

COMPUTER PROGRAMS ARE PATENTABLE*

A computer¹ is a machine that is capable of performing arithmetic and logical operations on data presented to it in an appropriate form. The operation of the apparatus, termed the hardware,² comprising a digital computer depends upon the use of a computer program, termed the software.³ While both hardware and software are currently of great economic importance,⁴ the anticipated growth of the development of software⁵ has generated much discussion⁶ as to whether proprietary interests in this form of property could best be protected by the patent system⁷ or by some other means. However, in spite of all the discussion,

* This Comment is directed toward the patent practitioner. Brief explanations of technical terms and words of art unique to the practice of patent law have been included in the footnotes for the benefit of readers outside of the patent field.

¹ There are two basic types of computers, analog and digital. Analog computers operate on numerical quantities by representing them by some kind of continuous measure, such as a voltage, whose magnitude is determined by the magnitude of the numerical quantity. Digital computers operate on numerical quantities having the form of digits represented by discrete electrical signals. Only digital computers are of interest in this Comment.

² The hardware comprising a digital computer is generally considered to comprise five distinct units: (1) an arithmetic unit for performing addition, subtraction and similar operations; (2) a memory unit for storing data; (3) input equipment for placing data in the memory unit; (4) output equipment for retrieving data from the memory unit; and (5) a control unit for providing the proper time sequence operation of the other units. See P. SHERMAN, PROGRAMMING AND CODING DIGITAL COMPUTERS 42 (1963).

³ Unfortunately, the terms "computer program" and "software" are commonly used to designate a great variety of distinct things. The following definition will be used herein: A computer program is a set of steps that serve to specify changes in the state of the component parts of a digital computer.

⁴ Bradburn, *Where Is The Computer Industry Heading?*, COMPUTERS AND AUTOMATION, Jan., 1970, at 10. The world-wide total of U.S. computer systems [including both hardware and software] has reached 70,000, valued at \$24 billion. The comparable figures one year ago were 57,000 systems worth \$17 billion.

⁵ It is expected that \$1.5 billion will be spent on software in 1970. This figure is expected to grow to \$2.6 billion in 1975. COMPUTER DECISIONS, Jan. 1970, at 2.

⁶ This concern has been expressed in a plethora of articles concerning the best means of protecting computer programs. For an excellent compilation of citations to these articles see Comment, *Computer Programs: Should They Be Patentable?*, 68 COLUM. L. REV. 241, n.3 (1968). In addition, see Davidson, *Practical Considerations in Program Patentability*, COMPUTERS AND AUTOMATION, May 1968, at 12; Bigelow, *Legal Aspects of Proprietary Software*, DATAMATION, Oct. 1968, at 32; Comment, *Adequate Legal Protection For Computer Programs*, 1968 UTAH L. REV. 369; Koller & Moshman, *Patent Protection for Computer Software: Implications For The Industry*, 12 IDEA 1109 (1968); Comment, *Computer Programs and Proposed Revisions of the Patent and Copyright Laws*, 81 HARV. L. REV. 1541 (1968); Kayton, *Should Computer Software Get Patent Protection?*, CHEMICAL ENGINEERING, Feb. 24, 1969, at 52; and Rackman & Popper, *The Case For Patenting Software*, ELECTRONICS, July 7, 1969, at 96.

⁷ The patent system in the United States is the result of the action of Congress

there was no case law directly in point until *Application of Prater*⁸ was handed down by the Court of Customs and Patent Appeals (C.C.P.A.) on November 20, 1968. In the year and a half that has followed, three more decisions⁹ pertaining to computer programs have been handed down by the C.C.P.A. While many issues remain to be considered and decided and the metes and bounds of patent protection for computer programs have by no means been rigidly established, the Court of Customs and Patent Appeals has clearly decided that the patent system will protect computer programs.

The following discussion will attempt to synthesize these four cases to establish what the current law regarding the patentability of computer programs is, as well as to indicate a few of the unresolved issues.

THE PATENTABILITY OF PROGRAMS BEFORE *Prater*

Of all the opinions¹⁰ that were expressed as to whether or not computer programs should be patentable and whether or not they are patentable subject matter¹¹ under the current patent law,¹² the most important to patent practitioners was that of the U.S. Patent Office, since its opinion determined the immediate disposition of patent applications¹³ directed to programming inventions. The Office's opinion was expressed in a set of Guidelines adopted on October 22, 1968.¹⁴

under the Constitutional provision of U.S. CONST. art. I, § 8: "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." The patent law currently in force is found in 35 U.S.C. (1952) and the RULES OF PRACTICE IN PATENT CASES, 37 C.F.R. (1969), promulgated by the Commissioner of Patents in accordance with the authority granted to him in 35 U.S.C. § 6 (1952).

⁸ 415 F.2d 1378 (C.C.P.A. 1968), *opinion superseded*, 415 F.2d 1393 (C.C.P.A. 1969).

⁹ *Application of Prater*, 415 F.2d 1393 (C.C.P.A. 1969); *In re Wheeling*, — F.2d — (C.C.P.A. 1969), 162 U.S.P.Q. 588 (1969); and *Application of Bernhart*, 417 F.2d 1395 (C.C.P.A. 1969).

¹⁰ *Supra* note 6.

¹¹ Patentable subject matter is defined by 35 U.S.C. § 101 (1952) as being "any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof. . . ." Computer programs, as defined in note 3 *supra* would seem to fit best in the statutory category of "process."

¹² 35 U.S.C. (1952) and RULES OF PRACTICE IN PATENT CASES, 37 C.F.R. (1969).

