the patent by bringing a suit for patent infringement in a United States district court. The fact that the patent has already been reviewed and issued by the PTO does not prevent the defendant in an infringement action from proving that the patent does not meet the requirements of the patent laws. However, the patent enjoys a presumption of validity. EDMUND W. KITCH & HARVEY S. PERLMAN, *LEGAL REGULATION OF THE COMPETITIVE PROCESS* 771-72 (4th ed. 1989).

<sup>2</sup> 35 U.S.C. § 101 (1988) [hereinafter all references in text are to section 101].

<sup>3</sup> See *infra* notes 35-42 and accompanying text.

<sup>4</sup> See *Diamond v. Diehr*, 450 U.S. 175, 185 (1981); *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980).

<sup>5</sup> See *infra* notes 43-44 and accompanying text.

<sup>6</sup> See *infra* notes 43-168 and accompanying text.

allow the patenting of inventions that consist only of mathematical algorithms. Part II consists of four subparts which analyze how courts have determined whether claims that include a mathematical algorithm contain patentable subject matter. The first subpart reviews how the United States Supreme Court's decisions in *Gottschalk v. Benson*<sup>7</sup> and *Parker v. Flook*<sup>8</sup> set the framework for later methods of analysis under section 101. The second subpart presents a two-step test as formulated by the Court of Customs and Patent Appeals (CCPA)<sup>9</sup> in *Application of Walter*.<sup>10</sup> The third subpart argues that the United States Supreme Court has implicitly endorsed the *Walter* test. The last subpart contrasts *Walter* with the CCPA's 1982 decision in *In re Abele*<sup>11</sup> and argues that the *Abele* court's relaxed reading of the *Walter* test is inconsistent with the principles and rationales underlying the *Walter* decision. Finally, Part III of this Note discusses the section 101 analysis recently presented in *In re Grams*.<sup>12</sup> The Note argues that while the *Grams* court reinstated the *Walter* test to determine when a claim containing a mathematical algorithm is patentable, it should have gone further by declaring the *Walter* test also dispositive of when such a claim is unpatentable.

## I

### ORIGINS OF PATENTABILITY

#### A. Patentable Subject Matter Under Section 101

The statutory standards of patentability rest on a constitutional grant of power. The United States Constitution states: "The Congress shall have power . . . [t]o promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries."<sup>13</sup>

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<sup>7</sup> 409 U.S. 63 (1972).

<sup>8</sup> 437 U.S. 584 (1978).

<sup>9</sup> The United States Court of Customs and Patent Appeals (CCPA) was merged in 1982 with the United States Court of Claims to create the United States Court of Appeals for the Federal Circuit. The most significant new jurisdiction conferred upon the Federal Circuit (in addition to the previous jurisdictions of the merging courts) is the power to review the patent decisions of the district courts. The purpose of this new jurisdiction is to lessen the burdens of the other circuit courts and to increase the uniformity of patent law. Because all patent appeals are decided by the Federal Circuit, there are never conflicts with other circuits on issues of patent law. Consequently, the Supreme Court rarely reviews a case involving patent law and decisions of the Federal Circuit are usually the sole controlling precedents. E. KITCH & H. PERLMAN, *supra* note 1, at 772.

<sup>10</sup> 618 F.2d 758 (C.C.P.A. 1980).

<sup>11</sup> 684 F.2d 902 (C.C.P.A. 1982).

<sup>12</sup> 888 F.2d 835 (Fed. Cir. 1989).

<sup>13</sup> U.S. CONST. art. I, § 8, cl. 8. Patent law grants inventors the right to exclude others from duplicating their patented invention for 17 years. ROBERT L. HARMON, PATENTS AND THE FEDERAL CIRCUIT 5 (1988).

Pursuant to this constitutional mandate, Congress enacted the patent laws, which are incorporated in Title 35 of the United States Code.<sup>14</sup> Section 101 of this title establishes the categories of subject matter into which inventions or discoveries must fall in order to qualify for patent protection.<sup>15</sup> A court will deem an invention "nonstatutory" or "unpatentable" subject matter if it does not fall within one of these categories.<sup>16</sup>

The section 101 categories of patentable subject matter include "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof."<sup>17</sup> The committee reports which accompanied the 1952 Patent Act<sup>18</sup> indicate that Congress intended statutory subject matter to "include anything under the sun that is made by man."<sup>19</sup> Recognizing this legislative intention, the Supreme Court has applied a broad interpretation to statutory subject matter.<sup>20</sup> Thus, the Court has in-

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<sup>14</sup> 35 U.S.C. §§ 1-376 (1988). The Patent Act of 1952 is the most recent and comprehensive patent legislation. In creating the requirements of the 1952 Act, Congress attempted to balance the traditional patent policy of encouraging inventors to develop inventions that benefit society with the need for well-defined patent issuance guidelines which promote orderly administration of the patent system. Note, *The Policy Implications of Granting Patent Protection to Computer Software: An Economic Analysis*, 37 VAND. L. REV. 147, 162 (1984) (authored by Jeffrey S. Goodman).

<sup>15</sup> Once an invention is deemed to be patentable subject matter under section 101, it must then be examined for novelty and nonobviousness as required under sections 102 and 103, respectively. However, if an invention does not satisfy the requirements of section 101, the invention is not patentable and the novelty and nonobviousness requirements are not addressed. Stephen D. Kahn & Daniel A. DeVito, *Patent Protection for Computer Software*, 1 J. PROPRIETARY RTS. 7, 8 (June 1989).

<sup>16</sup> The terms "nonstatutory" and "unpatentable" both mean that a claimed invention does not satisfy the requirements of section 101 and, therefore, is not patentable subject matter. This Note will use these two terms interchangeably.

<sup>17</sup> 35 U.S.C. § 101 (1988). Section 101 states three requirements for patentability: the invention must be (1) new; (2) useful; and (3) statutory subject matter. However, the question of whether a particular invention is new or novel is distinct from the question of whether it is statutory subject matter. See *Application of Bergy*, 596 F.2d 952, 961 (C.C.P.A. 1979). The novelty of an invention is considered only under section 102, notwithstanding that this requirement is first mentioned in section 101. *Id.*; see also *Application of Freeman*, 573 F.2d 1237, 1243 (C.C.P.A. 1978) (stating that the "point of novelty" approach is inappropriate in determining whether a claimed invention is statutory subject matter under section 101).

<sup>18</sup> See *supra* note 14.

<sup>19</sup> S. REP. NO. 1979, 82d Cong., 2d Sess. 5; see H.R. REP. NO. 1923, 82d Cong., 2d Sess. 6, reprinted in 1952 U.S. CODE CONG. & ADMIN. NEWS 2394, 2399.

