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It is difficult to overstate the impact of computers on modern society. Originally a tool of the research scientist, computers are now a regular feature of daily life. In the home, business, manufacturing, education, and medicine, computers have taken over dull repetitive tasks, as well as making possible other tasks thought impractical a generation ago.\

Central to the growth in utilization of computers has been the willingness of industry to invest in the creation of the software necessary to bring these machines to life. Development of sophisticated software requires many hours of work by computer programmers.\(^2\) With the growing market for computer software, the importance of protecting this investment will undoubtedly increase.\(^3\)

There are three bodies of law that can be used to prevent unauthorized use of computer software: trade secret, copyright, and patent law. Since the software industry is still comparatively young, there has been little development of case law applicable to the unique problems presented by software. This is particularly true in patent law. Although an appellate court first held that computer software could be patented in 1968,\(^4\) private litigants have only recently contested the validity of a patent obtained for a software in-
vention. The case law in this area has heretofore resulted from litigation between prospective patentees and the Patent and Trademark Office.

Section 101 of Title 35 of the United States Code sets out those classes of invention for which a patent may be obtained and has been the primary focus of disputes in the software area. In its most recent decision construing section 101, the Supreme Court declared that a claim for an invention utilizing a digital computer for one or more steps of a claimed process is statutory, provided the process is of the type that section 101 was intended to protect.

But suppose that a nonstatutory invention is implemented on a computer. Is such an invention patentable under section 101? This question was presented to the District Court of Delaware in *Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, Inc.* In a suit for declaratory judgment, plaintiff Paine, Webber, Jackson & Curtis, Inc. (Paine, Webber) challenged the validity of the patent obtained by defendant Merrill Lynch, Pierce, Fenner & Smith, Inc. (Merrill Lynch) on its Cash Management Account. The court held that the claims recited patentable subject matter because they taught a method of operating a computer.

This Note criticizes the analysis used by the District Court. The main premise of the Note is that the *Paine, Webber* decision side-steps issues requiring analysis under the most recent appellate court decisions in the software area. In addition, an approach to these omitted issues is suggested.

First, the facts of the case and a summary of the reasoning relied on by the court are discussed. Second, the legal background of the decision is explored, with particular attention paid to the develop-

5. *Paine, Webber, Jackson & Curtis, Inc. v. Merrill Lynch, Pierce, Fenner & Smith, Inc.*, 564 F. Supp. 1358 (D. Del. 1983) is the first reported case in which private litigants disputed the validity of a patent on a software invention. *But see* *Arshal v. United States*, 621 F.2d 421 (Ct. Cl. 1980), where a patentee sued the government for infringing his patent. While the government is obviously not a private litigant, the style of the action in *Arshal* resembles an infringement suit between private parties. *Paine, Webber* is also the first reported decision concerning the validity of a software patent by a district court.


7. "A claim drawn to subject matter, otherwise statutory, does not become nonstatutory simply because it uses . . . a digital computer." *Diamond v. Diehr*, 450 U.S. 175, 187 (1981). If a patent claim involves an invention that falls within § 101, it is said to recite statutory subject matter. The requirements of § 101 are discussed in greater detail at *infra* notes 59-82 and accompanying text.


9. *Id.* at 1369.
Development of present judicial views concerning the patentability of software. Third, the rationale for the court's holding is critically evaluated. The analysis relied on by the trial court is compared with that applied by the Supreme Court and by the Court of Customs and Patent Appeals (C.C.P.A.). This Note argues that the court correctly perceived that the disputed claims were drawn to a computer algorithm, but that the court's analysis of patentability was superficial. The court should not have held that the claims recited statutory subject matter simply because the claimed invention was implemented on a computer. Rather, the appropriate question was whether or not the steps of the claimed algorithm embodied a process that complied with the statutory requirements.

I. Paine, Webber Facts and Reasoning

In 1980 Merrill Lynch filed a patent application covering its then recently introduced Cash Management Account (CMA), entitled "Securities Brokerage-Cash Management System." As disclosed in the patent, the invention incorporated a combination of a conventional securities account providing for full value and margin purchases, a choice of short-term investments, and a credit account with both checking and charge account privileges. Merrill Lynch contended that by combining these three components, all of which were previously known, into a single account, synergistic effects accrued to the benefit of each customer. As an example, Merrill Lynch pointed to the purchase of interest-bearing mutual fund shares with the cash resulting from transactions in the securities account. In the ordinary securities account, uninvested capital resulting from market transactions lies idle, earning neither interest nor dividends.

Plaintiff Paine, Webber attacked the validity of Merrill Lynch's United States Patent 4,346,442 (the '442 patent). In a motion for summary judgment, Paine, Webber argued that the '442 patent was for a method of doing business, and was therefore not statutory subject matter under section 101 of the patent laws. In support of its motion, Paine, Webber cited a line of cases assertedly holding that methods of doing business were not patentable subject matter.

10. Id. at 1363. United States Patent 4,346,442 was issued to Thomas E. Musmanno on August 24, 1982. It was assigned on that date to Merrill Lynch.
11. Id. at 1361 (citing docket item 13A, CMA Money Trust Prospectus, at 2).
12. Id.
13. Id. at 1365. The list included: Loew's Drive-In Theaters, Inc. v. Park-In Theaters, Inc., 174 F.2d 547 (1st Cir. 1949); In re Patton, 127 F.2d 324 (C.C.P.A. 1942); Hotel Security Checking Co. v. Lorraine Co., 160 F. 467 (2d Cir. 1908); Berardini v. Tocci, 190 F. 329 (S.D.N.Y. 1911), aff'd, 200 F. 1021 (2d Cir. 1912); United States Credit System
The challenged claims\textsuperscript{14} were directed to a method or system of doing business. However, each claim was limited to a means (e.g., a computer) for carrying out the claimed method.\textsuperscript{15} Merrill Lynch argued that such claiming was authorized by section 112 as “means

Examination of these cases reveals that the issue of patentable subject matter was never actually decided. Rather, the patent claims were held invalid for “lack of invention.” \textit{See, e.g., Loew’s}, 174 F.2d at 553. The issue of the patentability of a method of doing business was discussed only in dictum, \textit{id.} at 552. \textit{See also}, Hansman, \textit{Method of Doing Business}, 50 J. PAT. OFF. SOC’y 503, 504 (1968), (stating that: “except for dicta, one can conclude that there is no basis in existing law for the rejection of claims as being directed to a ‘method for doing business’”). \textit{Contra Patent and Trademark Office, U.S. Department of Commerce, Manual of Patent Examining Procedure, § 706.03(a) (4th ed. 1979)} (“\textit{t}hough seemingly within the category of a process or method, a method of doing business can be rejected as not being within the statutory classes.”).