¹³ A person who desires to obtain a patent must file a patent application in the Patent Office in accordance with 35 U.S.C. §§ 111, 112, 113 and 115 (1952). A patent application must include, *inter alia*, a specification. A specification comprises two parts, a disclosure of the invention and one or more claims defining the invention. The disclosure must be a complete description of the invention that is sufficient to allow anyone having ordinary skill in the art to which it pertains to make and use it. The claims are a series of numbered paragraphs immediately following the description of the invention that serve, like the metes and bounds of a deed, to define the subject matter.

¹⁴ 33 Fed. Reg. 15609 (1968), *rescinded*, 34 Fed. Reg. 15724 (1969).

These Guidelines, after an introductory paragraph indicating that they were based on only a tentative analysis of the applicable statutory law and judicial precedent, set forth two propositions of law:

- (1) Mental processes may not be patented, for which *In re Abrams*¹⁵ was cited as authority; and
- (2) Processes, to be patentable, must be performed on physical materials, for which *Application of Shao Wen Yuan*¹⁶ and *Cochrane v. Deener*¹⁷ were cited as authority.

From these two propositions the Guidelines determined that a computer programming process which produces no more than a numerical, statistical or other informational result is a mental process and was not, per se, patentable but could be part of a patentable invention¹⁸ if combined with physical steps that are performed on physical material.

The Guidelines were consistent with the Patent Office's interpretation of a series of cases¹⁹ dealing with the so-called "mental process" or "mental step" doctrine. In essence, this doctrine, as interpreted by the Patent Office, held that steps in a process claim²⁰ that could be performed in the mind are not patentable.²¹

The Patent Office explicitly applied its reasoning, as expressed in

¹⁵ 188 F.2d 165 (C.C.P.A. 1951).

¹⁶ 188 F.2d 377 (C.C.P.A. 1951).

¹⁷ 94 U.S. 780 (1877).

¹⁸ The word "invention" is defined by 35 U.S.C. § 100 (1952) as an "invention or discovery." In order to be patentable, an invention must be new and useful and fit into one of the statutory classes set forth in 35 U.S.C. § 101 (1952), it must not be barred from patentability by any of the provisions of 35 U.S.C. § 102 (1952), and it must not, in accordance with 35 U.S.C. § 103 (1952), be obvious to one of ordinary skill in the art to which it pertains.

¹⁹ See Nimtz, *The Mental Step Doctrine As Developed in the Case Law*, in SOFTWARE PROTECTION BY TRADE SECRET, CONTRACT, PATENT 141 (1969), for an excellent summary of the foundation of the mental step doctrine.

²⁰ Process claims, also commonly termed method claims, are the particular type of claims that are used to define inventions fitting into the statutory category of processes. The elements of a method claim are always verb phrases that describe the manipulative steps of the process. Process claims are contrasted with apparatus claims, used to define inventions fitting into the statutory class of machines, and product claims, used to define inventions fitting into the statutory classes of manufacture and composition of matter.

²¹ This interpretation by the Patent Office did not meet with approval even prior to the *Prater* decision of November 20, 1968. See Popper, *Method Claims For Programmable Processes*, in THE LAW OF SOFTWARE B-55 (1968), for a criticism of the Patent Office's position, in particular the opinion at B-58 that narrowly construing *Cochrane* did violence to its liberalizing stand in the development of patent law.

the Guidelines, in two different ways to reject²² claims drawn to programming applications.

First, if computer programs are mental processes and mental processes are nonstatutory subject matter under the provisions of 35 U.S.C. § 101, then computer programs are not patentable. Second, even if computer programs are not mental processes, claims drafted to computer programs read on²³ mental processes, which are nonstatutory, and hence such claims are rejected for failure to comply with the requirement²⁴ of "pointing out and distinctly claiming the subject matter which the applicant regards as his invention."

The October 22, 1968, Guidelines did not mention the several other bases for rejection of claims drawn to computer programs that were commonly given²⁵ prior to the adoption of the Guidelines. One of these was a rejection of all claims under 35 U.S.C. § 112 as being based on an insufficient disclosure. The Patent Office was, in effect, insisting that an enabling disclosure of the computer upon which the proposed program was capable of running be included in the specification claiming the program. This view was in direct opposition to the general viewpoint of programmers that a flow chart²⁶ is the best way of concisely disclosing a computer program.

A second rejection commonly given²⁷ to claims in computer program applications is that since programmable computers are old, all possible ways of programming them are either directly anticipated by the computer itself, and thus barred by 35 U.S.C. § 102, or are obvious from the structure of the machine and are thus barred by 35 U.S.C. § 103.

²² After a person seeking a patent has filed a patent application, as discussed in note 13 *supra*, in the Patent Office, it is examined for patentability by an Examiner of the Patent Office. If the application discloses and claims a patentable invention, and contains no substantive or formal errors, a patent will be granted. If the application does contain substantive or formal errors, or if the disclosed invention does not meet the statutory standards for patentability, *supra* note 18, one or more of the claims will be *rejected* by the Examiner. The Examiner's decision is communicated to the applicant by means of a memorandum termed an "Official Action." See U.S. PAT. OFF., *MANUAL OF PATENT EXAMINING PROCEDURE*, ch. 700 (3d ed. 1961).

²³ The expression "The claim reads on this subject matter" is used by patent practitioners to indicate that the subject matter in question is included in the invention defined by the claim.

²⁴ 35 U.S.C. § 112 (1952).

²⁵ See Nimtz, *Computer Application and Claim Drafting Under Current Law*, in *SOFTWARE PROTECTION BY TRADE SECRET, CONTRACT, PATENT* 242, 248 (1969).

²⁶ A "flow chart" is a graphical representation of an ordered sequence of steps that must be executed by a digital computer in order to perform a particular function.

²⁷ See Nimtz, *supra* note 25, at 248.

