PATENT LAW—ANOTHER STEP PAST *Prater*—"PATENTABLE PROCESS" EXPANDED—*In re Musgrave*, 431 F.2d 882, 167 U.S.P.Q. 280 (C.C.P.A. 1970).

Albert W. Musgrave invented a method of and apparatus for obtaining seismograms which precisely delineate subsurface formations in the earth's crust. On September 30, 1965, a patent application containing both apparatus and method claims was filed to protect Musgrave's invention. The examiner rejected all of the method claims as being nonstatutory on the basis that either all of the claimed steps are "mental steps," or that some of the steps are "mental" and are relied on for patentability. The Patent Office Board of Appeals affirmed this rejection. The Court of Customs and Patent Appeals (C.C.P.A.) reversed,[1] and held that any sequence of operational steps that is in the technological arts is a statutory process, thereby adding another case to the series of cases[2] that have served to widen the scope of patent protection of programmable processes.

Musgrave's invention[3] pertained to the study of the earth's crust using seismic techniques. These techniques are particularly useful in searching for oil deposits. Typically, a charge of dynamite is set off at a point termed the "shotpoint" and the resulting earth vibrations, caused by some of the downwardly traveling energy from the blast being reflected upwardly by each different layer of the earth's crust, are detected by seismic detectors called "geophones." The time-dependent records made of these detected vibrations are called seismograms, with one seismogram being made for each geophone. In order to render the seismograms meaningful, it is necessary to apply a "weathered-layer correction" and a "normal moveout correction." The weathered layer (commonly called "soil") that exists at the earth's surface affects the travel time of the seismic energy passing through it, and its effect must

1 *In re* Musgrave, 431 F.2d 882, 167 U.S.P.Q. 280 (C.C.P.A. 1970).

2 *In re* Prater, 415 F.2d 1378, 159 U.S.P.Q. 583 (C.C.P.A. 1968), *opinion superseded*, 415 F.2d 1393, 162 U.S.P.Q. 541 (C.C.P.A. 1969); *In re* Bernhart, 417 F.2d 1395, 163 U.S.P.Q. 611 (C.C.P.A. 1969); *In re* Mahony, 421 F.2d 742, 164 U.S.P.Q. 572 (C.C.P.A. 1970). The *Prater* and *Bernhart* cases have been extensively analyzed; *see, e.g.*, Comment. *Mathematics, Computers, and In re Prater: the Medium and the Message*, 58 GEO. L.J. 391 (1969); Note, *Prater and Wei Process Claims—No Limitation of Invention Specification Can Be Read Into a Claim Where No Express Statement of the Limitation is Included in the Claim*, 4 GEORGIA L. REV. 404 (1970); Popper, *Prater II*, 19 AM. U.L. REV. 25 (1970); Nimtz, *The Patentability of Computer Programs*, 1970 RUTGERS J. OF COMPUTERS & THE LAW 38; Comment, *Computer Programs Are Patentable*, 1 SETON HALL L. REV. 113 (1970).

3 This description of the invention in *Musgrave* is abstracted from the court's detailed description at 431 F.2d 882-85, 167 U.S.P.Q. 281-83.

be subtracted out. The normal moveout correction is necessary to compensate for the physical spreading of the various geophones. Obviously the travel path and therefore the travel time of the seismic energy from the shotpoint to a layer of the earth's crust and thence to a geophone is greater for a geophone located some distance from the shotpoint than for a geophone directly adjacent the shotpoint. In addition to these corrections, it is necessary to identify and eliminate "multiples." Multiples represent unwanted signals that occur by reason of multiple reflection of seismic waves.

Musgrave discovered that a most precise correction for the effect of the weathered layer can be made by correcting a family of seismograms obtained from an *expanded-spread* of detectors by deriving the necessary time-correction from the time-occurrence of the first reflection on a corresponding family of seismograms that is simultaneously obtained from using a *split-spread* of detectors. In an expanded-spread, the shotpoint is located on the line of exploration but at some distance from the spread of geophones. In a split-spread, the shotpoint is located in the center of a spread of geophones. Thus one family of seismograms can be used to perform the weathered layer correction on another family of seismograms that is simultaneously obtained from the same dynamite blast.