14. Claim 1, which is representative, recites:

\begin{quote}
In combination in a system for processing and supervising a plurality of composite subscriber accounts each comprising a margin brokerage account, a charge card and checks administered by a first institution, and participation in at least one short term investment, administered by a second institution, said system including brokerage account data file means for storing current information characterizing each subscriber margin brokerage account of the second institution, manual entry means for entering short term investment orders in the second institution, data receiving and verifying means for receiving and verifying charge card and check transactions from said first institution and short term investment orders from said manual entry means, means responsive to said brokerage account data file means and said data receiving and verifying means for generating an updated credit limit for each account, short term investment updating means responsive to said brokerage account data file means and said data receiving and verifying means for selectively generating short term investment transactions as required to generate and invest proceeds for subscribers’ accounts, wherein said system includes plural such short term investments, said system further comprising means responsive to said short term updating means for allocating said short term investment transactions among said plural short term investments, communicating means to communicate said updated credit limit for each account to said first institution.
\end{quote}


15. For example, claim 1 is restricted to “brokerage account file means” and “manual entry means for entering short term investment orders.” \textit{id}. In the language of patent claims, the term “means” connotes an apparatus or machine. By referring to “means for” a function or step, this claim element is restricted to a machine or apparatus for accomplishing the described step.

When a patent claim recites a sequence of steps without limitation to “means for,” the patent is said to read on a process or method. This can be a broader way in which to claim an invention, since the sequence of steps is claimed, no matter how carried out. In the case of a software invention, the distinction between “means for” and method claims may disappear, since the method is to be carried out by only one means: a computer programmed according to the patented invention. In other technical areas, the distinction between means and method claims can be much greater. \textit{See In re Gelnovatch}, 595 F.2d 32, 37 (C.C.P.A. 1979).
plus function language.”

The court held that, for a section 101 analysis, it was irrelevant whether a patent claim was in method or apparatus (means) form. Rather, the question was whether or not the subject matter was patentable, regardless of the label of the claims. In the court’s view, the claims were drawn to a computer algorithm: a step-by-step logical method for solving a complex problem.

Evaluating the claims in the ’442 patent, the Paine, Webber court held that it had “carefully examined the claims in the case and [was] unable to find any direct or indirect recitation of a procedure for solving a mathematical problem. Rather, the patent allegedly claims a methodology for effecting a highly efficient business system.” Reasoning that the claims did not recite or preempt a mathematical algorithm, the court held that they were statutory.

The court swept aside Paine, Webber’s charge that Merrill Lynch’s ’442 patent was for a method of doing business. The court

16. 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.

17. Labels are not determinative in § 101 inquiries. 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 distinguishable from that of a method claim drawn to the steps of the 'means.' In re Maucorps, 609 F.2d 481 (C.C.P.A. 1979) (quoting In re Freeman, 573 F.2d 1237, 1247 (C.C.P.A. 1978)). Accord In re Gelnovatch, 595 F.2d 32 (C.C.P.A. 1979).

18. The court stated: “The specifications of the ’442 patent teach the schematic flow chart for the [Cash Management Account], but do not include any descriptions of any apparatus to effectuate the [Cash Management Account].” Paine, Webber, 564 F. Supp. at 1363.

19. Id. at 1368. As will be discussed infra, the Supreme Court has ruled that claims drawn to mathematical algorithms are not statutory under § 101. Gottschalk v. Benson, 469 U.S. 632 (1972).
held that, in view of *In re Toma,* 20 in deciding the patentability of a computer program under section 101, the analysis should focus on the steps of the algorithm, rather than on its product (here, a method of doing business). Concluding that although the method claimed in the '442 patent would be nonstatutory if carried out with a paper and pencil, the court said that "the '442 patent claimed statutory subject matter because the claims allegedly teach a method of operation on a computer to effectuate a business activity." 21 This result is significant because it indirectly overcomes a long-standing Patent Office rule against patenting methods of doing business. 22

II. THE LEGAL BACKGROUND OF PAINE, WEBBER

Sections 101, 102, and 103 of the patent statutes set out the requirements that any invention must satisfy in order to be entitled to the protection of the patent laws; each section represents a distinct requirement that must be satisfied. For computer programs, section 101 has been the most significant barrier to patentability. As will be developed in detail below, a number of courts have held computer programs unpatentable as not constituting statutory subject matter under section 101. 23 The treatment accorded software in cases in which the issue of patentability under section 101 has been litigated is best understood when the development and policy of the patent system as a whole is considered.

A. POLICY OF THE PATENT SYSTEM

The patent laws are intended to promote the progress of science and industry by providing a financial incentive (i.e., exclusive rights to the invention for a period of seventeen years) to either the inventor or to his assignee. 24 In addition, by establishing this enforceable right for an inventor, the patent laws promote the free exchange of ideas. Because of his enforceable monopoly, an inventor need not fear that making his invention public will deprive him of a financial reward for his efforts.