A third rejection,²⁸ using similar reasoning, involves 35 U.S.C. § 112 as the ground for rejection. Programs involve, even under the most liberal Patent Office viewpoint, *at most* a new use of an old machine. Any process claim directed to a programming invention which did not call for a new use were rejected as failing to "particularly point out and distinctly claim" the invention.

In summary then, prior to the *Prater* decision of November 20, 1968, any patent application that appeared to be directed to a computer program was certain to receive one or more of the following rejections:

1. Claims directed toward computer programs are unpatentable under 35 U.S.C. § 101 because computer programs are mental processes and mental processes are nonstatutory subject matter.

2. Claims directed toward computer programs either as processes or special purpose digital computers are unpatentable under 35 U.S.C. § 102 because the subject matter of such claims is completely anticipated by general purpose digital computers.

3. Claims directed toward computer programs either as processes or as special purpose digital computers are unpatentable under 35 U.S.C. § 103 because the subject matter of such claims is obvious in view of general-purpose digital computers.

4. Claims directed toward a computer program are unpatentable under 35 U.S.C. § 112 because the disclosure is insufficient due to a lack of an enabling disclosure of the computer upon which the program is to run.

5. Claims directed toward a computer program are unpatentable under 35 U.S.C. § 112 if they do not explicitly call for a new use of an old machine.

6. If computer programs per se are not mental processes, claims directed toward computer programs will of necessity read on mental processes, which are not patentable, and hence fail to meet the requirements of 35 U.S.C. § 112.

APPLICATION OF PRATER

The invention in this case was apparatus for and a method of determining the relative proportions of various known constituent gases in a mixture of gases through the use of a set of first order linear equations derivable from a spectrogram. The spectrograms of such gas mixtures typically include more peaks than there are constituent

²⁸ *Id.* at 249.

gases and hence more equations than unknowns result. The essence of the invention was the discovery that the particular subset of equations that had the largest determinant provided the most accurate solution.

No prior art²⁹ was cited by the examiner. The rejections were based solely on considerations of law and statutory construction.

The applicants set forth in detail an electromechanical apparatus capable of performing the invention. They also disclosed that a properly programmed digital computer could be used to perform their novel process.

There were 11 method claims and one apparatus claim on appeal. The examiner's rejections included those listed as numbers 1 and 6 in the above summary, with a citation to *Abrams*, as well as numbers 2 and 3. In addition, the examiner reasoned that if the applicants' apparatus claim did read on the analog embodiment that they disclosed, it also read on a programmed digital computer on which they were not entitled to coverage, and hence applicants had failed to distinctly point out their invention as required by 35 U.S.C. § 112.

The Patent Office Board of Appeals affirmed the examiner's rejections. The board, citing *Cochrane* and *Yuan*, found that applicants' claims could be performed mentally and did not therefore fall in a statutory category.

The court first considered the process claims and the rejections under 35 U.S.C. § 101 and § 102. The *Abrams* case, as well as the *Don Lee, Inc. v. Walker*³⁰ and *Halliburton Oil Well Cementing Co. v. Walker*³¹ cases cited therein, was analyzed in great detail to determine the origin of the mental step doctrine. *Abrams* involved a process claim³² involving the steps of, *inter alia*, "determining" and "comparing." The court carefully distinguished *Abrams* by pointing out that *Abrams* did not disclose any means for performing these steps and that digital computers suitable for performing them were not available at the time *Abrams* was decided. These steps, as far as *Abrams*' teaching was concerned, could *only* be performed in the mind. In contrast to this, the applicants in *Prater* had fully disclosed apparatus for carrying out the steps of their claims without *requiring* that any of them be performed in the mind.

The court then examined the reason that *Abrams*' claims had been

²⁹ The term "prior art" is used by patent practitioners to refer to those categories of subject matter that constitute bars to patentability under 35 U.S.C. §§ 102, 103 (1952).

³⁰ 61 F.2d 58 (9th Cir. 1932).

³¹ 146 F.2d 817 (9th Cir. 1944).

³² 188 F.2d at 165.

rejected. The *Abrams* decision had expressly adopted³³ the reasoning of *Halliburton*. In *Halliburton* the statement had been made that mental steps, even if novel, were not patentable.³⁴ The decision of *Don Lee* was cited as authority for this proposition. In analyzing *Don Lee*, the court found³⁵ dicta, unsupported by any precedent, indicating that so-called "mental step" claims were unpatentable. Since the claim in *Don Lee* was rejected on the basis of lack of novelty, the court in *Prater* concluded³⁶ that the mental step doctrine was not the result of any holding of the case law. The court reached this conclusion without either approving or disapproving the concept of the mental step doctrine.

At this point the court shifted to a discussion of the words "useful arts" that appear in Article I, Section 8 of the U.S. Constitution. The court discussed a series³⁷ of cases that have interpreted these words and showed that they have been construed in an increasingly broad fashion. The court particularly pointed out³⁸ the error in the Patent Office's contention that *Cochrane* stands for the rule that all patentable processes must operate physically on substances. This contention is contrary to the intent of the case which was not to limit process patentability but to point out that a process is not limited to the means used in performing it.

Next, the court considered³⁹ the 1952 Patent Act and found nothing therein, nor in the Act's legislative history, that tended to narrow the statutory category of "process."

Their review of the U.S. Constitution, the case law, statutes, and the intent of Congress led the court to the conclusion⁴⁰ that there was no basis for denying patent protection to process claims merely because they could *alternatively* be read on a mental process. Returning then to the distinction between *Abrams* and *Prater*, the court explicitly stated their holding:

This distinction from *Abrams* leads us to our present holding which is that patent protection for a process disclosed as being a sequence or combination of steps, capable of performance with-

³³ *Id.* at 170.

³⁴ 146 F.2d at 821.

³⁵ 415 F.2d at 1387.