Musgrave also discovered that the energy detected by an expanded-spread of detectors is hyperbolic in character. He used this discovery to develop a novel technique for identifying multiples by applying functions of hyperbolic character to a family of seismograms.

The specification disclosed "simplified analog type of instruments by means of which the invention may be utilized,"[4] and it is evidently on this basis that the apparatus claims were allowed by the examiner.

However, Musgrave's specification also stated

> that the several method steps may be carried out by a wide variety of apparatus, including computing equipment, which by a mathematical approach will provide solutions to equations which may be exact or approximate, as may be desired.[5]

This statement was interpreted by the board of appeals[6] as referring to the use of a digital computer and caused all of the method claims[7]

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4 431 F.2d at 887, 167 U.S.P.Q. at 285.

5 *Id.*, 167 U.S.P.Q. at 284.

6 *Id.*, 167 U.S.P.Q. at 285.

7 Appellant's application included 50 method claims. The court chose the following claims as being representative:

> 2. In seismic exploration, the method of establishing weathering corrections in the form of individual static time-corrections for the signals from each of a

to be rejected solely on the basis that they were nonstatutory under 35 U.S.C. § 101[8] for the reason that either all of the steps of the claims are "mental steps" or some of the steps are "mental" and are relied on for patentability, thus failing the tests set forth by the *Abrams*[9] rules.

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plurality of seismic detecting stations spaced one from the other along a traverse which comprises

[1] generating at generating stations seismic signals adjacent selected ones of said detecting stations whereby the magnitudes of said static corrections at said selected stations are known,

[2] applying said known static corrections respectively to signals generated at said selected stations,

[3] applying relative to said known corrections interpolated static corrections to the remaining signals generated at the remaining of said detecting stations, and thereafter

[4] generating at generating stations further seismic signals at spaced locations along said line,

[5] detecting at the location of a first group of said stations and thereafter at other locations of other groups of said stations seismic signals, said locations being selected in reference to the locations of said second-named generating stations for the production of an expanding-spread seismic-section having applied to the signals from each of said detecting stations said static corrections, and

[6] applying dynamic normal movement corrections to the signals of each group of said detectors to correct them for geometrical spreading.

60. In seismic exploration where a family of seismograms are produced, each seismogram including multiple reflection signals and a plurality of single reflection signals representative of waves reflected from subsurface reflecting points after travel to said points over a plurality of paths, each of which for any one of said seismograms differs from the path for any other of said seismograms, the method which comprises:

[1] generating signals from each of said seismograms,

[2] applying to said generated signals a succession of dynamic time-adjustments, one for each said seismogram, and of magnitude to correct for normal moveout delays present in said seismograms,

[3] time-shifting said generated signals, the magnitude of the time-shifts varying across said family of seismograms in accordance with a plurality of approximately hyperbolic functions of different eccentricities, and

[4] adding together said generated signals for the production of summation signals representing (a) multiple reflections which add together cumulatively for certain of said hyperbolic functions, and (b) single reflections which add together cumulatively for other of said hyperbolic functions.

431 F.2d at 885, 167 U.S.P.Q. at 283.

[8] The statute establishes which inventions are patentable:

> 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.

[9] *In re* Abrams, 188 F.2d 165, 89 U.S.P.Q. 266 (C.C.P.A. 1951). In this case appellant's counsel proposed three suggested rules of law pertaining to mental steps which have since become known as the "*Abrams* rules":

> 1. If all the steps of a method claim are purely mental in character, the subject matter thereof is not patentable within the meaning of the patent statutes.
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> 2. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the alleged novelty or advance over the art resides in one or more of the so-called mental steps, then the claim is considered un-

The C.C.P.A. noted that the opening sentence of the argument in the Patent Office brief stated: "The opinion by the Board * * * represents the best comprehensive statement of the Patent Office position."[10] The court then set forth two pages of the board's opinion verbatim to provide a basis for an extensive analysis of the board's reasoning in affirming the examiner's rejection.