22. See supra note 13 and accompanying text.
23. "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." 35 U.S.C. § 101 (1982).
24. "Every patent shall . . . grant to the patentee, his heirs or assigns, for the term of seventeen years . . . the right to exclude others from making, selling, or using the invention throughout the United States . . . ." 35 U.S.C. § 154 (1982).
B. LEGISLATIVE HISTORY

The patent laws were enacted by Congress in accordance with powers granted by the Constitution: "The Congress shall have the power . . . to promote the progress of science and the useful arts by securing for limited times to authors and inventors the exclusive rights to their respective writings and discoveries." 25

Out of this authority have grown the patent and copyright laws. The first Patent Act was submitted to the House of Representatives in the first session of Congress in 1790. President Washington urged passage of the act, stating: "I cannot forbear intimating to you the expediency of giving effectual encouragement . . . to exertion of skill and genius in producing new and useful inventions." 26

In the first revision of the patent laws, in 1793, statutory subject matter was defined as "any new and useful art, machine, or composition of matter or any new or useful improvement [thereof]." 27 This may be compared with the present definition of statutory subject matter: "[A]ny new and useful process, machine, manufacture or composition of matter, or any new and useful improvement thereof . . . ." 28

There is nothing in the plain language of the Constitution or the patent laws suggesting an intent to restrict the classes of invention for which patent protection ought to be available. On the contrary, a comparison of the original definition of statutory subject matter with that of the present section 101 demonstrates an intent to broaden the scope of the patent laws by inclusion of a "process" 29 within the current definition.

C. THE SPECIAL STATUS OF SOFTWARE

Beginning in 1964, an increasing number of inventors sought patents for inventions based wholly or in part on computer pro-

29. "Process" is defined as a "process, art, or method and includes a new use of a known process, machine, manufacture, composition or matter or material." 35 U.S.C. § 100(b) (1982).

Although the term "process" was first included in the 1952 revision of the patent laws, processes have long been recognized as patentable. See O'Reily v. Morse, 56 U.S. (1 How.) 402, 420 (1853) (citing the English case of Neilson v. Harford, 151 Eng. Rep. 1266 (Ex. 1841)); Corning v. Burden, 56 U.S. (1 How.) 503, 505 (1854) ("A process, eo nomine, is not made the subject of a patent in our act of congress. It is included under the general term 'useful art.' ").
grams. In 1965, the President's Commission on the Patent System was formed and charged with, among other things, investigating the wisdom of granting patents for computer programs. The Commission recommended against this for practical reasons. Since the Patent Office could not properly examine applications for programs because of the lack of a classification technique, and because of the tremendous burden of searching the already voluminous prior art, the patenting of programs would amount to mere registration and would deny programmers the presumption of validity other inventors enjoyed under the patent system. In addition, patent protection for software was viewed as unnecessary by the Commission because of the availability of copyright protection and because of "substantial and satisfactory growth" in the area.

As a result of this study, legislation designed to exclude software from patent protection was introduced in Congress. However, the legislation was not passed. Regulations excepting program inventions from patent protection were promulgated at the Patent Office, but were rescinded within a year. Thus, under current regulation and statutory law, computer programs are treated as any other invention.

1. A Brief History of the Patentability of Processes

Computer programs have been viewed as processes by both the Patent Office and the courts. The courts have struggled with

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30. In the first published decision allowing a patent on a software invention, the Board of Appeals of the Patent and Trademark Office held that a computer program was patentable because it transformed existing hardware into a special purpose device, which was patentable as a new and useful machine. Ex parte King, 146 U.S.P.Q. (BNA) 590 (Pat. Off. Bd. App. 1964). See also the cases cited supra notes 16-18.

31. President's Commission on the Patent System, To Promote the ... Useful Arts (1966).


33. H.R. 5924, 90th Cong., 2d Sess. 7 (1968).


35. See infra notes 49-83 and accompanying text.

36. The issue of whether a patent claim recites statutory subject matter comes before a court in one of three ways. First, an inventor may appeal a refusal by an examiner in the Patent and Trademark Office to issue a patent because an invention does not recite statutory subject matter. Second, when a patentee sues another party for infringement, the defendant often counterclaims that the patent in suit is invalid; one ground for such a counterclaim or affirmative defense is that the patent fails to recite patentable subject matter. See O'Reilly v. Morse, 56 U.S. (1 How.) 402 (1853).
patent claims for processes because of a policy of limiting an inventor to what he has actually contributed.

_O'Reilly v. Morse_ is illustrative. In that case, the Supreme Court held invalid Samuel Morse's broad claim for "any process whereby electromagnetism [would be] used for transmitting intelligible signs, characters or letters at a distance." Morse had harnessed the principle of electromagnetism for his invention of the telegraph, but he was denied a patent claim for then-unenvisioned uses of the principle.

On the other hand, in the _Telephone Cases_, Alexander Graham Bell's process patents were held valid because he claimed a _particular method_ of transmitting the human voice with an electric current, rather than claiming such transmission by any and all means.

A related policy bars patents on scientific principles or laws of nature. In _Funk Brothers Seed Co. v. Kalo Co._, the Supreme Court held invalid product claims on certain mixed cultures of root nodule bacteria capable of inoculating the seeds of leguminous plants.
The Court reasoned that: "He who discovers a hitherto unknown phenomenon of nature has no claim to a monopoly of it which the law recognizes. If there is an invention to come from such a discovery, it must come from the application of such a law to a useful end."43

The policy against allowing patents on scientific principles is founded on the proposition that the public must not be deprived of something that it already freely enjoys.44 One who establishes a scientific principle, or the mathematical expression of it, acknowledges a relationship that has always existed. Recognition of such a relationship should not entitle one to legal rights in the relationship.

An example of a patentable application of a scientific principle may be found in *Mackay Radio & Telegraph Co. v. Radio Corp. of America*.45 Here, the patent claims were for a directional antenna system in which the arrangement of wires was calculated from a mathematical formula that was itself an expression of a fundamental principle of electromagnetism. The Court said: "While a scientific truth with a 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."46 By this reasoning, a claim involving a scientific or mathematical principle (e.g., an equation derived from basic premises) may be patentable so long as the principle is applied to useful ends and is not *itself* claimed.