³⁶ *Id.*

³⁷ *Waxham v. Smith*, 294 U.S. 20 (1935); *Smith v. Snow*, 294 U.S. 1 (1935); *Telephone Cases*, 126 U.S. 1 (1888); *Tilghman v. Proctor*, 102 U.S. 707 (1881); *Cochrane v. Deener*, 94 U.S. 780 (1877).

³⁸ 415 F.2d at 1387-88.

³⁹ *Id.* at 1389.

⁴⁰ *Id.*

out human intervention and directed to an industrial technology—a “useful art” within the intendment of the Constitution—is not precluded by the mere fact that the process could alternatively be carried out by mental steps.⁴¹

The court then reversed the rejection of the process claims under 35 U.S.C. § 101 and § 102 and the rejection of the process claims under 35 U.S.C. § 101 and § 112. The same reasoning was held⁴² to apply to the rejection of the single apparatus claim and that rejection was also reversed.

Although the court's holding in *Prater* was clearly and explicitly stated, it was almost immediately misconstrued. The case was hailed in the technical press⁴³ as standing for both the patentability of computer programs and for the patentability of mental processes.

In view of the misconstruction of patent law that this case generated, it is as important to emphasize what the case did not hold as well as what it did hold. In the first place it most emphatically did *not* hold that mental processes are patentable. Neither did it hold that mental processes are not patentable. The case made no statements directly concerning the patentability of mental steps. The sum total of the court's decision insofar as mental steps are concerned is that there is no basis in law for holding a claim that reads on statutory subject matter unpatentable merely because it alternatively reads on mental steps.

The general statement that the case holds that computer programs are patentable is also inaccurate. The court's holding was only applicable to processes directed to an “industrial technology.”⁴⁴ Obviously the court considered the process in *Prater* to be directed toward an industrial technology, but the case certainly is not definitive of the meaning of these words. This decision, then, left room for later decisions broad enough to allow the patenting of any new, useful, and nonobvious program or narrow enough to follow the Patent Office Guidelines⁴⁵ and deny the patenting of a computer program that produces no more than a numerical, statistical or other informational result. This distinction is extremely important since the bulk of pres-

⁴¹ *Id.*

⁴² *Id.*

⁴³ See, e.g., *Software Patent Future Murky Despite Recent Court Decision*, DATAMATION, Jan. 1969, at 78. This short newsbrief contained the statement, referring to *Prater*, that the “court ruled that ‘mental processes’ may be patentable.” But see *Praternity* (Letter to the Editor), DATAMATION, Mar. 1969, at 13.

⁴⁴ 415 F.2d at 1389.

⁴⁵ *Supra* note 14.

ent-day programming, as well as that of the foreseeable future, is directed toward producing numerical, statistical or other informational results.⁴⁶

Unsatisfied with the decision in *Prater*, the Patent Office requested a rehearing,⁴⁷ submitting a petition that expressed the fear that *Prater* gave to a patentee ". . . the right to exclude others from thinking in a certain manner."⁴⁸ Reaching dramatic heights rarely found in a legal brief,⁴⁹ the Patent Office requested the court to reconsider its "landmark" opinion.⁵⁰ The rehearing was granted⁵¹ by a three to two margin over the forceful dissent of Judge Rich. The result of the rehearing (hereinafter referred to as the second *Prater* decision) was a decision⁵² that superseded the first *Prater* decision, and that affirmed the Board of Appeals' decision rejecting all of the process claims and reversed the board's decision rejecting the apparatus claim. Although the result of the rehearing was different from the result of the first *Prater* decision, the holding of the first decision was not actually overruled. Instead, the court decided that it was not necessary to go as far as the holding in the first *Prater* due to the admissions of the parties at the oral hearing.

The court, after discussing the appellants' invention and the rejections in the same manner as was done in the first *Prater* decision, took a critical look at the arguments that the appellants had presented. Appellants had not sought to have the issue of the patentability of mental steps, per se, decided. They merely sought to distinguish their case from cases involving mental steps. The thrust of their argument had been that they had disclosed nonmental steps for performing their process and that their claims, read in light of their disclosure, did not read on mental processes.⁵³ The Patent Office, on the other hand, had conceded⁵⁴ that appellants had disclosed a statutory invention but argued that the claims were too broad because they encompassed non-statutory subject matter.

⁴⁶ See McGovern, *User Software Economics*, in *THE LAW OF SOFTWARE 1969 PROCEEDINGS* L-1 at L-3.

⁴⁷ C.C.P.A. R. 7.

⁴⁸ Petition For Rehearing at 8, Application of *Prater*, 415 F.2d 1378 (1968).

⁴⁹ "A free people could not have delegated to Congress any power to control personal thought, directly or otherwise. Orwell's '1984' was not to be our destiny, although such might come to pass if the judiciary is not vigilant." *Id.*

⁵⁰ Petition For Rehearing at 13, Application of *Prater*, 415 F.2d 1378 (C.C.P.A. 1968).

⁵¹ Application of *Prater*, 415 F.2d 1390 (C.C.P.A. 1968).

⁵² Application of *Prater*, 415 F.2d 1393 (C.C.P.A. 1969).

⁵³ *Id.* at 1401, n.21.

⁵⁴ *Id.* at 1400, n.19.

The court then summarized the analysis that had been made of *Abrams* in the first *Prater* decision and noted⁵⁵ that such a detailed analysis was not required to decide the *Prater* case. In the course of this discussion the court cited the language of *Yuan* indicating that purely mental steps are unpatentable and defined⁵⁶ "purely mental steps" as being those which may only be performed in, or with the aid of, the human mind. The court then made the important statement:⁵⁷ "Whether or not a sequence of *purely* mental steps comes within the bounds of 'process' as used in 35 U.S.C. §§ 100 and 101 is, we feel, an issue which has never been squarely decided."