<sup>20</sup> See U.S. DEP'T OF COMMERCE, PATENT AND TRADEMARK OFFICE, MANUAL OF PATENT EXAMINING PROCEDURE ch. 2106, at 2100-02 (Oct. 1987) (stating that the Supreme Court in *Diamond v. Diehr* and *Diamond v. Chakrabarty* construed section 101 broadly). In *Diamond v. Chakrabarty*, 447 U.S. 303 (1980), the Supreme Court determined that a living man-made microorganism fell within the terms of "manufacture" or "composition of matter" in section 101. As stated in *Grams*, "*Chakrabarty* expressly rejects the argument that patentability in a new area, 'micro-organisms[,] cannot qualify as patentable subject matter until Congress expressly authorizes such protection.'" *In re Grams*, 888 F.2d 835, 838 (Fed. Cir. 1989) (quoting *Chakrabarty*, 447 U.S. at 314). The *Grams* court

terpreted the words of section 101 “‘as taking their ordinary, contemporary, common meaning,’”<sup>21</sup> and has avoided reading limitations into section 101 that Congress has not expressed.<sup>22</sup>

Generally, an invention that involves new acts or methods falls under the section 101 category of process.<sup>23</sup> An invention that contains physical subject matter is classified as either machine, manufacture, or composition of matter.<sup>24</sup> Congress defined the term “process” in section 100(b) as a “process, art or method” that may include “a new use of a known process, machine, manufacture, composition of matter, or material.”<sup>25</sup> This language, however, has provided courts with little guidance in determining when an invention can be classified as a process.<sup>26</sup>

The Supreme Court provided a more helpful and complete meaning for the term by defining a process as “an act, or a series of acts, performed upon the subject-matter to be transformed and reduced to a different state or thing.”<sup>27</sup> This judicial definition contemplates that a process will consist of a series of steps or operations whereby a desired result or effect will be produced by “‘chemical action, [or] by the operation or application of some element or power of nature, or of one substance to another.’”<sup>28</sup> One example of a patentable process is the step-by-step method for molding synthetic rubber, which begins with the loading of raw, uncured rubber into a mold and ends with the eventual opening of the press at the conclusion of the cure.<sup>29</sup>

Subject matter falls under the section 101 category of “machine” if an aspect of the patent claim includes a “mechanical

noted that the Court’s rejection of this argument in *Chakrabarty* seems to reflect a change in the Court’s thinking from *Parker v. Flook*, 437 U.S. 584 (1978), where the Court said that it must proceed cautiously when asked to extend patent rights into areas wholly unforeseen by Congress. *Grams*, 888 F.2d at 838.

<sup>21</sup> *Diamond v. Diehr*, 450 U.S. 175, 182 (1981) (quoting *Perrin v. United States*, 444 U.S. 37, 42 (1979)).

<sup>22</sup> *Id.*

<sup>23</sup> *PTO Report on Patentable Subject Matter: Mathematical Algorithms and Computer Programs*, 38 Pat. Trademark & Copyright J. (BNA) No. 948, at 563 (Sept. 21, 1989) [hereinafter *PTO Report*].

<sup>24</sup> *Id.*

<sup>25</sup> 35 U.S.C. § 100(b) (1988).

<sup>26</sup> Note, *Algorithm Patentability after Diamond v. Diehr*, 15 IND. L. REV. 713, 714 (1982) (authored by Roland A. Fuller III).

<sup>27</sup> *Diamond v. Diehr*, 450 U.S. 175, 183 (1981) (quoting *Cochrane v. Deener*, 94 U.S. 780, 788 (1877)); see also *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972) (“Transformation and reduction of an article ‘to a different state or thing’ is the clue to the patentability of a process claim that does not include particular machines.”).

<sup>28</sup> *Diehr*, 450 U.S. at 183 n.7 (quoting *Corning v. Burden*, 56 U.S. (15 How.) 252, 267 (1854)).

<sup>29</sup> *Id.* at 184. Other examples of patentable processes include the “arts of tanning, dyeing, making water-proof cloth, . . . [and] smelting ores.” *Id.* at 183 n.7.

device . . . to perform some function and produce a certain effect or result."<sup>30</sup> In many instances, a claim may include a combination of both machinery and process.<sup>31</sup> However, the machinery used to perform the process need not be new or patentable for the claim itself to be patentable.<sup>32</sup> If the machine is secondary to the process as a whole, and the process itself is patentable, then the claim recites statutory subject matter.<sup>33</sup>

## B. Mathematical Algorithms Are Not Per Se a Statutory Process Under Section 101

Notwithstanding the Supreme Court's view that courts should give statutory subject matter under section 101 a broad interpretation,<sup>34</sup> courts in the past have held that natural truths are not patentable.<sup>35</sup> This position follows from the language of section 101. Specifically, the use of the phrase "whoever invents" in section 101 requires that the claimed subject matter be man-made or invented, and not merely discovered.<sup>36</sup> Thus, laws of nature, scientific truths, natural phenomena, and abstract intellectual ideas are never patentable.<sup>37</sup> Courts have held that "[s]uch discoveries are 'manifestations of . . . nature, free to all men and reserved exclusively to none.'"<sup>38</sup>

The Supreme Court has viewed mathematical algorithms as

<sup>30</sup> *Id.* at 182-83 n.7.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.* at 184.

<sup>33</sup> *Id.*

<sup>34</sup> See *supra* notes 19-22 and accompanying text. Despite Congress's intentionally broad wording of section 101, courts have interpreted the language of this section narrowly to insure that grants of patent protection are consistent with basic policies of the patent system. See Note, *supra* note 14, at 163.

<sup>35</sup> *Diehr*, 450 U.S. at 185; *Parker v. Flook*, 437 U.S. 584, 589 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 67 (1972); see also *In re Meyer*, 688 F.2d 789, 795 (C.C.P.A. 1982) ("The Supreme Court has recognized that scientific principles and laws of nature, even when for the first time discovered, have existed throughout time, define the relationship of man to his environment, and, as a consequence, ought not to be the subject of exclusive rights of any one person.").

<sup>36</sup> *Kahn & DeVito*, *supra* note 15, at 8. The word "discovers" in section 101 has been interpreted as having the same meaning as the word "invents." E. KITCH & H. PERLMAN, *supra* note 1, at 856.

<sup>37</sup> *Le Roy v. Tatham*, 55 U.S. (14 How.) 156, 175 (1853). As the Court stated in *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127, 130 (1948), "[i]f there is to be [an] invention from such a discovery, it must come from the application of the law of nature to a new and useful end." See also *infra* note 48 and accompanying text.

<sup>38</sup> *Diamond v. Chakrabarty*, 447 U.S. 303, 309 (1980) (quoting *Funk Bros. Seed Co.*, 333 U.S. at 130). In holding that laws of nature, scientific truths, natural phenomena, and abstract intellectual ideas are not patentable, courts have reflected the principle that all of society should be free to use these concepts, and to allow such patents would suppress technological progress, contrary to article I, section 8 of the Constitution. Note, *Patentability of Computer-Related Inventions: A Criticism of the PTO's View on Algorithms*, 54 GEO. WASH. L. REV. 871, 884 (1986) (authored by Jeffrey A. Simenauer).

similar to laws of nature and has held that a “[mathematical] algorithm, or mathematical formula . . . like a law of nature . . . cannot be the subject of a patent.”<sup>39</sup> This exception applies only to *mathematical* algorithms and not to algorithms in general.<sup>40</sup> Any process is an algorithm in the sense that it is a step-by-step procedure to arrive at a given result. To extend this exception to all algorithms would have the effect of reading “process” out of section 101.<sup>41</sup> Thus, only mathematical algorithms in and of themselves are excepted from the section 101 statutory class of a process and are, therefore, unpatentable.<sup>42</sup>

## II

### THE PATENTABILITY OF CLAIMS CONTAINING MATHEMATICAL ALGORITHMS

#### A. Background: The *Benson* and *Flook* Decisions

Although mathematical algorithms themselves are nonstatutory under section 101, courts have recognized that the presence of a mathematical algorithm does not automatically render a process unpatentable.<sup>43</sup> Courts generally agree that a claim containing a mathematical algorithm may well satisfy the requirements of section 101 if that claim applies or implements the algorithm in a known structure or process.<sup>44</sup>

This principle evolved from the Supreme Court’s decision in

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<sup>39</sup> *Diehr*, 450 U.S. at 186.