The key then appears to be *invention*. Morse was denied claims for methods of communication yet undefined. Bell went no further than his actual contribution and was sustained. In *Funk Brothers*, the Court recognized that discovery of a natural phenomenon is not an invention, while in *Mackay Radio*, it held that an application of such a phenomenon is. Stated somewhat differently, "[a]n idea . . . is not patentable, but a new device by which it may be made practically useful is."47 The patentability of computer software now appears to depend on similar considerations,48 although the evolution of the present position of the courts has not been straightforward.

2. *Patents for Software in the Courts*

Programmable digital computers were developed in the 1950s

43. 333 U.S. at 130.
45. 306 U.S. 86 (1938).
46. *Id.* at 94.
and came into general usage in the 1960s. Until 1964, applications for patents on computer programs were routinely denied by the Patent Office on the basis of the "mental steps" doctrine. This doctrine invalidated claims for processes that required the intervention of the human mind in the interpretation of data. The bar was subsequently broadened to preclude patents on any invention in which the process included steps that could be carried out mentally and was applied to computer programs. In Prater, the C.C.P.A. reversed this rule, holding that only inventions that required mental steps should be disallowed. Thereafter the C.C.P.A. took a liberal stance with regard to the patentability of computer programs under section 101.

In view of the Patent Office's opposition to permitting patents on software, it is not surprising that the Commissioner of Patents and Trademarks sought to have the C.C.P.A. reversed. The Supreme Court provided this reversal in 1972, in Gottschalk v. Benson.

In Benson, the applicants sought a patent for a method of converting data in binary-coded-decimal format to absolute binary. A denial of two of the broad claims by the Patent Office had been reversed by the C.C.P.A. The Supreme Court in turn reversed the C.C.P.A., affirming the rejection of the patent by the Patent Office.

49. See supra note 30.
51. In re Prater, 415 F.2d 1378, 1381 (C.C.P.A. 1968). See also In re Prater, 415 F.2d 1393, 1403 (reversing the Board's earlier decision as to claim 10, affirming the decisions on all other claims).
52. In re Prater, 415 F.2d at 1389.
53. The C.C.P.A. stated: "All that is necessary, in our view, to make a sequence of operational steps a statutory 'process' within 35 U.S.C. § 101 is that it might be in the technological arts . . . ." In re Musgrave, 431 F.2d 881, 893 (C.C.P.A. 1970). But see In re Musgrave at 895-96 (Baldwin, J., dissenting).
55. 409 U.S. 63 (1972).
56. See In re Benson, 441 F.2d 682 (C.C.P.A. 1971).
Justice Douglas, writing for a unanimous court, held that a mathematical algorithm, like an idea or fundamental scientific truth, could not be patented. The fact that the method was limited to being practiced on a computer was of no significance for analysis of patentability under section 101.

Following Benson, in Freeman, the C.C.P.A. developed a two-step test for patent claims reciting computer programs:

1. Each claim is examined to determine if it recites a mathematical algorithm.
2. If it does, it must be determined if a claim in its entirety would wholly preempt the algorithm.

Claims were denied if both questions were answered affirmatively.

For the C.C.P.A., the major impact of the Benson decision appeared to be preclusion of patent protection for programs that claimed mathematical algorithms. Hence, a claim for a computer

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58. Justice Douglas summarized the opinion in what has come to be known as the nutshell holding: "The mathematical algorithm involved here has no substantial 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." Id. at 72.

Although the Court correctly summarized existing precedents in formulating the rule that a mathematical algorithm could not be patented, the Court incorrectly applied the rule. The disputed claims recite not a mathematical algorithm or formula, but a process carried out by a particular kind of hardware within a computer. Claim 8 is representative of the claims:

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 re-entrant 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,
(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.

59. In re Freeman, 573 F.2d 1237, 1245 (C.C.P.A. 1978). The claims in Freeman were for a computerized typesetting system. The C.C.P.A. reasoned that because the claim elements did not include a mathematical algorithm, the claims should not be rejected under the rule of Gottschalk v. Benson. The C.C.P.A. was careful to distinguish mathematical algorithms from computer algorithms, the latter being a more general term. The court said: "Because every process can be characterized as a 'step-by-step procedure ... for accomplishing some end,' a refusal to recognize that Benson was concerned with mathematical algorithms leads to the absurd view that the Court was reading the word 'process' out of the statute." In re Freeman, 537 F.2d at 1246.
program that did not recite such an algorithm would appear to be statutory under the C.C.P.A.'s interpretation of the Benson decision.

This issue was squarely presented to the C.C.P.A. in In re Toma. The claimed invention was a program for translating between natural languages (Russian and English), which did not involve a mathematical algorithm. The Patent Office refused the patent application, relying on a broad definition of the term "algorithm": "A fixed, step-by-step procedure for accomplishing a given result . . . ." The Patent Office reasoned that if a patent claim recited such an algorithm, and if it was the only novelty present in the claim, then Benson required rejection.

The C.C.P.A. reversed, explicitly rejecting the broad definition of the term "algorithm," holding that Benson required the term to be applied in a specific sense, only to a solution of a given type of mathematical problem. The court effectively confined the holding in Benson to claims reciting mathematical algorithms. This limitation is not required by either the rationale or holding in Benson. It is illustrative of the tension that exists between the decisions of the Supreme Court and the C.C.P.A. in the area of computer software.

Even though a claim drawn to a mathematical algorithm is non-statutory under Benson, the decision in Mackay Radio & Telegraph Co. v. Radio Corp. of America would seem to indicate that a practical application of such an algorithm should be patentable. In Parker v. Flook, this issue was before the Supreme Court.