The court concluded that the *Prater* case was not controlled by *Abrams*, *Yuan*, or *Cochrane* because appellants' disclosure did not require the use of a purely mental step. However, even though appellants' *disclosed* process did not fall within the so-called mental step doctrine, the issue was really as to the limitations of their *claimed* process.⁵⁸ Appellants' original brief had admitted⁵⁹ that their process claims, read apart from their disclosure, were broad enough to cover a person working with a pencil. Further, appellants had stated that they did not wish coverage of any purely mental process or any mental process coupled only with pencil and paper markings. The court then reasoned⁶⁰ that the appellants were, in effect, requesting the court to read certain limitations into their process claims; limitations which were not based on the actual language of the claims. This request was interpreted by the court as an admission by the appellants that their process claims were too broad.

The court therefore rejected all of appellants' process claims under 35 U.S.C. § 112 for their failure to particularly point out and dis-

⁵⁵ *Id.* at 1401.

⁵⁶ *Id.* at 1402, n.22.

⁵⁷ *Id.* at 1402, n.23.

⁵⁸ As discussed *supra* note 13, it is the claims that comprise the exact legal description of the invention. Regardless of what a patentee has disclosed in his specification, his patent protection consists only of what his claims cover. Hence the claims of a patent application must, in accordance with 35 U.S.C. § 112 (1952), distinctly point out the invention.

⁵⁹ 415 F.2d at 1404.

⁶⁰ Nevertheless, "reading a claim in the light of the specification," to thereby interpret limitations explicitly recited in the claim, is a quite different thing from "reading limitations of the specification into a claim," to thereby narrow the scope of the claim by implicitly adding *disclosed* limitations which have no express basis in the claim. This distinction is difficult to draw and is often confused by courts; but it is even more difficult for attorneys, attempting to work within the framework of the former, not to cross over into the latter.

In our view, appellants would really like us to read a limitation of the specification into the claims, not merely interpret the claims in the light of the specification. *Id.*

tinctly claim the subject matter that appellants regarded as their invention.

This problem did not arise, the court found, in regard to appellants' apparatus claim. The apparatus claim did not involve any mental step issues and had been rejected under 35 U.S.C. § 103 based on the reasoning of rejection number 3 in the above list. The court held⁶¹ this reasoning fatally defective for the simple reason that, even though general-purpose digital computers and typical programming techniques were in existence at the time of appellants' invention, their apparatus claim was not obvious because, without appellants' teaching, one of ordinary skill in the art would not know what to program the computer to do.

The court's holdings in the second *Prater* decision may be summarized as follows. In regard to the process claims, the court held that claims that read on subject matter that an applicant does not regard as his invention are unpatentable under 35 U.S.C. § 112 for failure to particularly point out and distinctly claim the subject matter which the applicant regards as his invention. In regard to the apparatus claim, the court held that the mere existence of a general-purpose digital computer does not render obvious all apparatus claims that can be read on such a computer.

Since the second *Prater* decision superseded the first one, the holding in the first case, although not overruled, cannot be said to be a valid proposition of the case law. The first holding of the second *Prater* case does not apply specifically to the field of computer programming while the second holding is really a very small step and is, in fact, nothing of a surprise in view of the fact that, since a general-purpose digital computer can perform the same function as almost every possible digital circuit, a converse holding would forever bar patent protection to this important class of inventions as well as invalidate a large number of existing patents.

What, then, is there of value to the patent practitioner in the two *Prater* cases? It is submitted that dicta in these two cases indicate how patent applications, particularly the claims, may best be formulated to insure approval by the C.C.P.A., assuming, of course, that the invention is new, useful, and not obvious to one of ordinary skill in the art. Some of the *Prater* dicta, particularly footnote 29⁶² of the sec-

⁶¹ *Id.* at 1406.

⁶² No reason is now apparent to us why, based on the Constitution, statute, or case law, apparatus and process claims broad enough to encompass the operation of a programmed general-purpose digital computer are necessarily unpatentable. In one sense, a general-purpose digital computer may be regarded as but a store-

ond *Prater* decision, has already been transformed into law by a later case,⁶³ and therefore further discussions of the probable effect of the *Prater* dicta will be deferred pending the summaries of the two cases that remain to be considered.

In re WHEELING

The invention in this case involved a process for optimizing the operation of a chemical plant, a refinery, or the like where such parameters as temperatures, pressures, feed rates and feed quality can be varied. The essence of the optimization involved the changing of each of the variables repetitively in a random manner initially and thereafter making the changes less random depending upon past performance.

The court discussed the invention,⁶⁴ the examiner's position,⁶⁵ the board's opinion,⁶⁶ the solicitor's position,⁶⁷ and the appellant's position⁶⁸ in detail. It then held⁶⁹ that the statutory provisions upon which the claims had been rejected had not been set forth with sufficient clarity to permit a proper determination of the legal issues and remanded the case for clarification. Hence, although the invention in this case appears to involve a computer program, it adds nothing to the law of software patentability.

APPLICATION OF BERNHART

The invention in this case was disclosed as a method of and apparatus for automatically making a two-dimensional portrayal of a three-dimensional object from any desired angle and distance and on any desired plane of projection. The apparatus comprised a general-

room of parts and/or electrical components. But once a program has been introduced, the general-purpose digital computer becomes a special-purpose digital computer (i.e., a specific electrical circuit with or without electro-mechanical components) which, along with the process by which it operates, may be patented subject, of course, to the requirements of novelty, utility, and non-obviousness. Based on the present law, we see no other reasonable conclusion.

Id. at 1403.

⁶³ Application of Bernhart, 417 F.2d 1395 (C.C.P.A. 1969), discussed *infra* in text.