<sup>40</sup> *PTO Report*, *supra* note 23, at 564. The Supreme Court in *Gottschalk v. Benson* defined the term algorithm narrowly so as to include only “procedure[s] for solving a given type of mathematical problem.” 409 U.S. 63, 65 (1972); *see Diehr*, 450 U.S. at 186 n.9; *Parker v. Flook*, 437 U.S. 584, 586 n.1 (1978); Application of *Walter*, 618 F.2d 758, 765 n.4 (C.C.P.A. 1980). Thus, courts often refer to a mathematical algorithm as an algorithm in the *Benson* sense of the term. Application of *Freeman*, 573 F.2d 1237, 1245 (C.C.P.A. 1978).

<sup>41</sup> *Walter*, 618 F.2d at 765 n.4.

<sup>42</sup> Mathematicians for centuries have freely used mathematical algorithms in their research. Progress in the field of mathematics is accomplished through the sharing of ideas among mathematicians and the building on and improvement of previous research. If mathematical algorithms were patentable, basic research and the free exchange of information would be inhibited. Mathematicians would thus be reluctant to share their findings while awaiting a patent. Further, it would be an impossible task for mathematicians to keep track of everyone’s patented algorithms during their research. As a practical matter, enforcing these patents would be extremely difficult. Edmund L. Andrews, *Patents on Equations: Some See a Danger*, N.Y. Times, Feb. 15, 1989, at D1, col. 4.

<sup>43</sup> *Flook*, 437 U.S. at 590; *see also Diehr*, 450 U.S. at 187 (“a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula”). The *Diehr* Court recognized that the technological application of mathematical algorithms furthers the constitutional purpose of promoting the progress of science and useful arts, and therefore, should be patentable in such cases. *PTO Report*, *supra* note 23, at 564.

<sup>44</sup> *Diehr*, 450 U.S. at 187-88. As the concurring opinion in *O’Reilly v. Morse*, 56 U.S. (15 How.) 62, 132-33 (1853) noted:

*Gottschalk v. Benson*.<sup>45</sup> In *Benson*, the Court held that a method of converting numerical information from binary-coded decimals into pure binary numbers for use in programming digital computers was not patentable.<sup>46</sup> The mathematical formula involved in the process had no substantial application except in connection with a digital computer. Thus, the Court reasoned that to grant protection "would wholly pre-empt the mathematical formula and in practical effect would be a patent on the algorithm itself."<sup>47</sup> Although the Court based its decision on the longstanding rule that mathematical algorithms are not patentable, the Court recognized that a patentable invention may evolve from the discovery of a mathematical algorithm if the invention applies the algorithm "to a new and useful end."<sup>48</sup> However, a process claim which contains a mathematical formula cannot be drawn so broadly that it covers all uses of the formula.<sup>49</sup>

The *Benson* decision is significant in that the Court focused its inquiry on the mathematical algorithm and its connection with other physical or mechanical processes of the invention.<sup>50</sup> This method of analysis laid the framework for all subsequent section 101 analyses of claims containing mathematical algorithms. When confronted with determining the patentability of this type of claim, courts generally focus on the relationship between the mathematical algorithm and the other physical or mechanical steps of the claim.<sup>51</sup>

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The mere discovery of a new element, or law, or principle of nature, without any valuable application of it to the arts, is not the subject of a patent. But he who takes this new element or power, as yet useless, from the laboratory of the philosopher, and makes it the servant of man; who applies it to the perfecting of a new and useful art, or to the improvement of one already known, is the benefactor to whom the patent law tenders its protection.

<sup>45</sup> 409 U.S. 63 (1972).

<sup>46</sup> *Id.* at 71-72.

<sup>47</sup> *Id.* A mathematical algorithm is preempted if its discoverer is granted "the right to exclude others from enjoying the benefits derived from the operation" of that mathematical algorithm. *Id.* at 65.

<sup>48</sup> *Id.* at 67; see also *MacKay Radio & Tel. Co. v. Radio Corp. of Am.*, 306 U.S. 86, 94 (1939) ("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."); *Paine, Webber, Jackson & Curtis v. Merrill Lynch, Pierce, Fenner & Smith, Inc.*, 564 F. Supp. 1358, 1366 (D. Del. 1983) ("The Supreme Court and the CCPA has [sic] clearly stated that a mathematical algorithmic formula is merely an idea and not patentable unless there is a new application of the idea to a new and useful end.").

<sup>49</sup> *Benson*, 409 U.S. at 68.

<sup>50</sup> *Kahn & DeVito*, *supra* note 15, at 9.

<sup>51</sup> See *infra* notes 53-174 and accompanying text; see also *Application of Walter*, 618 F.2d 758, 765 (C.C.P.A. 1980) (decision as to whether an invention utilizing a mathematical algorithm is statutory rests on the relationship of the algorithm to the remainder of the invention's substance as claimed).

However, courts differ in formulating the nature and scope of this connection.<sup>52</sup>

For example, the Supreme Court in *Parker v. Flook*<sup>53</sup> broadened the preemption approach it earlier endorsed in *Benson*. The *Flook* Court held that a method of updating alarm limit values during catalytic conversion processes did not describe patentable subject matter under section 101.<sup>54</sup> *Flook*'s method consisted of three steps: measuring the present value of a process variable (e.g., temperature); calculating, via a mathematical formula, an updated alarm limit value; and finally, adjusting the actual alarm limit to the updated value.<sup>55</sup>

Even though *Flook*'s claims did not cover every conceivable application of the mathematical algorithm and did not preempt all uses of the mathematical algorithm as in *Benson*, the Court held the invention unpatentable.<sup>56</sup> Unlike the claims in *Benson*, *Flook*'s claim included a specific end use for the process: the adjustment of the alarm limit to the figure computed by the formula.<sup>57</sup> While the presence of this "post-solution activity" convinced the CCPA that the mathematical algorithm per se was not preempted,<sup>58</sup> the Supreme Court rejected the notion that post-solution activity is enough to transform an unpatentable principle into a patentable process.<sup>59</sup> The Court expressed the fear that if the addition of insig-

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<sup>52</sup> See *Diamond v. Diehr*, 450 U.S. 175 (1981); *In re Grams*, 888 F.2d 835 (Fed. Cir. 1989); *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982); *Application of Walter*, 618 F.2d 758 (C.C.P.A. 1980); see *infra* notes 66-174 and accompanying text.

<sup>53</sup> 437 U.S. 584 (1978).

<sup>54</sup> *Id.* at 594-96.

<sup>55</sup> *Id.* at 585-86. This method is used during catalytic conversion processes in which operating conditions such as temperature, pressure, and flow rates must be constantly monitored. When any of these process variables exceed a predetermined alarm limit, an alarm may signal the presence of an abnormal condition indicating either inefficiency or danger. Since operating conditions are transient in many catalytic conversion processes, alarm limits must be updated periodically. *Id.* at 585.

<sup>56</sup> *Id.* at 586; see *Kahn & DeVito*, *supra* note 15, at 10.

<sup>57</sup> *Flook*, 437 U.S. at 589-90.

<sup>58</sup> *In re Flook*, 559 F.2d 21, 23 (C.C.P.A. 1977), *rev'd*, *Parker v. Flook*, 437 U.S. 584 (1978). For clarification of the term "preempted," see *supra* note 47.