61. 575 F.2d at 876, n.4.
62. Id. at 876.
63. "[I]t is clear to us that the Benson Court used the term 'algorithm' in a specific sense, namely 'a procedure for solving a given type of mathematical problem.'" Id. at 877 (citing Gottschalk v. Benson, 409 U.S. 63, 65 (1972)) (emphasis added).
64. Although the "nutshell holding," supra note 58, is confined to mathematical algorithms, the bulk of the opinion is written in broader language. The Court rested its holding in general on the principle that one may not obtain a patent for an idea or for a law of nature. Gottschalk v. Benson, 409 U.S. at 68.
Flook involved an applicant who had devised a mathematical algorithm for a particular application: control of a catalytic process for refining petroleum. The patent claims were carefully worded so as not to pre-empt the claimed algorithm. Nonetheless, the Supreme Court held that a method for calculating a number, even when tied to a specific end use, was unpatentable subject matter under section 101. This was an expansion of the rule in Benson, because the claims in Flook were made in the context of another process that was otherwise statutory. The Supreme Court went further, holding that a program was unpatentable if the only novelty in the claims resided in a mathematical algorithm.

The C.C.P.A. attempted to limit the scope of the Flook holding since requiring a determination of whether or not an invention comprised statutory subject matter by separating the new aspects of the invention from the algorithm would severely limit the scope of the patent system. For example, the C.C.P.A. held that the proper interpretation of Flook was a requirement that the claim as a whole not be directed toward the solution of a mathematical problem in In re Walter. The case utilized the two-step test formulated in Freeman for patent claims involving computer programs. The second step of the Freeman test required only that a claimed mathematical algorithm not have a pre-emptive effect. That is to say, the algorithm could not be claimed for all applications. Flook clearly imposed further limitations. As a result, the C.C.P.A. used In re Walter

68. Id. at 589.

69. This result is clearly at odds with the Court's decisions in the Telephone Cases, 126 U.S. 584 (1887), and MacKay Radio, 306 U.S. 86 (1938).

70. "Respondent's process is unpatentable under § 101, not because it contains a mathematical algorithm as one component, but because once that component is assumed to be within the prior art, the application, considered as a whole, contains no patentable invention." Flook, 437 U.S. at 594.

The difficulty with this portion of the majority opinion is that it mixes the requirements of § 101 with that of § 102, which sets out the standard for novelty. The dissent in Flook objected to this confusion of the § 101 and § 102 issues. Flook 437 U.S. at 599 (Stewart, J., dissenting). The commentators have also been critical of this "point of novelty" analysis applied by the majority to the claims in Flook. See, e.g., Flewellyn, An Anomaly in the Patent System: The Uncertain Status of Computer Software, 8 Rutgers J. Computers Tech. & L. 273, 292 (1981).

This holding is a further illustration of the tension between the C.C.P.A. and the Supreme Court. The C.C.P.A. has criticized a "point of novelty approach to patent claims as neither correct nor within the intent of Congress." In re Bernhart, 417 F.2d 1395, 1399 (C.C.P.A. 1969).

71. "If a point of novelty approach were to be adopted it would immeasurably debilitate the patent system. We do not believe the Supreme Court acted in a manner so potentially destructive." In re Walter, 618 F.2d 758, 766 (C.C.P.A. 1978).

72. Id.

73. See supra text accompanying note 59.
Walter to modify the second step of the Freeman test to require that a mathematical algorithm, to be statutory, “define structural relationships between physical elements of the claim (in apparatus claims) or to refine or limit claim steps (in process claims) . . . ”.

However, in a later case, the Patent Office contended that this narrow reading of Flook gutted the opinion. The claimed invention in Diamond v. Diehr involved the use of a digital computer to adjust the cure time in the molding of synthetic rubber. The computer was required to repeatedly solve a well-known equation at fixed intervals using temperature data from the mold in order to predict optimal cure time. In the majority opinion, the invention was perceived as an improvement in the process for curing synthetic rubber. The involvement of a computer program was viewed as incidental to the claimed process.

Relying on Mackay Radio & Telegraph Co. v. Radio Corp. of America, the Supreme Court held that “[a] claim drawn to subject matter otherwise statutory does not become nonstatutory because it uses a mathematical formula, a computer program or digital computer.” The Supreme Court explained that “when a claim stating 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 . . . then the claim satisfies the requirements of §101.” The majority in Diehr appears to have adopted the position of the C.C.P.A. in In re Walter, focusing on the invention as a whole, and rejecting the Flook approach.

Following Diehr, the C.C.P.A. considerably relaxed the requirements of the second prong of its two-step Freeman/Walter test, but has adhered to its basic bipartite form.

74. In re Walter, 618 F.2d at 766.
76. Id.
77. The Arrhenius equation. Diehr, 450 U.S. at 177 n.2.
78. “We view respondent’s claims as nothing more than a process for molding rubber . . . ” Diehr, 450 U.S. at 191. But see id. at 210 (Stevens, J., dissenting) (concluding that application of the Flook analysis to the claims would find them unpatentable under §101).
81. Id. at 192.
82. Apparently, limiting a claim including a mathematical algorithm that would otherwise be statutory would meet the requirements of §101. See In re Abele, 681 F.2d 787, 792 (C.C.P.A. 1982) (“The goal is to answer the question ‘What did applicants invent’ . . . If the claimed invention is an application of the algorithm, §101 will not bar the grant of a patent.”). See Milde, Life After Diamond v. Diehr: The C.C.P.A.
Although the Supreme Court has now held at least some software inventions patentable under section 101, uncertainty prevails. There is no clear standard for analyzing patent claims. The C.C.P.A., until it was replaced by the C.A.F.C., adhered to the two-step analysis reserved for software, whereas the Supreme Court has consistently applied a more general analysis.

The common thread running through the decisions is that claims drawn to nonstatutory subject matter, such as mathematical formulae, must be limited to hardware to be valid. But the requisite degree of restriction is unsettled.

With the appointment of Justice O'Connor, the narrow majority of Diehr may have disappeared. In addition, the combining of the C.C.P.A. and the Court of Claims into the Court of Appeals for the Federal Circuit may produce a shift in the position of this appellate panel on software cases.

Whatever the differences in the tests applied by the courts in deciding section 101 cases, it is settled law that an analysis must consider what function the claimed algorithm performs. It is here that the Paine, Webber court seemingly erred.