Musgrave, in response to the examiner's rejection, had urged the board that the *Abrams* case was not applicable to him. In *Abrams*, so far as was apparent from the specification, one critical step of the claimed process could *only* be performed in the mind. Musgrave argued that he had disclosed apparatus for practicing his invention and that, in light of this disclosure, *Abrams* should not apply even if certain steps of the method could also be carried out within the human mind.

The board rejected this argument. They found that Musgrave's claims comprised physical steps and mental steps, and they agreed with the examiner that the physical steps were old and that patentability was predicated solely on the nonstatutory mental steps. The board found the claims to be totally nonstatutory by drawing an analogy between the 35 U.S.C. § 112 requirements[11] as to the permissible breadth of claims and the 35 U.S.C. § 101 requirements[12] as to which inventions are patentable. A claim that embraces the prior art as well as the invention is clearly too broad in view of 35 U.S.C. § 112 and therefore, the board reasoned, by analogy a claim that embraces nonstatutory as well as statutory subject matter is too broad in view of 35 U.S.C. § 101.[13]

The board then specifically turned its attention to claim 2.[14] The board construed the term "seismic signals" appearing in claim 2 to mean "the generation of a physical state in a physical body, the earth."[15]

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patentable for the same reason that it would be if all the steps were purely mental in character.

3. If a method claim embodies both positive and physical steps as well as so-called mental steps, yet the novelty or advance over the art resides in one or more of the positive and physical steps and the so-called mental step or steps are incidental parts of the process which are essential to define, qualify or limit its scope, then the claim is patentable and not subject to the objection contained in 1 and 2 above.

188 F.2d at 166, 89 U.S.P.Q. at 267-68.

10 431 F.2d at 888, 167 U.S.P.Q. at 285.

11 35 U.S.C. § 112 (1965) provides, *inter alia*:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12 *See* note 8 *supra*.

13 431 F.2d at 886, 167 U.S.P.Q. at 284.

14 *See* note 7 *supra*.

15 431 F.2d at 887, 167 U.S.P.Q. at 284.

However, the term "signals," when "unmodified as to any physical thing that is altered to give rise to the signals," was construed "to mean the generation of abstract data."[16] The result of the construction was the decision that "[s]teps (2) and (3) [of claim 2] are non-statutory since they require no physical act on any physical thing."[17]

The board sustained the rejection of claim 60 with the statement:

> This claim merely calls for a general mathematical or a general graphical solution of an algorithm which appellant has propounded but which cannot be patented directly, as an algorithm, or indirectly, as a series of conceptual steps in a method of solving the algorithm, under the statutes as they have been interpreted heretofore.[18]

The board's opinion, in sustaining the examiner's reliance on the rules of *Abrams*, ran counter to the *Prater*[19] decision which had completely rejected[20] these rules. However, as the court noted, the board's opinion in *Musgrave* was rendered several months prior to the first decision in *Prater*. In view of this, the C.C.P.A. in *Musgrave* might have merely referred to *Prater* and indicated its continuing disavowal of *Abrams*. Although the court did quote a portion of the *Prater* II opinion dealing with *Abrams*,[21] it went on to a more detailed criticism of *Abrams*.

The court began this criticism with the flat assertion that *Abrams* " 'Rules' 2 and 3, at least, are logically unsound."[22] *Abrams* rules 2 and 3 indicate that the question of whether a particular process constitutes statutory subject matter depends upon where the alleged novelty lies, in the "physical" or in the "mental" steps. Although an invention must

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16 *Id.*

17 *Id.*, 167 U.S.P.Q. at 285.

18 *Id.* at 888, 167 U.S.P.Q. at 285.