<sup>59</sup> *Flook*, 437 U.S. at 590. "Insignificant post-solution activity" is activity that has no essential role in the claimed process and is merely one of many applications of the process's solution. Courts have generally agreed that claimed subject matter is nonstatutory if the only limitation in the claim, aside from the mathematical algorithm, is insignificant post-solution activity. In short, insignificant post-solution activity by itself is never sufficient to constitute a statutory process. *PTO Report*, *supra* note 23, at 567; see also *In re de Castelet*, 562 F.2d 1236, 1244 (C.C.P.A. 1977) (final step of transmitting electric signal representing the result of its calculations "does not transform the claim into one for a process merely using an algorithm"); *Safe Flight Instrument Corp. v. Sundstrand Data Control, Inc.*, 706 F. Supp. 1146 (D. Del. 1989) (final step of means for processing a windshear signal to provide an indication representing the magnitude thereof not sufficient to render claim statutory), *aff'd*, 899 F.2d 1228, *reh'g denied*, 1990 U.S. App. LEXIS 6256 (Fed. Cir.), *cert. denied*, 111 S. Ct. 295 (1990). A good indicator

nificant post-solution activity makes an otherwise unpatentable claim patentable, any competent draftsman could turn a claim with a mathematical algorithm into a patentable claim.<sup>60</sup> Such a notion, the Court said, "exalts form over substance."<sup>61</sup>

The *Flook* Court presented a new procedure for analyzing claims employing a mathematical algorithm. The Court interjected issues of novelty and inventiveness into the section 101 inquiry,<sup>62</sup> and examined the claim accordingly to determine whether it disclosed "some other inventive concept" besides the mathematical algorithm.<sup>63</sup> The Court found that the mathematical algorithm was the only novel feature of *Flook's* process, and concluded that the claim presented merely an improved method of calculation.<sup>64</sup> Consequently, the Court rejected *Flook's* patent claim.<sup>65</sup>

### B. *Application of Walter*: The Two-Step Test

The *Benson* and *Flook* decisions left the section 101 analysis of claims containing a mathematical algorithm in a state of extreme

that post-solution activity may be insignificant if "the end-product of a claimed invention is a *pure number*." In such a case, "the invention is nonstatutory regardless of any post-solution activity." Application of *Walter*, 618 F.2d 758, 767-68 (C.C.P.A. 1980). But see *In re Abele*, 684 F.2d 902, 908 n.9 (C.C.P.A. 1982) ("[T]he fact that [the] equation is the final step is not determinative of the section 101 issue.") (citing *In Re Richman*, 563 F.2d 1026, 1030 (1977)).

<sup>60</sup> *Flook*, 437 U.S. at 590.

<sup>61</sup> *Id.*

<sup>62</sup> The *Flook* dissent criticized the majority for importing the criteria of novelty and inventiveness into the section 101 inquiry. The dissent argued that novelty and inventiveness fall under section 102 and section 103 analysis, and thus play no part in the issue of subject-matter patentability. *Id.* at 600 (Stewart, J., dissenting); see also 1 DONALD R. DUNNER, PATENT LAW PERSPECTIVES § 1.4[3], at 1-85 (2d ed. 1989) ("*Flook* was particularly disturbing because of the majority's inability to distinguish between Section 101 subject matter and Section 102 and 103 requirements for the grant of patents on inventions that meet the tests of novelty and nonobviousness."). The Supreme Court in *Diamond v. Diehr*, 450 U.S. 175 (1981), subsequently rejected the *Flook* Court's approach of requiring claims to be dissected to find the point of novelty. "In determining the eligibility of . . . [a] claimed process for patent protection under § 101, . . . claims must be considered as a whole. It is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis." *Id.* at 188. The *Diehr* Court stated that novelty is of no relevance in determining whether the subject matter of the claim falls under one of the section 101 categories. *Id.* at 188-89; see *supra* note 17.

<sup>63</sup> *Flook*, 437 U.S. at 594.

<sup>64</sup> *Id.* at 594-95, 595 n.18. In *Walter*, 618 F.2d at 766, the court rejected the notion that the *Flook* Court adopted a point of novelty approach to section 101; *i.e.*, an invention would be nonstatutory if the mathematical algorithm in the claim is the claim's only novel feature. The *Walter* court reasoned that since the *Flook* Court instructed that the claim must be considered as a whole, the Court could not have adopted a point of novelty approach since such an approach ignores the claim as a whole and instead concentrates on a single claim component. *Id.* at 767.

<sup>65</sup> *Flook*, 437 U.S. at 594.

confusion.<sup>66</sup> The CCPA subsequently attempted to introduce some concrete criteria into this analysis. In *Application of Walter*,<sup>67</sup> the CCPA formulated a test intended to clearly define the scope and nature of the connection that must exist between a mathematical algorithm and the other physical or mechanical process steps of the claim in order to satisfy section 101 requirements.

In *Walter*, the claimant invented a method and apparatus for correlating and cross-correlating signals in the field of seismic prospecting and surveying.<sup>68</sup> The invention unscrambled the returning signals of seismic source waves which are transmitted downward into the earth and deflected back to the earth's surface by subsurface formations and anomalies. By studying these signals, analysts can determine the nature of the subsurface structure of the earth. Several mathematical operations performed the necessary correlations and cross-correlations.<sup>69</sup>

The PTO Board of Appeals affirmed the PTO Examiner's final rejection of the claims.<sup>70</sup> The Board viewed the process steps of the claim to be directed to the solution of a mathematical problem, and held that granting the claims would effectively preempt<sup>71</sup> this mathematical algorithm.<sup>72</sup> Therefore, the Board concluded that the claims were not patentable. The CCPA affirmed the PTO's rejection of *Walter's* claims.<sup>73</sup> The CCPA held that all of the process steps were part of a mathematical algorithm for performing the correlation or cross-correlation of seismic signals.<sup>74</sup> Although the claim preamble related the invention to the practice of seismic surveying, the CCPA concluded that this field of use limitation<sup>75</sup> did

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66 See Kahn & DeVito, *supra* note 15, at 10.

67 618 F.2d 758 (C.C.P.A. 1980).

68 *Id.* at 761.

69 *Id.* at 760-61.

70 *Id.* at 762 (discussing procedural history).

71 See *supra* note 47 for discussion of this term.

72 *Walter*, 618 F.2d at 762-63.

73 *Id.* at 760.

74 *Id.* at 769.

75 A "field of use limitation" exists when a claim preamble attempts to specify the application of a mathematical algorithm to a particular technological environment or end use. Courts have held that such a limitation does not make the claim statutory. See *Parker v. Flook*, 437 U.S. 584, 586 (1978) (the preamble, while limiting the application of the claimed method to a process comprising the catalytic chemical conversion of hydrocarbons, did not render the method statutory); *Walter*, 618 F.2d at 769 ("Although the claim preambles relate the claimed invention to the art of seismic prospecting, the claims themselves are not drawn to methods of or apparatus for seismic prospecting."); *In re de Castelet*, 562 F.2d 1236, 1244 n.6 (C.C.P.A. 1977) ("The potential for misconstruction of preamble language requires that compelling reason exist before that language may be given weight."); cf. *In re Waldbaum*, 559 F.2d 611, 616 n.6 (C.C.P.A. 1977) (portion of preambles referred to in method portion claims "are necessary for

not save the claim.<sup>76</sup> Consequently, the claims contained only a mathematical algorithm or nonstatutory subject matter.<sup>77</sup>

The *Walter* court used a two-step test to reach its holding. The CCPA first formulated this test<sup>78</sup> in *Application of Freeman* where the court reversed the PTO's rejection of a process for typesetting alphanumeric information.<sup>79</sup> The first step of the test requires the court to determine whether the claim recites a mathematical algorithm.<sup>80</sup> If a patent claim contains a mathematical formula or an equation expressed in traditional mathematical symbols, it directly recites a mathematical algorithm.<sup>81</sup> A claim may indirectly recite a mathematical algorithm by substituting prose or words for mathematical symbols.<sup>82</sup> Ascertaining the existence of an algorithm is important, for a claim cannot attempt to patent a mathematical algorithm if it does not include one.<sup>83</sup>

Once a court finds a mathematical algorithm, the court must analyze the claim as a whole to determine whether it contains patentable subject matter under section 101. The *Freeman* court stated this second step in terms of preemption:<sup>84</sup> "[T]he claim must be further analyzed to ascertain whether in its entirety it wholly preempts that algorithm."<sup>85</sup>

The *Walter* court clarified this second step of the *Freeman* holding. To determine whether a claim preempts a mathematical algorithm under *Freeman*, "the claim is analyzed to establish the relationship between the [mathematical] algorithm and the physical steps or elements of the claim."<sup>86</sup> The *Walter* court carefully re-

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completeness of the claims and are proper limitations thereto"); see also *PTO Report, supra* note 23, at 567 (explaining case treatment).