III. A CRITICAL ANALYSIS OF PAINE, WEBBER

The test applied to the claims in Paine, Webber was simply to determine whether or not a mathematical algorithm was recited in the patent claims. Not finding such an algorithm, the court held the claims statutory. The apparent problems with this test are twofold. First, no appellate court has ever concluded that all processes not containing mathematical algorithms become statutory when claimed as computer programs or algorithms. As the preceding section demonstrates, the analysis is usually carried out the other


84. The Court summarized the test it applied:

The product of the claims of the '442 patent effectuates a highly useful business method and would be unpatentable if done by hand. The C.C.P.A., however, has made clear that if no Benson algorithm exists, the product of a computer program is irrelevant, and the focus of analysis should be on the operation of the program on the computer. The Court finds that the '442 patent claims statutory subject matter because the claims allegedly teach a method of operation on a computer to effectuate a business activity.

Paine, Webber, 564 F. Supp. at 1369.

The court apparently ignored the plain meaning of its own language, since there is no analysis in the opinion concerning the "operation of the program on the computer."

85. See In re Toma, 575 F.2d 872 (C.C.P.A. 1978); In re Phillipps, 608 F.2d 879 (C.C.P.A. 1979); In re Pardo, 684 F.2d 912 (C.C.P.A. 1982).
way around: an algorithm is statutory only when the process it embodies is statutory.\textsuperscript{86} Second, the test ignores the rationale for many of the prior decisions in the software area; the test is simply too superficial.\textsuperscript{87}

This analysis will begin by critically examining the reasoning and precedents used by the \textit{Paine, Webber} court. Next, an alternate analysis will be applied, utilizing a modified version of the C.C.P.A.'s two-step test. The policy questions raised by the '442 patent litigation will also be considered.

A. THE COURT'S ANALYSIS

The \textit{Paine, Webber} court read the Supreme Court decisions in \textit{Benson} and \textit{Diehr}, as those cases were interpreted by the C.C.P.A., establishing two broad classes of algorithms: as mathematical algorithms and computer algorithms.\textsuperscript{88} Since it was unable to find any procedure for solving a mathematical problem in the '442 patent, the court ruled that the '442 patent was outside of the special area identified by the precedents.\textsuperscript{89} The court then apparently relied on \textit{In re Toma}\textsuperscript{90} for the proposition that a computer program for a nonmathematical process is in the "technological arts" and is, therefore, statutory under section 101.\textsuperscript{91} The problem with the court's analysis is that the process embodied by the claimed computer program is thereby made irrelevant, a result decidedly at odds with the decisional law.\textsuperscript{92}

\textsuperscript{86} The court in \textit{In re Walter}, 618 F.2d 767, 769 (C.C.P.A. 1980), stated that the fact that a computer might utilize arithmetic steps in its internal operations while executing a process is irrelevant in determining whether or not claimed mathematical operations themselves are statutory. \textit{See also In re Pardo}, 684 F.2d 812 (C.C.P.A. 1982).

Because of the equivalence of the terms algorithm and process, the approach used in a \$101 analysis is to determine whether or not the elements of a claimed step comply with the statute.

\textsuperscript{87} \textit{See In re Freeman}, 573 F.2d 1237, 1247 (C.C.P.A. 1978) (criticizing the Board for failing to analyze the steps of the claimed algorithm for compliance with \$101); \textit{In re Toma}, 575 F.2d 872, 874 (C.C.P.A. 1978) (emphasizing that the claimed process of translation between languages as implemented by computer differs markedly from the process of translation as carried out by humans).


\textsuperscript{89} \textit{Paine, Webber}, 564 F. Supp. at 1369.

\textsuperscript{90} 575 F.2d 872 (C.C.P.A. 1978).

\textsuperscript{91} \textit{Paine, Webber}, 564 F. Supp. at 1369. \textit{See also supra} note 84.

\textsuperscript{92} \textit{Compare} what the \textit{Paine, Webber} court stated \textit{supra} note 84 (method claims that would be unpatentable if done by hand become patentable when implemented on computer) with \textit{In re Walter}, 618 F.2d 758, 766 (C.C.P.A. 1980) (if an inventor im-
1. The Meaning of Toma

In *Toma*, the Patent Office objected to the claims because translation between languages was a "liberal art," rather than a technological one.93 The origin of the language on which the Patent Office relied in making its rejection is found in several earlier cases. The C.C.P.A. ruled in *In re Musgrave* that the only requirement for a computer program to be patentable under section 101 was that it be "in the technological arts."94 The requirement of statutory subject matter virtually disappeared. Judge Baldwin, in a separate concurrence in *Musgrave*, foresaw the difficulty with this ill-defined section 101 requirement.95 He urged instead that the analysis of the computer-related inventions be carried out using the traditional process tests.96 Judge Baldwin's approach was ultimately adopted by the Supreme Court and the technological arts test was forgotten.97 Any doubt as to the fate of the technological arts test was put to rest in *Toma* when Judge Baldwin wrote that the test was "not intended to create a generalized definition of statutory subject matter."98 Judge Baldwin's view of the technological arts issue is that an invention is not statutory if it is not within the technological or useful arts. But if an invention is within the technological arts, it is not exempted from further analysis.99

In overruling the technological arts objection, the *Toma* court discussed factors it considered important in deciding if an invention was within the technological arts. The court stressed that the focus of the inquiry should be on the method by which translation between languages was accomplished, rather than on the results of that translation.100 In other words, the court held that in deciding proves a process or method, his invention is statutory, if the underlying subject matter that has been improved is itself statutory).