19 *In re* Prater, 415 F.2d 1378, 159 U.S.P.Q. 583 (C.C.P.A. 1968), *opinion superseded*, 415 F.2d 1393, 162 U.S.P.Q. 541 (C.C.P.A. 1969). These two decisions will be hereinafter referred to as *Prater* I and *Prater* II, respectively, when it is necessary to distinguish between them, and will be collectively referred to as *Prater* when it is not.

20 [M]uch confusion in subsequent interpretation of the *Abrams* decision has been caused by people misreading the decision as conferring judicial sanction upon the "rules" formulated and proposed by Abrams' attorney. This confusion has arisen because the court, after initially declaring there was no necessity to embrace the rules, apparently adopted Rule 2 towards the later part of the opinion. We believe this later statement was advanced not to show adoption of the rules by the court but merely to point out that even if, *arguendo*, the court had adopted his rules, Abrams would still not have prevailed in this particular fact situation. (footnotes omitted).

In re Prater, 415 F.2d at 1386, 159 U.S.P.Q. at 591.

21 *See* note 20 *supra*.

22 431 F.2d at 889, 167 U.S.P.Q. at 286.

be novel *and* must be within one of the statutory classes of subject matter in order to be patentable, these are separate and independent tests.

> It should be apparent, however, that novelty and advancement of an art are *irrelevant* to a determination of whether the nature of a process is such that it is encompassed by the meaning of "process" in 35 U.S.C. § 101.[23]

The logical result of failing to keep these two tests separate would be that

> a given process including both "physical" and "mental" steps could be statutory during the infancy of the field of technology to which it pertained, when the physical steps were new, and non-statutory at some later time after the physical steps became old, acquiring prior art status, which would be an absurd result.[24]

In addition to characterizing the board's reliance on the "Abrams non-rules" as "legal error,"[25] the court criticized the board's requirement that *each* individual process step must require a physical act on a physical thing.

First, as had been previously pointed out in *Prater* I,[26] this requirement was due to a misconstruction of *Cochrane v. Deener*.[27] Processes need *not* operate physically upon substances in order to be patentable, and the board's contrary presumption in *Musgrave* "further infects its conclusions with legal error."[28] In addition, it is immaterial whether individual steps in the claims are nonstatutory, for it is only necessary to be concerned with "whether the *combinations* of steps constituting the claimed processes are statutory 'processes'."[29]

In addition to criticizing the board of appeals' reliance on *Abrams*, the court discussed and quoted from a series[30] of decisions that had been rendered by the board since *Abrams*. The quotations chosen by the court, and particularly the portions of the quotations emphasized by the court, indicate that the mental step prohibition, when correctly applied, is limited to those processes that *require* the exercise of *inter-*

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23 *Id.* (emphasis added).

24 *Id.*, 167 U.S.P.Q. at 286-87.

25 431 F.2d at 892, 167 U.S.P.Q. at 289.

26 415 F.2d at 1387-88, 159 U.S.P.Q. at 592.

27 94 U.S. 780 (1876).

28 431 F.2d at 893, 167 U.S.P.Q. at 289.

29 *Id.*

30 *Ex parte* Moser, 124 U.S.P.Q. 454 (1959); *Ex parte* McNabb, 127 U.S.P.Q. 456 (1959); *Ex parte* Kahn, 124 U.S.P.Q. 511 (1959); *Ex parte* Egan, 129 U.S.P.Q. 23 (1960); *Ex parte* Garrett, 132 U.S.P.Q. 514 (1961); *Ex parte* Bond, 135 U.S.P.Q. 160 (1961); and *Ex parte* Tripp, 141 U.S.P.Q. 918 (1963).

pretive human judgment.[31] Thus it is not the requirement of human intervention that determines whether a process is subject to the mental step rejection, but the nature[32] of the human intervention that is required.