<sup>76</sup> *Walter*, 618 F.2d at 769.

<sup>77</sup> *Id.*

<sup>78</sup> The two-step test has been referred to by the courts as either the *Freeman-Walter* test or the *Walter* test. Since the CCPA made its most important revisions to the test in *Application of Walter*, this Note will refer to it as the *Walter* test.

<sup>79</sup> *Application of Freeman*, 573 F.2d 1237 (C.C.P.A. 1978). The subject matter of *Freeman's* invention was a system for typesetting alphanumeric information, which was especially useful in printing mathematical formulae. The system used both a computer-based control system and a conventional phototypesetter. *Id.* at 1238-39. The CCPA held that the method claims at issue did not recite either directly or indirectly mathematical calculations, formulae, or equations. Therefore, the claim contained patentable subject matter. *Id.* at 1246.

<sup>80</sup> *Id.* at 1245.

<sup>81</sup> *Id.* at 1246.

<sup>82</sup> *Id.*; see *Gottschalk v. Benson*, 409 U.S. 63 (1972). As noted in *Freeman*, the claims at issue in *Benson* did not contain a formula or equation expressed in traditional mathematical symbols. *Freeman*, 573 F.2d at 1246. The claims as a whole, however, recited in prose a formula for converting binary-coded decimal numbers into binary numbers.

<sup>83</sup> *Freeman*, 573 F.2d at 1245.

<sup>84</sup> *Id.*; see *supra* note 47 for discussion of this term.

<sup>85</sup> *Freeman*, 573 F.2d at 1245.

<sup>86</sup> *Walter*, 618 F.2d at 767.

worded the second step of the test as follows: “[i]f it appears that the mathematical algorithm is implemented in a specific manner to define structural relationships between the physical elements of the claim (in apparatus claims) or to refine or limit claim steps (in process claims), the claim being otherwise statutory,<sup>87</sup> the claim passes muster under § 101.”<sup>88</sup> If the claimed invention merely solves the mathematical algorithm, the claim recites only an improved method of calculation and does not contain patentable subject matter under section 101.<sup>89</sup> The court formulated a new standard by holding that in such a case, *the mathematical algorithm is not applied in a manner as to define, refine, or limit the physical process steps of the claim.*<sup>90</sup> The *Walter* court stated that “no amount of post-solution activity<sup>91</sup> . . . nor . . . a preamble merely reciting the field of use<sup>92</sup> of the mathematical algorithm”<sup>93</sup> will render such a claim statutory.

After applying the two-step test to the claims at issue, the *Walter* court held the claims to be nonstatutory. The court first determined that the claims clearly recited mathematical algorithms, since correlation and cross-correlation are mathematical exercises which relate two mathematical functions.<sup>94</sup> The court then analyzed the claims to determine whether they implemented the mathematical algorithm in such a manner so as to define, refine, or limit the physical process steps of the claims.<sup>95</sup> The court found that the claims were not drawn to any process or apparatus for seismic surveying; rather, the claims were only an improved mathematical method for interpreting the results of seismic prospecting.<sup>96</sup> Thus, the mathematical algorithm did not define, refine, or limit any physical process steps in the claims, and the claims did not contain patentable subject matter when the mathematical algorithm was excluded. Further, the *Walter* court concluded that the specific field of use recited in the preamble did not save the claims from being nonstatutory and, therefore, the claims failed the second step of the *Walter* test.<sup>97</sup>

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<sup>87</sup> A claim is “otherwise statutory” if it recites statutory subject matter when the mathematical algorithm is excluded. See *infra* text accompanying notes 123-25.

<sup>88</sup> *Walter*, 618 F.2d at 767 (footnote added).

<sup>89</sup> *Id.*

<sup>90</sup> *Id.*

<sup>91</sup> See *supra* text accompanying notes 58-61.

<sup>92</sup> See *supra* note 75.

<sup>93</sup> *Walter*, 618 F.2d at 767 (footnotes added).

<sup>94</sup> *Id.* at 768-69.

<sup>95</sup> See *supra* text accompanying note 90.

<sup>96</sup> *Walter*, 618 F.2d at 769.

<sup>97</sup> *Id.*; see *supra* note 75.

C. *Diamond v. Diehr*: The Supreme Court's Implicit Endorsement of the *Walter* Test

In *Diamond v. Diehr*,<sup>98</sup> the United States Supreme Court implicitly endorsed the *Walter* test.<sup>99</sup> Diehr applied for a patent on a process for molding raw, uncured synthetic rubber into cured precision products.<sup>100</sup> The rubber industry had been unsuccessful in developing a process for determining proper curing times because of the difficulty of obtaining precise temperature measurements inside the curing press. Diehr solved this problem by inventing a process which constantly measured the temperature inside the mold and fed the temperature measurements into a computer. The computer repeatedly recalculated the cure time with a mathematical equation. When the cure time was calculated to be zero, the mold press automatically opened.<sup>101</sup>

The Court held that the curing process was patentable subject matter even though the process included the use of a mathematical algorithm.<sup>102</sup> The Court did not expressly use the language of the *Walter* test; rather, it recited a method of analysis that was consistent with and very similar to the analysis used in *Walter*.<sup>103</sup> The Court stated that "when a claim recites a mathematical formula . . . an inquiry must be made into whether the claim is seeking patent protection for that formula in the abstract."<sup>104</sup> If such an inquiry reveals that the claim is in effect patenting the mathematical formula, then the claim merely recites an improved method of calculation and a court will not accord it patent protection.<sup>105</sup> "[T]his principle cannot be circumvented by attempting to limit the use<sup>106</sup> of the formula to a particular technological environment" or by including insignifi-

<sup>98</sup> 450 U.S. 175 (1981).

<sup>99</sup> See *infra* notes 103-08 and accompanying text.

<sup>100</sup> *Diehr*, 450 U.S. at 177.

<sup>101</sup> *Id.* at 177-78.

<sup>102</sup> *Id.* at 185.

<sup>103</sup> See Travis G. White & Richard T. Redano, *Proprietary Rights: Patent Opportunities for Software-Related Subject Matter*, 4 THE COMPUTER LAW. 13, 14 (July 1987).

<sup>104</sup> *Diehr*, 450 U.S. at 191. A claim seeks patent protection for a mathematical algorithm in the *abstract* if the claim, in effect, presents only an improved method of calculation despite reciting insignificant post-solution activity or a field of use limitation.

<sup>105</sup> *Id.*

[P]atent laws have been interpreted as providing protection for a tangible thing. With respect to a process, the tangible thing requirement is satisfied by the transformation of an article from one state to another. A claim reciting an improved method of calculation which includes post-solution activity is attempting to obtain protection for an intangible that is outside section 101. A claim for a process that is improved by the application of such an intangible falls within section 101.