⁶⁴ 162 U.S.P.Q. at 589.

⁶⁵ *Id.* at 590.

⁶⁶ *Id.* at 592.

⁶⁷ *Id.* at 593.

⁶⁸ *Id.* at 594.

⁶⁹ *Id.*

purpose digital computer coupled to a plotting machine. The method comprised the use of allegedly novel equations definitive of the geometric relationships between the three-dimensional coordinates of each point of interest and the corresponding two-dimensional points of interest.

The examiner rejected⁷⁰ all of the appealed claims under 35 U.S.C. § 112 as based on insufficient disclosure since the applicants had merely set forth equations without including a computer program. This rejection was reversed⁷¹ by the board for the reason that, given applicants' equations, the required computer program would be obvious to those skilled in programming.

The examiner further rejected the applicants' apparatus claim under 35 U.S.C. § 101, citing a reference showing that it was old in the art to connect a computer and a plotting machine and stating that applicants' novelty lay in the disclosed equations which did not constitute a structural difference over the prior art. Applicants' method claim was rejected for reason number 1. The board affirmed these rejections reasoning that the issues involved in the apparatus claims were analogous to the "printed matter" cases.⁷²

The court first considered the apparatus claims. Applicants' apparatus claims involved conventional means plus function language including "electronic digital signal processing means," "planar illustration means," and "electronic digital computer means." Appropriate antecedents for this language were found in applicants' disclosure of digital computers and mechanical drafting machines. The court found no recitation of mental steps in the claim language holding⁷³ that, in accordance with 35 U.S.C. § 112, means-plus-function⁷⁴ language would be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof, but that a human being could not be construed as being the equivalent of a machine disclosed in a patent application. The court also held⁷⁵ that the

⁷⁰ Application of Bernhart, 417 F.2d 1395, 1398 (C.C.P.A. 1969).

⁷¹ *Id.*

⁷² *Id.* These cases, exemplified by the case cited by the board, *Ex parte Gwinn*, 112 U.S.P.Q. 439 (P.O. Bd. App. 1955), dealt with claims defining as the invention certain novel arrangements of printed lines or characters useful and intelligible only to the human mind.

⁷³ *Id.* at 1399.

⁷⁴ This term refers to the provision in 35 U.S.C. § 112 (1952) for expressing an element in a claim for a combination as a means or a step for performing a specified function without the recital of structure, material, or acts in support thereof.

⁷⁵ 417 F.2d at 1399.

"printed matter" cases had no factual relevance to applicants' invention.

The court next considered the examiner's reasoning that since the novel part of the invention was indicated by an equation, and since equations do not fit into a statutory class, the invention was non-statutory. The court rejected this reasoning and struck down the implication that applicants were trying to patent mathematical principles by carefully pointing out that it is not the equations that are being claimed, but the machine that operates in accordance with the equations.⁷⁶ The court recognized that mathematics is the language of science and as such can often be used as the most concise way of describing the operation of a machine. Further, since 35 U.S.C. § 103 provides that patentability shall not be negated by the manner in which the invention was made, the inventor who mathematically discovers new and unobvious principles which he then embodies in a machine must get the same patent protection as he would if he had invented the machine directly by a process of trial and error.

This careful distinction between patenting equations and patenting the machine defined by the equations is important in that it lays to rest an emotional reaction to the patenting of computer programs. This important step forward was followed in the next paragraph by an even greater step.

Dicta⁷⁷ in the second *Prater* decision indicated that the court knew of no reason why apparatus claims broad enough to encompass the operation of a programmed general-purpose digital computer would be necessarily unpatentable. In *Bernhart* the court fulfilled the promise of this dicta by holding, "We are concluding here that such machines are statutory under 35 U.S.C. § 101, and that claims defining them must be judged for patentability in light of the prior art."⁷⁸ Since this says that a novel, useful, and unobvious program can convert a well-known digital computer into a *patentable* machine, the court thus granted patent protection in the form of *apparatus* claims to computer programs.

⁷⁶ Moreover, all machines function according to laws of physics which can be mathematically set forth if known. We cannot deny patents on machines merely because their novelty may be explained in terms of such laws if we are to obey the mandate of Congress that a machine is subject matter for a patent. We should not penalize the inventor who makes his invention by discovering new and unobvious mathematical relationships which he then utilizes in a machine, as against the inventor who makes the *same machine* by trial and error and does not disclose the laws by which it operates.

Id. at 1399-1400.

⁷⁷ See note 62 *supra*.

⁷⁸ 417 F.2d at 1400.

The court's reasoning in reaching this decision is extremely interesting since it goes further than even most proponents of patent protection for computer programs had foreseen. The idea had been expressed⁷⁹ that the four-dimensional machine, the fourth dimension being time, that existed solely during the execution of a novel and unobvious program on a general-purpose digital computer, was patentable. The court went further than this in that they held that the three-dimensional machine that results from storing a novel and unobvious program in the core memory of a computer is *structurally* different from the same machine without that program since its memory elements are differently arranged. This structural difference actually comprises a difference in the direction of the magnetism existing in the multitude of tiny magnetic cores⁸⁰ comprising the computer's memory unit. The court stated that "[t]he fact that these physical changes are invisible to the eye should not tempt us to conclude that the machine has not been changed."⁸¹

Turning to applicants' method claim, the court again refused to construe conventional language such as "digital computer" and "planar plotting apparatus" to cover a human being, again finding no mental step issues. However, it appears that the mental step issue actually was present in view of the form of the steps in the method claim. In the second *Prater* case the court, in dicta, said⁸² that although the applicants there had *disclosed* a "machine-implemented process" they had not *claimed* it as such. Rather, their method claims had required the steps, *inter alia*, of "dividing," "generating" and "comparing," each of which, the court held, did read on a non-machine implementation. The first two steps of the method claim in *Bernhart* require "programming the computer to compute. . . ."⁸³ While "dividing," "generating," and "comparing" are steps reading on both machine and non-machine steps, the step of "programming" a computer reads solely upon a human act requiring mental steps. The court did find the method claim in *Bernhart* to be unpatentable but did so because they found it to be obvious in light of the prior art. It is submitted that the claim, in this form, did require mental steps and that therefore

⁷⁹ See Eltgroth, *Software and the Patent Law*, in 1966 PATENT LAW ANNUAL 1.