The result of this reasoning is that the mental process rejection, when correctly applied, pertains to the 35 U.S.C. § 112 requirements on the disclosure (§ 112, first paragraph) and the claims (§ 112, second paragraph) rather than the 35 U.S.C. § 101 requirements on the nature of statutory inventions. This result is clearly set forth in the court's holding:

> 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 be in the technological arts so as to be in consonance with the Constitutional purpose to promote the progress of the "useful arts." Const. Art. 1, sec. 8.
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> Of course, to obtain a valid patent the claim must also comply with all the other provisions of the statute, including definiteness under 35 U.S.C. § 112. A step requiring the exercise of subjective judgment without restriction might be objectionable as rendering

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[31] This analysis of the board's recent decisions was anticipated by an earlier article that traced the mental process doctrine through the decisions of the Supreme Court, the C.C.P.A., the circuit courts of appeal, and the Patent Office Board of Appeals. After discussing the same board decisions as did the court in *Musgrave*, the following summary was given:

> In summary, the Board decisions relating to mental processes evidence a trend away from the view that the requirement of any thought in the performance of a method renders the method a nonstatutory process. . . . These later cases properly recognize that mental steps capable of being objectively defined are permissible in statutory processes. Furthermore, this line of cases recognizes that a method disclosed in such a way that it constitutes a statutory process is not rendered a nonstatutory process when, by ignoring the disclosure, it is possible to envision an alternative way of practicing the method that does not constitute a statutory process. In other words, this entire line of later decisions clearly indicates that the status of a method as statutory subject matter must be determined in the context of the specification disclosing it and that certain types of human activity are permissible in the performance of statutory methods.

McClaskey, *The Mental Process Doctrine: Its Origin, Legal Basis, and Scope*, 55 IOWA L. REV. 1148, 1191-92 (1970).

[32] The rationale behind the prohibition of mental steps supporting a disclosure should be one of the ability to teach the invention to the art. Can one teach a blacksmith when to take a horseshoe from the fire? Can one teach a doctor how to read a cardiogram? Can one teach a programmer how to interact, as with a light pencil, with the processing equipment he is using? If there are objective criteria for teaching the art, then the mental process objection should fail. If, however, a subjective test is required, as dependent upon an aesthetic value standard, or upon some creative activity which may or may not occur, then the disclosure of the invention is not sufficiently definite to support the claims. (footnote omitted.)

Falk, *Mental Steps and the Patent Law—A Rumination*, 1970 PATENT LAW ANNUAL 203, 214 (Southwestern Legal Found.).

> a claim indefinite, but this would provide no statutory basis for a rejection under 35 U.S.C. § 101.[33]

The majority opinion in *Musgrave* was criticized in a concurring opinion by Judge Baldwin. Although agreeing with the result, Judge Baldwin felt that the majority's statements went much further than required by the facts of the case and constituted "a serious breach with the time-honored judicial practice of resolving important questions of law on a case-by-case basis . . . ."[34]

Judge Baldwin indicated that the mental steps doctrine had lost its sting after the decisions in *In re Bernhart*[35] and *In re Mahony*.[36] These cases clearly indicated that process claims drawn to cover the operation of a programmed digital computer would be reasonably interpreted and would be subject to the protection of the patent statutes, and

> [f]urther, in *Mahony*, the Patent Office view that a claim reading on both statutory and non-statutory subject matter could not comply with the second paragraph of section 112 was discarded.[37]

The previous cases, however, had not, according to the concurring opinion, decided the following questions:

(1) Is a claim drawn to cover a disclosed machine-implemented process that is broad enough, even when reasonably interpreted, to cover the same process implemented only with the aid of the human mind, a statutory claim?

(2) What is the effect of the inclusion in a claim of a *purely* mental step, as that term is defined in footnote 22[38] of the *Prater* II decision?

(3) Are claims drawn to a process consisting entirely of a sequence of *purely* mental steps within the ambit of 35 U.S.C. § 101?