Note, *supra* note 26, at 729.

<sup>106</sup> See *supra* note 75.

cant post-solution activity in the claim.<sup>107</sup>

“On the other hand, when 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.”<sup>108</sup>

The Court viewed Diehr’s claims as drawn to nothing more than a process for molding rubber products, and not as an attempt to patent a mathematical formula.<sup>109</sup> Diehr’s claim sought patent protection of the mathematical formula only in connection with all of the other physical steps in the claimed process,<sup>110</sup> *i.e.*, installing rubber in a press, closing the mold, constantly determining the temperature of the mold, constantly recalculating the cure time with a mathematical formula and computer, and automatically opening the press at the proper time.<sup>111</sup> Therefore, the claimed process implemented the mathematical formula in a manner which defined, limited, and refined the physical process steps.<sup>112</sup>

In contrast, the claimants in *Parker v. Flook* were not seeking patent protection for a patentable process improved by the application of the algorithm.<sup>113</sup> The claims in *Flook* merely provided a formula for computing an updated alarm limit and did not explain how the variables used in the formula were to be selected. Further, the claims lacked any disclosure relating to the chemical processes at work or the means of setting off an alarm or adjusting the alarm unit.<sup>114</sup> The mathematical algorithm did not define, limit, or refine any physical process steps as no physical process steps were included in the claim. Flook’s claims merely attempted to patent an improved method of calculation.<sup>115</sup>

#### D. *In re Abele*: A Less Restrictive Reading of the *Walter* Test

The CCPA in *In re Abele*<sup>116</sup> reinterpreted its *Walter* analysis in light of the *Diehr* decision.<sup>117</sup> After *Diehr*, the *Abele* court determined

<sup>107</sup> *Diehr*, 450 U.S. at 191-92 (footnote added); *see supra* note 59.

<sup>108</sup> *Diehr*, 450 U.S. at 192.

<sup>109</sup> *Id.* at 191.

<sup>110</sup> *See supra* text accompanying notes 51 & 67.

<sup>111</sup> *Diehr*, 450 U.S. at 187.

<sup>112</sup> *See supra* text accompanying note 90.

<sup>113</sup> *See supra* text accompanying notes 53-65.

<sup>114</sup> *Diehr*, 450 U.S. at 186-87.

<sup>115</sup> *Id.* at 191.

<sup>116</sup> 684 F.2d 902 (C.C.P.A. 1982).

<sup>117</sup> Karl F. Milde, Jr., *Life after Diamond v. Diehr: The CCPA Speaks Out on the Patentability of Computer-Related Subject Matter*, 64 J. PAT. OFF. SOC’Y 434, 442 (1982).

that the operative language of *Walter*<sup>118</sup> made it too difficult to patent inventions which contained mathematical algorithms.<sup>119</sup> The *Abele* court stated that *Walter* should not be read so narrowly as to limit patentable subject matter only to claims in which a mathematical algorithm defines, limits, or refines the structural relationships or physical process steps.<sup>120</sup> Instead, "*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."<sup>121</sup> Given that this language is very similar to the language in the *Walter* and *Diehr* opinions, it is not literally inconsistent with either decision.<sup>122</sup>

The *Abele* court, however, in the next sentence of its opinion, eased the requirements of the second step of the *Walter* test. The court explained that this second step required that courts view the claim without the mathematical algorithm.<sup>123</sup> If no statutory subject matter remains, then the claim merely defines a mathematical algorithm and the claim as a whole is nonstatutory.<sup>124</sup> On the other hand, if statutory subject matter remains, then the presence of the mathematical algorithm will not render the otherwise statutory claim nonstatutory.<sup>125</sup> Such a relaxed reading of the second step of the *Walter* test is inconsistent with the operative language in *Walter*.<sup>126</sup>

In effect, the *Abele* court's interpretation of the *Walter* test's second step discards the requirement that the mathematical algorithm exist in such a relationship with the physical process steps of the claim so as to limit or refine them. Instead, the *Abele* court's new standard concentrates entirely on the patentability of the physical process steps which remain in the claim after the removal of the mathematical algorithm.<sup>127</sup> This new standard is distinguishable from the *Walter* test's second step.<sup>128</sup> Although the second step in

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<sup>118</sup> See *supra* text accompanying note 90.

<sup>119</sup> *Abele*, 684 F.2d at 907.

<sup>120</sup> *Id.* at 907.

<sup>121</sup> *Id.* (quoting *In re Walter*, 618 F.2d 758, 767 (C.C.P.A. 1980)).

<sup>122</sup> See *supra* text accompanying notes 86-97, 104-08.

<sup>123</sup> *Abele*, 684 F.2d at 907.

<sup>124</sup> *Id.* at 908.

<sup>125</sup> *Id.* at 907. The court stated that the claim presents statutory subject matter even if the subject matter is inoperative or less useful without the mathematical algorithm.

<sup>126</sup> See *supra* text accompanying note 90.

<sup>127</sup> See *supra* text accompanying notes 121-25.

<sup>128</sup> This new standard is also inconsistent with the *Diehr* decision. First, the *Diehr* Court required that the claims be considered as a whole and not dissected into old and new elements. *Diamond v. Diehr*, 450 U.S. 175, 188 (1981). The *Abele* standard requires the claim to be dissected and then analyzed without the mathematical algorithm for determining whether it is statutory. This conflicts with the *Diehr* principle. Second,

*Walter* clearly requires that the mathematical algorithm be applied to otherwise statutory physical process steps,<sup>129</sup> the *Walter* court took its analysis a step further. The court required that the mathematical algorithm define, refine, or limit the physical process steps of the claim.<sup>130</sup> *Walter* thereby created a standard which clearly defines when a claim recites a statutory process, and when it merely seeks patent protection for the mathematical algorithm itself.<sup>131</sup>

In not requiring this additional step, the *Abele* court focused its analysis entirely on the question of whether the claim is otherwise statutory.<sup>132</sup> Such an analysis is in sharp contrast with the *Walter* court's approach, which emphasized the relationship between the mathematical algorithm and the physical process steps of the claim.<sup>133</sup> The Federal Circuit in *In re Grams*<sup>134</sup> finally reconciled these two distinct approaches. As *Grams* illustrates, some connection between the mathematical algorithm and the physical process steps of the claim must exist in order for the claim as a whole to be statutory.<sup>135</sup>

### III

#### IN RE GRAMS

##### A. Background

Grams's invention involved a method of testing a complex system to determine whether a system condition was normal or abnormal. If abnormal, the invention provided a method of diagnosing the cause of the abnormality.<sup>136</sup> Although the method was applicable to any complex system, whether it be electrical, mechanical,

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the *Diehr* Court concluded that "a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula." *Id.* at 187. This conclusion, however, is very different from the *Abele* standard. The *Diehr* opinion nowhere stated that a claim which is statutory without the mathematical algorithm remains statutory when the algorithm is included.

<sup>129</sup> See *supra* text accompanying notes 87-88.

<sup>130</sup> *Walter*, 618 F.2d at 767.

<sup>131</sup> See *supra* text accompanying notes 86-93.

<sup>132</sup> See *supra* text accompanying notes 120-21. The *Abele* court did require that the mathematical algorithm be applied to the physical process steps of the claim. *Abele*, 684 F.2d at 907. Therefore, the *Abele* court did not go so far as to state that a claim containing a mathematical algorithm could be made statutory by including in the claim any number of statutory physical process steps. Rather, the *Abele* court required that the algorithm and physical process steps at least be somehow related. See *supra* text accompanying note 121. By contrast, the *Walter* court's standard was much stricter in that it required the mathematical algorithm to define, refine, or limit the physical process steps of the claim. *Walter*, 618 F.2d at 767.