⁸⁰ A magnetic core is a doughnut-shaped piece of magnetic material having two states of polarization, thereby being capable of storing one binary digit of information. The polarization of a core may be changed by pulses of electrical current carried on wires that run through the center of the core.

⁸¹ 417 F.2d at 1400.

⁸² 415 F.2d at 1404.

⁸³ 417 F.2d at 1397.

the mental step issue was squarely raised and should have been decided. Since the court said in regard to the method claim that "... we find that it in no way covers any mental steps . . . ,"⁸⁴ it cannot be said that the mental step issue was implicitly decided by the court's conclusion that the claim was statutory.

Finally, the court applied the cited prior art to the apparatus claims and found them to be patentable over it. The prior art had disclosed the combination of a computer and a plotting machine. The claims of *Bernhart* distinguished over the prior art solely in the provision of a new way to perform the data transformations. The court stated⁸⁵ "[w]e believe . . . the new programming claimed, does make the invention as a whole unobvious."

CONCLUSIONS

In view of the foregoing four cases, what is the law concerning the patentability of computer programs? First, the six rejections which were commonly given to computer program applications are clearly invalid. While the court has not as yet decided whether purely mental processes are nonstatutory subject matter, rejection 1 is invalid because of the court's reasoning that computer programs effect structural changes in the machines upon which they are run. Rejections 2 and 3 were struck down by the court's statement⁸⁶ that general-purpose digital computers, programmed in a novel and unobvious way, are statutory machines that must be judged for patentability in light of the prior art. Additional support was given toward laying rejection 4 to rest in the court's citation, with approval, of *Application of Naquin*.⁸⁷

⁸⁴ *Id.* at 1401.

⁸⁵ *Id.* at 1401-02.

⁸⁶ *Id.* at 1400.

⁸⁷ 398 F.2d 863 (C.C.P.A. 1968). This case involved a method of underground surveying in which seismic signals are generated at several points on the earth's surface, travel into the earth, and are reflected by underground formations back to the surface where they can be detected and measured. The method involved the use of a digital computer. Appellant did not disclose how a digital computer could be programmed to perform the calculations required in the method, but merely contended that a person of ordinary skill in the art of programming would know how to do the programming required by the method. The court held:

The specification need describe the invention only in such detail as to enable a person skilled in the most relevant art to make and use it. When an invention, in its different aspects, involves distinct arts, that specification is adequate which enables the adepts of each art, those who have the best chance of being enabled, to carry out the aspect proper to their specialty.

Id. at 866.

Rejection 5, which was actually directed more toward an issue of form rather than substance, was implicitly overturned by the court's statement⁸⁸ that "[i]f a new machine has not been invented, certainly a 'new and useful improvement' of the unprogrammed machine has been . . ." coupled with their explicit approval⁸⁹ of *Bernhart's* claim 19.⁹⁰ Finally, by approving of the form of *Bernhart's* method claim, the court has implicitly held that claims directed toward computer programs need not, of necessity, read on mental processes, thereby disapproving of rejection 6.

In addition to overcoming these six rejections, it is submitted that the court's opinion in *Bernhart* has established the following propositions of law.

1. Each different program that is placed in the core memory of a general-purpose digital computer represents a structural change resulting in a machine that is different from the unprogrammed computer.

2. The mere existence of programming techniques and general-purpose digital computers does not make all such possible structural changes obvious.

3. The machines resulting from such a structural change comprise statutory subject matter.

4. These machines may be described in the specification and claimed by using the appropriate mathematical relationships without the inclusion of a complete program listing.

5. The placing of a novel, useful and nonobvious program in the memory of a digital computer renders the resulting structure patentable.

These propositions clearly show that patent protection may now be obtained for computer programs. This fact established, the next question of interest to the patent practitioner is how he can draft a disclosure and a set of claims that will adequately protect his client's programming inventions and will be most clearly within the scope of the court's approval.

Considering first the question as to the disclosure, it is noted that

⁸⁸ 417 F.2d at 1400.

⁸⁹ *Id.* at 1402.

⁹⁰ *Id.* at 1397-98. This claim was drafted in typical apparatus claim format and called for "electronic digital computer means programmed to . . ." The court's approval of this language is in accordance with their holding that programming a computer results in a structural change, as discussed *infra* in text.

three elements are generally regarded⁹¹ as providing an exhaustive description of a programming invention: a written description of the novel process, including a reference to one or more suitable general-purpose computers upon which the process can be performed; a flow chart detailing the steps of the novel process; and a listing of a program suitable for performing the process. The court's approval of *Naquin in Bernhart*⁹² suggests that the last element, a program listing, is superfluous.⁹³ However, in view of the prohibition of the addition of new matter⁹⁴ to a specification after it has been filed, a listing should probably be included to insure against a 35 U.S.C. § 112 rejection. The listing can always be deleted from the specification during the prosecution of the application if it is later deemed advisable to do so.