94. 431 F.2d 882, 893 (C.C.P.A. 1970). The language is ultimately derived from the Constitutional mandate for a patent system.
95. *Id.* at 895 (Baldwin, J., concurring).
96. *Id.* at 894-95 (Baldwin, J., concurring).
99. *Id.*
100. [W]e hold that the method for enabling a computer to translate natural languages is in the technological arts, i.e., it is a method of operating a machine. The "technological" or "useful" arts inquiry must focus on whether the claimed subject matter (a method of operating a machine to translate) is statutory, not on whether the product of the claimed subject matter (a translated text) is statutory, not on whether the prior art which the claimed sub-
upon compliance with section 101, the focus of the inquiry should be on the steps of the claimed process. The opinion in *Toma* is thus seen to be consistent with other computer cases that have been before the C.C.P.A. The question in determining compliance with section 101 is whether or not the steps of the claimed process are statutory. The technological arts test is not a means to avoid this crucial issue.

2. *Problems with the* Paine, Webber *Test*

   The test applied in *Paine, Webber* appears to avoid consideration of the steps of the claimed process. The court did not analyze the elements of the claims except to determine that mathematical algorithms had not been recited. To be statutory under section 101, it was sufficient that the claims were for a nonmathematical computer algorithm, without determining whether or not the claimed steps constituted a statutory process. It is for this reason that the court's analysis of the claims was faulty. The position of the C.C.P.A. is clear: "While a program may configure a computer in a manner to carry out a process, it is the process, i.e., what the computer does, which is the subject of examination under 35 U.S.C. § 101 . . . ." The Supreme Court has taken a similar position in the computer cases it has decided.

   Because of the superficial test applied to the claims of the '442 patent, the *Paine, Webber* court avoided confronting the crucial issue of whether or not a claim drawn to a method of doing business is patentable under section 101.

   \*ject matter purports to replace (translation by the human mind) is statutory

   \*Id. at 877.

   101. See cases cited *supra* note 85.
   103. If the *Paine, Webber* court correctly stated the law, then any process implemented on a computer, except one claiming a mathematical formula, is statutory under § 101. This would constitute a virtual return to the standard announced in *In re Musgrave*, 431 F.2d 882, 893 (C.C.P.A. 1974). This is a difficult position to defend in view of the language in *Diamond v. Diehr*, 450 U.S. 175, 185 (1981) ("This Court has undoubtedly recognized limits to § 101 . . . . Excluded from such patent protection are laws of nature, natural phenomena, and abstract ideas."). See also *In re Meyer*, 688 F.2d 789 (C.C.P.A. 1982) (affirming rejection of computer algorithm embodying a mental process).
B. AN ALTERNATIVE ANALYSIS

The most recent formulation of the C.C.P.A. two-step test is stated as follows:

[I]t must be determined whether a scientific principle, law of nature, idea, or mental process, which may be represented by a mathematical algorithm, is included in the subject matter of the claim. If it is, it must then be determined whether such principle, law, idea, or mental process is applied in an invention of a type set forth in 35 U.S.C. § 101.106

This test captures the Supreme Court holdings in the computer cases establishing that a patentee may not claim a mathematical algorithm, but may claim an otherwise statutory process that requires a mathematical step. The test also broadens the first prong of the test to include nonstatutory processes besides mathematical algorithms.

The Supreme Court has consistently held that a computer program is to be analyzed, using the same approach as would be applied to any other claimed process.107 For example, the mathematical algorithm exception announced in Gottschalk v. Benson was not a special case, but an application of the rule that one may not patent a law of nature.108 As a result, it would be in keeping with the Supreme Court’s rulings to further expand the scope of the first step of the C.C.P.A.’s two-step test by striking out the reference to mathematical algorithms in the first sentence.109 Thus, the test should be reformulated: first, determine whether or not any nonstatutory subject matter is recited in the claims; second, determine whether or not such nonstatutory subject matter is applied in an invention of the type set forth in section 101.

This test would explicitly preserve all judicially created exceptions to section 101 unless the reason for their existence was eliminated by limitations included in the language of the claim. For example, claims reciting mathematical algorithms are patentable provided that they are limited to application of the claimed formula in a concrete invention. Unfortunately, what constitutes an adequate limitation is still unclear.110

107. See cases cited supra note 105.
109. See supra note 106 and accompanying text.
110. Compare Parker v. Flook, 437 U.S. 584, 590 (1978) (stating that "the notion that post solution activity ... can transform an unpatentable principle into a patentable process exalts form over substance") with Diamond v. Diehr, 450 U.S. 175 (1981) (holding that application of a similar formula to a similar process, i.e., limiting the time of a chemical reaction by way of sensor data fed back to a controlling computer,
In applying this modified two-step test to the claims at issue in *Paine, Webber*, the threshold question is whether or not the claims come within the scope of the test.\textsuperscript{111} In order for a claimed process to come within the "methods of doing business" exception,\textsuperscript{112} it must merely facilitate business dealings.\textsuperscript{113} In evaluating the '442 claims, the *Paine, Webber* court stated that the product of the claims of the '442 patent would be unpatentable if done by hand, implying that the claims, if expressed as a general method, would fall within the exception. Examination of the claim language reveals that the claimed invention would be such a method but for the inclusion of the limiting words "means for."\textsuperscript{114} Since this limitation has little significance in the case of an invention embodied as a computer program, however, the claims of the '442 patent should be analyzed as a method for doing business and not as an apparatus claim.\textsuperscript{115}

Assuming, arguendo, that the claims of the '442 patent fall within this judicially created exception to section 101, thus failing the first prong of the proposed test, then, to be patentable, the claims must be limited to avoid the problem that motivated the creation of the exception in the first place. In the case of mathematical formulas, for example, the claims must be limited to a concrete statutory application, in order to avoid monopolizing the formula it-was statutory under § 101). See e.g., Milde, *Life After Diamond v. Diehr: The C.C.P.A. Speaks Out on the Patentability of Computer Related Subject Matter*, J. PAT. OFF. SOC'Y 434, 437 (1982). In a recent opinion, however, the C.C.P.A. held that if, absent the mathematical algorithm, a claim was statutory, then the presence of an element drawn to such an algorithm would not render the claim unpatentable. See *In re Abele*, 684 F.2d 902 (C.C.P.A. 1982).