<sup>133</sup> See *supra* text accompanying notes 86-93.

<sup>134</sup> 888 F.2d 835 (Fed. Cir. 1989).

<sup>135</sup> See *infra* notes 143-56 and accompanying text.

<sup>136</sup> *Grams*, 888 F.2d at 836.

chemical, biological, or combinations thereof, the claims limited the method to the diagnosis of a person.<sup>137</sup> The first step of Grams's claim,<sup>138</sup> step [a], required the performance of clinical laboratory tests on an individual to obtain data for the method parameters.<sup>139</sup> The remaining steps, steps [b] through [e], analyzed that data to ascertain the existence and identity of an abnormality and its possible causes.<sup>140</sup>

The Patent Examiner rejected Grams's claim on the ground that the method was nonstatutory subject matter.<sup>141</sup> On administrative appeal, the Board of Patent Appeals and Interferences upheld the Examiner's decision.<sup>142</sup>

### B. The Reconciliation of *Walter* and *Abele*

On appeal, the Federal Circuit affirmed the Board's holding that the claim was drawn to a mathematical algorithm and was therefore nonstatutory under section 101.<sup>143</sup> In reaching its decision, the court adopted language from the *Abele* opinion, but restricted its scope to that which the *Walter* court originally intended.

The *Grams* court determined that the claim easily satisfied the first step of the *Walter* test: "[S]teps [b]-[e] are in essence a mathematical algorithm, in that they represent '[a] procedure for solving a given type of mathematical algorithm.'" <sup>144</sup> The *Grams* court then sought to determine whether the claim at issue contained statutory subject matter.

Significantly, the *Grams* court interpreted the standard set forth in *Abele*<sup>145</sup> as consistent with the second step of the *Walter* test.<sup>146</sup> The *Grams* court did not construe *Abele* as "declaring patentable any claim that is statutory without the algorithm."<sup>147</sup> Instead, it interpreted the language of *Abele* as "requiring . . . not only that the physical steps in the claim (without the algorithm) constitute a statutory process but, also, that the algorithm operates on a claimed physical

<sup>137</sup> *Id.*

<sup>138</sup> Because all of the additional claims in the patent application depended on claim I, it was the only one the court examined.

<sup>139</sup> *Id.* at 837.

<sup>140</sup> *Id.*

<sup>141</sup> *Id.* at 835, 841.

<sup>142</sup> *Id.* at 835.

<sup>143</sup> *Id.* at 841.

<sup>144</sup> *Id.* at 837 (quoting *Gottschalk v. Benson*, 409 U.S. 63, 65 (1972)). The applicants in *Grams* did not, in fact, dispute that claim I included a mathematical algorithm.

<sup>145</sup> See *supra* text accompanying notes 120-25.

<sup>146</sup> *Grams*, 888 F.2d at 839 n.4.

<sup>147</sup> *Id.*

step.”<sup>148</sup> Thus, under this interpretation, the court divided the second step of the *Walter* test into two distinct inquiries: (1) Does the claim, absent the mathematical algorithm, contain patentable subject matter?<sup>149</sup> and (2) Does the mathematical algorithm “operate on a claimed physical step?”<sup>150</sup>

This interpretation of the second step of the *Walter* test is consistent with the *Walter* decision. The *Grams* court’s requirement that the mathematical algorithm operate on a claimed physical process step is equivalent to the *Walter* requirement that the mathematical algorithm define, refine, or limit the physical process steps of the claim.<sup>151</sup> Under this requirement, a connection or relationship between the mathematical algorithm and the physical process steps must exist in order for the claim as a whole to be statutory.<sup>152</sup>

Applying its interpretation of the second step of the *Walter* test to the claim at issue, the *Grams* court determined that algorithm steps [b] through [e] did not operate to change any aspect of the physical process of step [a].<sup>153</sup> In addition, the *Grams* court found that step [a] merely provided data for the mathematical algorithm, and held that such a data gathering process was not statutory subject matter under section 101.<sup>154</sup> The court explained that since all mathematical algorithms require the substitution of values for the variables expressed in the algorithm, the establishment and substi-

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148 *Id.*

149 *Id.* at 839.

150 *Id.* at 839 n.4.

151 *See supra* note 90 and accompanying text. The *Grams* court demonstrated its adoption of the *Walter* test in its analysis of the sixth claim in the *Abele* case. In *Abele* the court viewed the claim without the algorithm and determined that the physical process steps which remained constituted patentable subject matter. *Abele*, 684 F.2d at 908. The *Abele* court concluded that the claim was patentable under section 101 not because the algorithm refined or limited the physical process steps of the claim, but because the appellants discovered “an application of an algorithm to process steps which are themselves part of an overall process which is statutory.” *Id.* at 909. The *Grams* court agreed that the *Abele* claim recited patentable subject matter, but emphasized the importance of the *Walter* test in making this determination. *Grams*, 888 F.2d at 840. The *Grams* court stated that the algorithm in *Abele* satisfied the *Walter* guideline of “refining a process step in a process that is otherwise statutory.” *Id.* Therefore, the claim as a whole was patentable.

152 *See supra* notes 86-88 and accompanying text.

153 *Grams*, 888 F.2d at 840.

154 *Id.* at 839; *see also In re Christensen*, 478 F.2d 1392, 1394 (C.C.P.A. 1973) (“Given that the method of solving a mathematical equation may not be the subject of patent protection, it follows that the addition of the old and necessary antecedent steps of establishing values for the variables in the equation cannot convert the unpatentable method to patentable subject matter.”). The *Grams* court, however, fell short of concluding that section 101 precludes patentability in every case where the physical step of obtaining data is the only other significant element in a claim containing a mathematical algorithm. *Grams*, 888 F.2d at 840. Rather, the claim as a whole and the circumstances surrounding the claim must contribute, in each case, to this determination. *Id.*

tution of values is nothing more than a mathematical step.<sup>155</sup> “If the steps of gathering and substituting values were alone sufficient, every mathematical equation, formula, or algorithm having any practical use would be per se subject to patenting as a “process” under [section] 101.’”<sup>156</sup> Since the claim, absent the mathematical algorithm, did not contain statutory subject matter and the mathematical algorithm did not operate on a claimed physical step, the claim as a whole was nonstatutory.

### C. The *Grams* Court Retreats

Although the *Grams* court appeared ready to adopt the *Walter* standard in its entirety, it ultimately declined to do so. The *Grams* court stated that although satisfaction of the *Walter* test indicates that the claim recites statutory subject matter, failure to meet that test is not dispositive of whether the claim is patentable.<sup>157</sup> According to the *Grams* court, the final analysis under section 101 requires evaluation of the claimed invention as a whole in order to answer the question, “[w]hat did applicants invent?”<sup>158</sup> This analysis requires “‘careful interpretation of each claim in light of its supporting disclosure.’”<sup>159</sup>

The question “[w]hat did applicants invent?” was originally posed in *Abele*.<sup>160</sup> The *Abele* court stated that the goal and purpose of the two-step analysis was to answer this critical question.<sup>161</sup> “If the claimed invention is a mathematical algorithm, it is improper subject matter for patent protection, whereas if the claimed invention is an application of the algorithm, § 101 will not bar the grant of a patent.”<sup>162</sup> Therefore, the *Abele* court concluded that its proposed two-step analysis was consistent with the ultimate purpose of the analysis.