Considering next the question of claim formats, it should first be noted that, since special-purpose apparatus can always be designed to perform any function that can be performed by a programmed general-purpose digital computer,⁹⁵ both method and apparatus claims should be used to insure adequate protection of the invention. While the doctrine of equivalents⁹⁶ probably would allow apparatus claims drafted to a programmed general-purpose digital computer to cover such special-purpose apparatus, protection can be assured through the additional use of method claims, which, if properly drafted, will cover all apparatus which can be used to practice the invention. In view of the holding⁹⁷ in *Bernhart* and the dicta in both the *Bernhart* and the second *Prater* cases, it appears reasonable to make some definite recommendations as to suitable claim formats. The following suggested claim formats are presumed to be drawn to inventions involving a new, useful, and nonobvious process suitable for being practiced on a digital computer.

Dealing first with method claims, it can be noted that although none of the above-analyzed cases actually allowed a method claim, the

⁹¹ See Kurtz, *Examples of Inventions Embodying Software, Types of Disclosures and Claims* in SOFTWARE PROTECTION BY TRADE SECRET, CONTRACT, PATENT 160 (1969).

⁹² 417 F.2d at 1398.

⁹³ See Kayton, *Patent Protectability of Software: Background and Current Law*, in THE LAW OF SOFTWARE 1968 PROCEEDINGS at B-50.

⁹⁴ 35 U.S.C. § 132 (1952).

⁹⁵ See Popper, *From Hardware to Software: An Adventure Having Some Surprises*, in SOFTWARE PROTECTION BY TRADE SECRET, CONTRACT, PATENT 99 (1969).

⁹⁶ The doctrine of equivalents arose in the case law due to the necessity of determining, in particular cases, whether a particular apparatus or method infringed a valid patent. In essence, the doctrine states that no one can borrow the substance of a patented invention by making immaterial variations. See generally Pugh, *The Doctrine of Equivalents—Asset or Liability to the Drafter of Claims?*, 43 J. PAT. OFF. SOC'Y 614 (1961).

⁹⁷ See discussion of *Bernhart* in text.

form that such claims should take is clearly indicated. The court in *Bernhart* approved of the form of the sole method claim in that case, however, as previously discussed,⁹⁸ that particular form appears to be subject to the argument that it covers mental steps. Since the question of the patentability of mental steps has not yet been decided and since such coverage will probably not be desired by a client,⁹⁹ the patent practitioner's objective is to draft method claims that clearly exclude mental steps and thus do not raise the issue as to their patentability. Turning, then, to the dicta in the second *Prater* decision, it appears that the court went out of its way to suggest suitable method claim elements. The court pointed out¹⁰⁰ that although the appellants in *Prater* had disclosed a "machine-implemented process," they had not limited their claims to a "machine process" or a "machine-implemented process." This language seems to clearly point to the following format:

The machine implemented process of [performing a specified function] comprising the steps of:

machine	[determining a specified quantity];
machine	[computing a specified quantity];
machine	[comparing specified quantities];
•	•
•	•
•	•
machine	[generating a specified quantity].

The exact language placed in the bracketed portions of the claim would, of course, depend upon the nature of the particular invention.

The use of the modifying word "machine" in front of the steps of "determining," "comparing," etc. should overcome the court's statement¹⁰¹ in the second *Prater* decision that these latter words do read on a mental process augmented by pencil and paper markings. Support for this supposition is found in the following language of *Bernhart*:

To find that the claimed process could be done mentally would require us to hold that a human mind is a digital computer or its equivalent, and that a draftsman is a planar plotting apparatus or its equivalent. On the facts of this case we are unwilling so to hold.¹⁰²

⁹⁸ *Id.*

⁹⁹ The program processes for which a client will be seeking patent protection will generally be of such a nature as to make it literally impossible for a human being to practice them by using only his mind and a pencil and paper.

¹⁰⁰ 415 F.2d at 1404.

¹⁰¹ *Id.*

¹⁰² 417 F.2d at 1401.

In view of this it appears doubtful that the court would ever hold that the human mind is a "machine" as that term is used in the patent law. On the other hand, the term is broad enough in scope to cover all types of apparatus that could be used to practice the method.

Dealing next with apparatus claims, the following generalized form of claim 19¹⁰³ of *Bernhart* should be allowable based on the court's discussion in *Bernhart*:

A system for [performing a particular function] comprising in combination: electronic digital computer means programmed to [perform a particular step] according to the relationship [descriptive equation]; means coupled with said computer to [perform a particular function]; . . . and means coupled with said computer to [perform a particular function]. Again, the exact language placed in the bracketed portions of this claim depends upon the nature of the particular invention being claimed.

While this claim covers a programmed general-purpose electronic digital computer it is of narrow scope due to the explicit recital of "electronic digital computer means." In attempting to broaden this claim, it is profitable to consider the holding in the second *Prater* decision with respect to appellants' claim 10: "We do not perceive any 'mental steps' issue in regard to apparatus claim 10. It is quite clear that claim 10, in typical means-plus-function language as expressly permitted by the third paragraph of 35 U.S.C. § 112, does not encompass the human being as the 'means' or any part thereof."¹⁰⁴ It must be remembered that appellants in *Prater* disclosed in detail an electromechanical apparatus, but only briefly mentioned¹⁰⁵ the alternate use of a digital computer. However, *Bernhart* expressly supported and approved the above-quoted language, and *Bernhart* did disclose a digital computer as the primary means of practicing the invention. This fact, coupled with the holding in *Bernhart* that placing a program into the core memory of a computer results in a structural change, indicates that this resulting structure should be claimable in means-plus-function language, where each means clause in the claim has as its basis a particular portion of the programmed core memory. That is, apparatus claims could be drafted in the following manner to cover the structure of a programmed general-purpose computer:

Apparatus [for performing a specified function] comprising:

¹⁰³ *Id.* at 1397-98.

¹⁰⁴ 415 F.2d at 1406.

¹⁰⁵ *Id.* at 1397, n.18.

