

United States Court of Appeals,

Federal Circuit

*In re Kuriappan P. ALAPPAT, Edward E. Averill and James G. Larsen.*

No. 92-1381

July 29, 1994

Applicants appealed from reconsideration decision of Board of Patent Appeals and Interferences of the United States Patent and Trademark Office which sustained rejection of claims of application as being unpatentable. After ordering matter to be heard en banc, [980 F.2d 1439](#), the Court of Appeals, [Rich](#), Circuit Judge, held that: (1) Commissioner of Patents and Trademarks had authority under statute governing Board of Appeals and Interferences to designate members of panel to consider request for reconsideration of Board's decision; (2) Board had sole authority to grant rehearing; and (3) computer operating pursuant to software may represent patentable subject matter, as long as claimed subject matters meets all other statutory patentability claims. Reversed.

[Archer](#), Chief Judge, filed concurring and dissenting opinion with which Nies, Circuit Judge, joined.

[Pauline Newman](#), [Plager](#) and [Rader](#), Circuit Judges, filed concurring opinions. [Mayer](#), Circuit Judge, filed dissenting opinion with which [Michel](#), Circuit Judge, joined. [Schall](#), Circuit Judge, filed dissenting opinion, with which [Clevenger](#), Circuit Judge, joined.

West Headnotes

[\[1\] KeyCite this headnote](#)

170B Federal Courts

170BI Jurisdiction and Powers in General

170BI(A) In General

170Bk29 Objections to Jurisdiction, Determination and Waiver

170Bk30 k. Power and Duty of Court. Most Cited Cases

170B Federal Courts [KeyCite this headnote](#)

170BI Jurisdiction and Powers in General

170BI(A) In General

170Bk29 Objections to Jurisdiction, Determination and Waiver

170Bk31 k. Waiver or Consent. Most Cited Cases

Jurisdiction cannot be conferred on Court of Appeals for Federal Circuit by waiver or acquiescence, and court thus has duty to raise issue of jurisdiction sua sponte.

[\[2\] KeyCite this headnote](#)

#### 361 Statutes

- 361VI Construction and Operation

  - 361VI(A) General Rules of Construction

    - 361k187 Meaning of Language

      - 361k188 k. In General. Most Cited Cases

#### 361 Statutes [KeyCite this headnote](#)

- 361VI Construction and Operation

  - 361VI(A) General Rules of Construction

    - 361k187 Meaning of Language

      - 361k190 k. Existence of Ambiguity. Most Cited Cases

When statutory interpretation is at issue, plain and unambiguous meaning of statute prevails in absence of clearly expressed legislative intent to contrary.

[\[3\] KeyCite this headnote](#)

#### 291 Patents

- 291IV Applications and Proceedings Thereon

  - 291k111 k. Appeals in Patent Office. Most Cited Cases

Commissioner of Patents and Trademarks has authority under statute governing Board of Appeals and Interferences to designate members of panel to consider request for reconsideration of Board's decision, and Commissioner may designate expanded panel made up of members of original panel, other members of board, and himself, to consider request for reconsideration of decision rendered by that original panel. [35 U.S.C.A. § 7.](#)

[\[4\] KeyCite this headnote](#)

#### 291 Patents

- 291XII Infringement

  - 291XII(C) Suits in Equity

    - 291k324 Appeal

      - 291k324.2 k. Decisions Reviewable. Most Cited Cases

Reconsideration of decision of Board of Appeals and Interferences is valid decision over which court may exercise subject matter jurisdiction, in light of authority of Commissioner of Patents and Trademarks under statute governing Board of Appeals and Interferences to designate members of panel to consider request for reconsideration of Board's decision. [35 U.S.C.A. § 7.](#)

[\[5\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Statute governing Board of Patent Appeals and Interferences plainly and unambiguously provides that Commissioner, Deputy Commissioner, and Assistant Commissioner of Patents and Trademarks are members of Board. [35 U.S.C.A. § 7](#).

[\[6\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Language in statute governing Board of Patent Appeals and Interferences providing that "at least three" Board members will hear each appeal was express grant by Congress of authority to Commissioner of Patents and Trademarks to designate expanded Board panels made up of more than three Board members. [35 U.S.C.A. § 7\(a, b\)](#).

[\[7\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Commissioner of Patents and Trademarks has authority to convene expanded panel to hear appeal which panel includes, or is predominately made up of, senior executive officers of the Board of Patent and Trademark Office (PTO), such as Deputy Commissioner, Assistant Commissioner, Board's Chairman and Vice-Chairman, and himself.