The *Grams* court misinterpreted this part of the *Abele* decision, however. According to the *Grams* court, even if a claimed invention is not found to satisfy the requirements of the *Walter* test, the invention is not necessarily unpatentable.<sup>163</sup> The court must ultimately answer the dispositive question, “[w]hat did applicants invent?,” to determine whether the invention is patentable.<sup>164</sup> The *Abele* court,

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<sup>155</sup> *Grams*, 888 F.2d at 839.

<sup>156</sup> *Id.* (quoting *In re Sarkar*, 588 F.2d 1330, 1335 (C.C.P.A. 1978)).

<sup>157</sup> *Id.*

<sup>158</sup> *Id.* (quoting *In re Abele*, 684 F.2d 902, 907 (C.C.P.A. 1982)).

<sup>159</sup> *Id.* (quoting *Abele*, 684 F.2d at 907).

<sup>160</sup> *Abele*, 684 F.2d at 907.

<sup>161</sup> *Id.*

<sup>162</sup> *Id.*

<sup>163</sup> *Grams*, 888 F.2d at 839.

<sup>164</sup> *Id.*

however, did not pose the question as an additional step in its analysis. Rather, answering the question is merely the goal of its two-step analysis.<sup>165</sup>

The *Grams* court's adoption of this additional step is clearly troublesome. The court did not explain what objective criteria should be used in order to determine what the applicants invented; it only stated that such "analysis can be difficult."<sup>166</sup> After *Grams*, courts are left to make their own subjective determinations of what the applicants invented. The *Grams* court stated that this determination "is facilitated somewhat if . . . the only physical step involves merely gathering data for the algorithm."<sup>167</sup> The court concluded that *Grams*'s claimed invention as a whole was a mathematical algorithm since the only physical process step of the claim involved gathering data for a mathematical algorithm.<sup>168</sup> Therefore, the invention was unpatentable.

#### D. The Test Stated in *Walter* Must Be the Standard

The *Grams* court was wise to adopt a clear and concrete test to determine when claims containing mathematical algorithms are statutory. According to the court, a claim that meets the *Walter* test necessarily depicts statutory subject matter.<sup>169</sup> The *Grams* court, however, should have also made the *Walter* test the final determinant of when claims containing mathematical algorithms are unpatentable. By requiring courts and patent examiners to answer the additional question, "[w]hat did applicants invent?," the *Grams* court implicitly questions the effectiveness of the *Walter* test. A test that successfully determines when a claim is statutory should also be able to successfully determine when that claim is nonstatutory. Therefore, failure of the *Walter* test should render a claim nonstatutory and no further analysis should be necessary.

By holding that the final analysis requires careful interpretation of the claims to determine what the applicant invented, the *Grams* court left the ultimate determination of whether a claim is nonstatutory to the subjective discretion of the PTO and the courts. In so doing, the *Grams* court implied that this analysis should be conducted on a case-by-case basis. Thus, the determination of whether the claimed process was an improved method of calculation or a statutory invention would be within the reviewing body's sole discretion.

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<sup>165</sup> *Abele*, 684 F.2d at 907.

<sup>166</sup> *Grams*, 888 F.2d at 839.

<sup>167</sup> *Id.*

<sup>168</sup> *Id.*; see *supra* text accompanying notes 153-56.

<sup>169</sup> *Grams*, 888 F.2d at 839.

Such an approach may produce consistent decisions from case to case in the Federal Circuit. Since the Federal Circuit is the only appellate court that reviews PTO-rejected patent applications and infringement actions brought in the district courts, one would expect its decisions to be consistent with its precedents.<sup>170</sup> The discretionary standard of *Grams*, however, will probably result in uncertain and inconsistent decisions in the PTO. The *Grams* decision leaves PTO examiners with no clear and straightforward standard with which to determine when claims that contain mathematical algorithms are nonstatutory. *Grams* provides the PTO with neither guidelines nor rules to follow when confronted with the question “[w]hat did applicants invent?”<sup>171</sup> Therefore, the ultimate decision of whether such claims are nonstatutory will be left to the subjective discretion of each examiner.

To minimize the likelihood of inconsistent decisions, the *Grams* court should have provided lower courts and the PTO with a more concrete and objective standard for analyzing claims containing mathematical algorithms. The second step of the *Walter* test, as originally formulated, provides such a standard and would likely achieve the correct result in most cases. By first asking whether the claim contains statutory subject matter without the algorithm, and then looking at the connection between the mathematical algorithm and the physical process steps of a claim, the second step of the *Walter* test effectively decides whether the claim as a whole contains only a mathematical algorithm and is thus nonstatutory.<sup>172</sup> As stated by the court in *Abele*, the purpose of the two-part analysis is to determine what the applicants have invented.<sup>173</sup> Therefore, this second step answers the critical question “[w]hat did applicants invent?” Unlike the test adopted in *Grams*, the *Walter* test provides a standard that can answer this question objectively: “[Is the mathematical algorithm] implemented in a specific manner to define structural relationships between the physical elements (in apparatus claims) or to refine or limit claim steps (in process claims)?”<sup>174</sup> In addition to providing courts and the PTO with clear and simple guidelines, this standard would ultimately result in fair and correct

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<sup>170</sup> See *supra* notes 1 & 9.

<sup>171</sup> See *supra* text accompanying note 166.

<sup>172</sup> See *supra* text accompanying notes 87-88. The *Walter* test heeds the principle that insignificant post-solution activity, field of use limitations, and data gathering steps are never sufficient to constitute a statutory process. See *supra* notes 91-93, 154 and accompanying text.

<sup>173</sup> *In re Abele*, 684 F.2d 902, 907 (C.C.P.A. 1982); see *supra* text accompanying notes 160-62.

<sup>174</sup> Application of *Walter*, 618 F.2d 758, 767 (C.C.P.A. 1980); see *supra* text accompanying notes 87-88.

determinations of when claims with mathematical algorithms contain patentable subject matter.

#### IV

#### CONCLUSION

Following the *Abele* decision in 1982 and the PTO's adoption of the *Abele* court's broad interpretation of the *Walter* test, universities and corporations flooded the PTO with patent applications for inventions which contained mathematical algorithms.<sup>175</sup> The PTO awarded patents to many of these inventions despite the fact that the mathematical algorithm constituted the heart of the claim and the claim described only general applications of the algorithm.<sup>176</sup>

Mathematicians quickly grew concerned that the courts' and the PTO's new liberal attitude toward mathematical algorithm patentability could erode the historical principle that mathematical algorithms by themselves cannot be patented.<sup>177</sup> The Court of Appeals for the Federal Circuit in *Grams* apparently paid heed to this concern. By adopting the *Walter* test, the court emphasized that a mathematical algorithm must exist in a special relationship with the physical process steps of the claim in order for the claimed invention as a whole to contain patentable subject matter under section 101. However, the court only adopted the *Walter* test to determine when a claimed invention is statutory. According to the court, failure of the *Walter* test is not dispositive of whether a claimed invention is nonstatutory. Rather, courts must engage in a further step of analysis by determining, "[w]hat did applicants invent?" If the claimed invention is merely a mathematical algorithm, it is unpatentable. If the claimed invention is an application of the algorithm, however, it is patentable subject matter. Unfortunately, the *Grams* court did not provide any objective criteria for courts or the PTO to use in making this determination. Thus, an increasingly significant aspect of section 101 analysis is left with a subjective and unclear standard. This uncertainty requires correction. Complete application of the *Walter* test provides the remedy.

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<sup>175</sup> Andrews, *supra* note 42.

<sup>176</sup> *Id.* at D6, col. 1.

<sup>177</sup> *Id.*