In Judge Baldwin's view,

> [t]he majority now proposes to answer all these questions in the affirmative, regardless of the fact that this case could be decided on very narrow grounds.[39]

These "narrow grounds" are that the claims in Musgrave's application, when reasonably interpreted, contain no *purely* mental steps and are

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33 431 F.2d at 893, 167 U.S.P.Q. at 289-90.
34 *Id.* at 894, 167 U.S.P.Q. at 290.
35 417 F.2d 1395, 163 U.S.P.Q. 611 (C.C.P.A. 1969).
36 421 F.2d 742, 164 U.S.P.Q. 572 (C.C.P.A. 1970).
37 431 F.2d at 895, 167 U.S.P.Q. at 291.
38 415 F.2d at 1402, 162 U.S.P.Q. at 548.
39 431 F.2d at 895, 167 U.S.P.Q. at 291.

hence patentable without the need to answer any of the above questions.

The foremost problem with the majority opinion that is foreseen by the concurring opinion is the interpretation of the meaning of "technological arts." In Judge Baldwin's view this term sounds broader than the "industrial technology" mentioned by Judge Smith in *Prater* I.[40]

Another problem foreseen by Judge Baldwin results from his viewing the majority as abrogating the requirement that an applicant disclose apparatus for carrying out his process. If this view is correct, then the court in future cases

> could get involved in deciding, first, whether a reasonable interpretation of the claims would include both machine and mental implementation of the process and, second, whether the absence of a disclosure of apparatus for carrying out the process would warrant rejection of the broad process claims for lack of support.[41]

A third problem foreseen by the concurring opinion is that since the majority found that claims drawn entirely to *purely* mental processes can be statutory, the court will face many different fact patterns in which they will be forced "to decide whether a step requiring certain human judgment evaluations is definite or not."[42]

The fourth problem foreseen by Judge Baldwin arises from the following supposition:

> [S]uppose a claim happens to contain a sequence of operational steps which can reasonably be read to cover a process performable both within *and without* the technological arts? This is not too far fetched. Would such a claim be statutory? Would it comply with section 112?[43]

The first problem raised by the concurring opinion—the interpretation of the term "technological arts"—is of primary importance to patent practitioners since it replaces the mental step doctrine as the outer limit of programmable processes to which patent protection will be extended. The holding in *Musgrave* makes the question of machine-

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40 The holding in *Prater* I was that

> patent protection for a process disclosed as being a sequence or combination of steps, capable of performance without 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.

415 F.2d at 1389, 159 U.S.P.Q. at 593.

41 431 F.2d at 896, 167 U.S.P.Q. at 291.

42 *Id.*

43 *Id.*

versus-mental implementation of a process immaterial as long as the process can be set forth as a series of objective, definite steps and as long as the process is in the technological arts.

The first point that comes to mind in seeking an interpretation of "technological arts" is that this term is probably no broader than the term "useful arts" of article 1, section 8, of the United States Constitution.[44] Although the Constitution does not expressly prohibit the provision of protection to inventors for discoveries that are *not* in the useful arts, the reasoning used in construing section 8 as a "balanced sentence" would probably serve to limit patent protection to the "useful arts."[45]

Is the term "technological arts" likely to be any narrower than "useful arts?" The majority opinion in *Musgrave* referred to an article by Coulter[46] to point out that purely mental steps that involve "peculiarly human activities," such as those involving aesthetic, emotional, imaginative or creative thought, are nonstatutory. Coulter's article uses the term "technological arts" and states, as a definition, "*[t]he technological arts are the 'useful arts.'* "[47] Hence it is possible to infer that the majority, in citing Coulter's article, has adopted his use of "technological arts" as being merely a way of expressing the concept of "useful arts" by using a word in common usage today. Even if this inference is incorrect, it seems unlikely that "technological arts" would ever be interpreted so as to be distinguishable from "useful arts"; at least, no reason for so doing is readily apparent.