\textsuperscript{111} See *In re Pardo*, 684 F.2d 912, 916 (C.C.P.A. 1982) ("Any process, machine, manufacture or composition of matter constitutes statutory subject matter unless it falls within a judicially determined exception to § 101.").

\textsuperscript{112} There is no clear precedent holding methods of doing business unpatentable, although this "non-exception" is well recognized, *In re Johnston*, 502 F.2d 765, 771 (C.C.P.A. 1974); *In re Duetsch*, 553 F.2d 689, 692 n.5 (C.C.P.A. 1977). See also supra notes 12-13 and accompanying text.

\textsuperscript{113} *In re Wait*, 73 F.2d 982 (C.C.P.A. 1934).

\textsuperscript{114} See, e.g., supra note 14.

\textsuperscript{115} "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 . . ." *In re Walter* 618 F.2d 758, 768 (C.C.P.A. 1980). See also supra notes 16-18 and accompanying text. The claim language of the '442 patent is sufficiently broad to cover the invention if it were implemented by hand, except for the "means for" limitation. *But see In re Johnston*, 502 F.2d 765 (C.C.P.A. 1974) (data processing system for record keeping associated with banking transactions not a method of doing business), rev'd sub nom. *Dann v. Johnston*, 425 U.S. 219 (1976) (system held unpatentable on grounds of obviousness).
In the case of methods of doing business, the policy behind the exception is that such a method is merely an idea, and an idea, by itself, is not patentable. A second ground for the exception is that "a system of business, disconnected from means for carrying out the system . . . is not an art," implying that such a system is not one of the "useful arts" that the patent laws were mandated by the Constitution to protect.

Clearly, restricting the '442 patent claims to a computer-based implementation could meet either objection. Unfortunately, the claim language does not sufficiently restrict the claimed invention. The only reference to a computer or to digital data processing may be found in the patent specification. The claims are limited only by "means for" language. In view of the C.C.P.A.'s interpretation of "means for" language in software related inventions, it is unlikely that this is adequate. In the case of the '442 patent, although the invention itself is statutory, the claims are drafted too broadly to comply with the statute. Accordingly, the court erred in finding the claims patentable under section 101.

It is instructive to apply this analysis to the claims in In re Toma. Again, the threshold question is whether or not the claims come within the scope of the proposed two-step test. In other words, do the claims fail part one of the test?

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117. Loew's Drive-In Theaters, Inc. v. Park-In Theaters, Inc., 174 F.2d 547 (1st Cir. 1949); accord, Hotel Security Checking Co. v. Lorraine Co., 160 F. 467 (2d Cir. 1908).
119. See supra note 115.

A method for translation between source and target natural languages using a programmable digital computer system, the steps comprising:
(a) storing in the main memory of the computer a source text to be translated;
(b) scanning and comparing such source text with dictionaries of source language words stored in a memory and for each source text word for which a match is found, storing in a file main memory each word and in association with each such word, the coded information including memory offset linkages to a memory in the computer system where grammar and target language translations for the word are stored;
(c) analyzing the source text words, in its file of words, a complete sentence at a time, and converting the same into a sentence in the target language utilizing the coded information and including the steps of
(1) utilizing the memory offset address linkages for obtaining the target translations of words from a memory, and
(2) reordering the target language translation into the proper target language sequence.

Id. at 875.
The Patent Office rejected the claims in *Toma* partly because translation between languages was held not to be in the technological arts. The preamble to claim 1 is unequivocal: "[a] method for translating between source and target natural languages . . . ." Thus, if it is assumed for this discussion that methods for translating between languages are nonstatutory because translation is not in the technological arts, then clearly the claims in *Toma* read on nonstatutory material. Of course, it might be pertinent to observe that the "technological arts" have not been defined specifically, either by statute or judicial opinion. Even conceding that translation between languages is nonstatutory, the claims at issue in *Toma* are statutory under section 101 because they satisfy the second step of the test: the claims are explicitly restricted to a method for enabling a computer to carry out translation. Moreover, the elements of claim 1, which consist of storing, scanning, and analyzing, can only be read to claim a method whereby a machine carries out the translation. Since section 100(b) defines a statutory process to be a method for operating a machine, it is clear that the claims in *Toma* fall within the definition of statutory subject matter.

The analysis by the Patent Office is somewhat different from that used by the C.C.P.A. in *Toma*. The C.C.P.A. first held that the claims were not objectionable because no mathematical algorithm was claimed. It then rejected the technological arts objection, holding that the claims were drawn to a process that was within the technological arts because it was "for a method of operating a machine to translate." The *Toma* court thus never considered whether or not a method for translation of languages was nonstatutory; it proceeded directly to the second issue, whether or not such a method, limited to computer applications, was statutory. The only category of nonstatutory subject matter that the *Toma* court referred to was that of mathematical algorithms, condemned by the

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121. *Id.* at 877.
122. *Id.*
125. *See supra* text accompanying notes 106-110.
126. 35 U.S.C. § 100(b) (1982).
127. *Toma*, 875 F.2d at 877.
128. *Id.*
129. The court avoided this issue by distinguishing between the product of the algorithm (translation between languages) and the claimed steps. *Id.*
Supreme Court in *Benson*. The proposed analysis is both simpler and more logical.

Significantly, this analysis suggests that processes previously held unpatentable because they involved mental processes, or because the claimed steps were not restricted to particular implementations, should now be patentable, if the claimed processes are restricted to operation on a computer. This result could considerably broaden the scope of patentable subject matter.

**CONCLUSION**

There is strong reason to believe that the *Paine, Webber* court applied an incorrect test for compliance with section 101 to the claims. As a result of its incomplete analysis, the court failed to confront the fundamental issues of the case. A better analytic alternative is that applied by the C.C.P.A. in computer cases, which with slight modification should be applied to the claims of the '442 patent. The improved result for such claims would be a nonstatutory status under section 101.

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130. It may be that this approach is an attempt to confine the impact of the *Benson* and *Flook* decisions. See supra text accompanying notes 60-74.

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