This discussion, however, merely serves to beg the question, what is the scope of the "useful arts?" One writer argues that this term should be construed broadly enough to protect a mathematician's discoveries

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44 Article 1, section 8, of the Constitution states:

> The Congress shall have the Power . . . To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

45 Section 8 of the Constitution is an example of a "balanced sentence" that actually contains two statements. In interpreting such a sentence all first-named items must be connected by the thread of thought. Thus Congress is seen to be given two separate powers:

> 1. Power . . . To promote the Progress of Science . . . by securing for limited Times to Authors . . . the exclusive Right to their . . . Writings.
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> 2. Power . . . To promote the Progress of . . . useful Arts, by securing for limited Times to . . . Inventors the exclusive Right to their . . . Discoveries.

See Lutz, *Patents and Science, A Clarification of the Patent Laws of the United States Constitution*, 18 GEO. WASH. L. REV. 50, 51 (1949).

46 *The Field of the Statutory Useful Arts*, 34 J. PAT. OFF. SOC'Y 417-35, 487-507, and 718-38 (1952).

47 *Id.* at 498.

per se.[48] The theory behind this argument is subject to criticism,[49] but the advent of modern technology has, practically speaking, converted many mathematical inventions into useful processes.[50] *Musgrave* has served to bring to light the issue of the extent to which processes comprise "useful arts." It remains for future cases to resolve this issue.

The second problem raised by the concurring opinion is the effect of the majority opinion on disclosure requirements: "[T]he majority now says, in effect, that one no longer need disclose apparatus for carrying out his process."[51]

This concern appears to be founded on a misapprehension of the law. When the invention is a process, the specification need not disclose the details of the apparatus needed to practice the invention.[52] All that

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48 It is a pertinent inquiry, therefore, whether a method of accomplishing a given result which does not require the use of tangible instrumentalities; in other words, whether a purely mental process, not involving the manipulation of substance, can be protected by patent as an "art". If, for instance, a mathematician should evolve, as the result of real inventive genius, a new method of determining the cube root of numbers; or if a stage "magician" should hit upon a novel method of conveying secret information by means of apparently commonplace speech, would not these methods of accomplishing the ends desired come within the statutory meaning of an "art"? There is no direct authority upon the question, but the writer fully believes that such a process of accomplishing a result is an "art," and as such is patentable. The reason is negative; that is, there is no sound reason why it should not be patentable as an art.

J. WAITE, PATENT LAW 31 (1920).

49 The difficulty with the argument is that the law and the public have not heretofore considered mathematics as a *useful* art.

This is the reason that applying novel mathematics to known apparatus becomes a statutory invention. It is not that the application of the mathematics, once it is known, is inventive or that the machine, apart from the mathematics, is inventive. It is, instead, that the machine establishes that the mathematics is useful. The mathematics may equate to "art" but so far our law has needed the machine to equate to "useful." The machine puts the clothing of "useful" on the naked principal.

Falk, *supra* note 32, at 217-18 (footnote omitted).

50 The point is that we now have building blocks which may perform almost any desired mathematical function, and we can assemble these and interconnect them at the appropriate times to execute some very sophisticated mathematical processes. We are on the verge of a technological revolution in which complete physical systems can be built from these building blocks. To control a catalytic cracking plant or to orient a missile in space or to transfer color television signals, we need only specify the mathematical problems to be solved and then interface the mathematical building blocks with the appropriately controllable valves and gears and levers and switches. Accordingly, much of the design of future industrial systems will take place in the mathematical departments of laboratories and possibly less on the shop floor where metal is cut and breadboard models assembled.

Popper, *Current Status of Patent Protection for Programmable Processes*, 1969 PATENT LAW ANNUAL 37, 42 (Southwestern Legal Found.).

51 431 F.2d at 894, 167 U.S.P.Q. at 290.

52 If there is enough in the patent to indicate to those skilled in the art a

is required is that the requisite apparatus be identified.[53] Indeed, if a new machine is needed to practice the inventive process, the applicant may be entitled to two patents, one on the new machine and one on the process itself.[54]

The third problem pertains to the difficulty in determining whether *purely* mental steps are sufficiently definite. According to one interpretation of Supreme Court opinions dealing with the nature of the useful arts, the test of whether a particular step is sufficiently definite is whether its performance by one skilled in the art produces a predictable result.[55] It is submitted that this test is a valid one and, further, that it is amenable to a case-by-case development in the same manner[56] as is the determination of nonobviousness which is required by 35 U.S.C § 103.

The fourth problem foreseen by the concurring opinion arises when a claim can be reasonably read to cover a process both within and without the technological arts. It would seem that the basis for this problem is that such a claim is indefinite. However, once the meaning of "technological arts" is settled the problem could be solved by judicially restricting the breadth of such claims to cover only the use of the process in a technological art, since a use in a nontechnological art would not be covered and would not infringe the claim. A similar argument dealing with the possibility of a purely mental infringement of a claim that did not cover mental processes was presented in an amicus brief which was submitted at the *Prater* rehearing. The court set forth that amicus argument in footnote 20 of its opinion[57] but did not find

mechanism whereby the process may be carried out, it is sufficient even though no specific mechanism is described.

WALKER ON PATENTS 1224 (Deller's ed. 1937).

53 [T]he requirement of the patent law, in order to make a method or process patentable, is that the patent shall *indicate* to those skilled in the art the adaptation of means to put it into practice.

Expanded Metal Co. v. Bradford, 214 U.S. 366, 380 (1909) (emphasis added).

54 *See In re* Tarczy-Hornoch, 397 F.2d 856, 867, 158 U.S.P.Q. 141, 150 (C.C.P.A. 1968).

55 [A]ny useful art capable of being described with such definiteness as to enable one skilled in the art to produce the desired or predictable results on the basis of the description constitutes statutory subject matter. In other words, if a useful art is of such a nature that its performance by one skilled in the art produces predictable results, then the art falls within the Supreme Court's definition of statutory subject matter.

McClaskey, *supra* note 31, at 1151.

56 This is not to say, however, that there will not be difficulties in applying the nonobviousness test. . . . The difficulties, however, are comparable to those encountered daily by the courts in such frames of reference as negligence and scienter, and should be amenable to a case-by-case development.

Graham v. John Deere Co., 383 U.S. 1, 18, 148 U.S.P.Q. 459, 467 (1966).

57 415 F.2d at 1400, 162 U.S.P.Q. at 547.

it necessary to further discuss it. Analogously, it has been pointed out that the fact that a claim reads on a device that lacks utility does not make the claim invalid because such a device is implied by the law to be outside the scope of the claim.[58] Thus the fourth problem seems to be resolvable by judicial restriction.

CONCLUSION

Musgrave provides a new pronouncement of law that obviates the necessity of characterizing a process or a step of a process as being either "mental" or "purely mental." The opinion may be criticized, as was done in the concurring opinion, on the basis that it may have gone further than the particular facts of the case demanded. The problems raised by the decision do not appear to be as formidable as the concurring opinion seems to indicate and, at any rate, the problems it does raise are real ones that must be solved to clarify the law on the patentability of processes, particularly processes requiring interaction between humans and machines.

The *Musgrave* holding, when combined with the patent statute and the holdings in *Prater, Bernhart* and *Mahony,*[59] indicates that the necessary and sufficient conditions that a process claim must now satisfy to be patentable may be stated as follows:

(1) It must be directed to a "new" process within the meaning of 35 U.S.C. § 102.

(2) It must be directed to a process that is nonobvious within the meaning of 35 U.S.C. § 103.

(3) It must be directed to a process that is in the "technological arts," considering the process as a whole as distinguished from its individual steps.

(4) It must be based on a sufficient disclosure of the process comprising the invention, as required by the first paragraph of 35 U.S.C. § 112.

(5) It must, when its terms are given the meaning normally accorded to them by the art to which the process pertains, cover only that which the applicant regards as his invention, as required by the second paragraph of 35 U.S.C. § 112.

(6) Each step of the claim must be capable of being performed solely through the use of definite, objective criteria.

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58 Falk, *supra* note 32, at 209.

59 *See* note 2 *supra.*