[\[8\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Commissioner of Patents and Trademarks reasonably interpreted statute providing that only Board of Patent Appeals and Interferences had authority to grant rehearings to apply to reconsideration action. [35 U.S.C.A. § 7\(b\)](#).

[\[9\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon  
291k111 k. Appeals in Patent Office. Most Cited Cases

Term "rehearings" in statute governing Board of Patents Appeals and Interferences included any reconsideration by Board of decision rendered by one of its panels, even though Patent Office regulation refers to "reconsideration"; differing terminology was nothing more than result of imprecise regulation drafting and did not indicate intent to create separate review process. [35 U.S.C.A. § 7.](#)

[\[10\] KeyCite this headnote](#)

291 Patents  
291IV Applications and Proceedings Thereon  
291k111 k. Appeals in Patent Office. Most Cited Cases

Express statutory authority of Commissioner of Patents and Trademarks to designate members of panel hearing appeal extends to designation of panel to consider request for rehearing pursuant to state governing Board of Patent Appeals and Interferences; legislative history did not indicate clear congressional intent to limit authority to designate members of Board panel to designation of original panel. [35 U.S.C.A. § 7.](#)

[\[11\] KeyCite this headnote](#)

291 Patents  
291IV Applications and Proceedings Thereon  
291k111 k. Appeals in Patent Office. Most Cited Cases

Statute governing Board of Patent Appeals and Interferences vests Board with sole authority to grant rehearing, and, thus, despite general authority of Commissioner of Patents and Trademarks over operation of Board of Patent and Trademark Office (PTO), Commissioner lacks authority to personally grant rehearing. [35 U.S.C.A. § 7\(b\).](#)

[\[12\] KeyCite this headnote](#)

291 Patents  
291IV Applications and Proceedings Thereon  
291k97 k. Patent Office and Proceedings Therein in General. Most Cited Cases

Commissioner of Patents and Trademarks has broad supervisory authority regarding operation of Board of Patent and Trademark Office (PTO) and is not bound by Board decision that applicant is entitled to patent; only court, and not Board, can order Commissioner to act.

[\[13\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k97 k. Patent Office and Proceedings Therein in General. Most Cited Cases

Board of Patent Appeals and Interferences is highest level of Examining Corps, and, like all other members of Examining Corps, Board operates subject to overall ultimate authority and responsibility of Commissioner of Patents and Trademarks.

[\[14\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k111 k. Appeals in Patent Office. Most Cited Cases

Fact that Commissioner of Patents and Trademarks may determine composition of panels of Board of Patent Appeals and Interferences and may convene panel which he knows or hopes will render decision he desires does not reduce Board to alter ego or agent of Commissioner as Commissioner may not unilaterally overturn decision of Board panel or instruct other Board members how to vote.

[\[15\] KeyCite this headnote](#)

27 Amicus Curiae

27k3 k. Powers, Functions, and Proceedings. Most Cited Cases

Amicus curiae in patent case did not have standing to make due process argument on behalf of claimant.

[\[16\] KeyCite this headnote](#)

92 Constitutional Law

92XX Separation of Powers

92XX(C) Judicial Powers and Functions

92XX(C)2 Encroachment on Legislature

92k2499 Particular Issues and Applications

92k2518 k. Intellectual Property. Most Cited Cases

(Formerly 92k70.3(9.1))

Whether it was sound policy to grant Commissioner of Patents and Trademarks limited ability to control Board decisions through his authority to designate Board panels was question for legislature and not courts.

[\[17\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k101 Claims

291k101(4) k. Specifications and Drawings, Construction With. Most Cited Cases

Board of Patent and Trademark Office (PTO) was not exempt from following statutory mandate to construe claim expressed as a "means" for performing specified function as covering corresponding structure, material, or acts described in specification and equivalents thereof.

[\[18\] KeyCite this headnote](#)

291 Patents

291IX Construction and Operation of Letters Patent

291IX(B) Limitation of Claims

291k165 Operation and Effect of Claims in General

291k165(4) k. Reading Limitations or Elements Into Claims, or Disregarding Limitations or Elements. Most Cited Cases

Means clauses in claim for invention relating to software for creating smooth waveform display in digital oscilloscope, which employed "anti-aliasing" technique and eliminated apparent discontinuity or oscillation in waveform, could not be read as mere process claim; claim unquestionably recited machine, or apparatus, made up of combination of known electronic circuitry elements.

[\[19\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k7.14 k. Particular Processes or Methods as Constituting Invention. Most Cited Cases

Claim for "rasterizer," which was machine for converting vector list data representing sample magnitudes of input waveform into antialiased pixel illumination intensity data, was claim directed to "machine" which was patentable subject matter.

[\[20\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k6 k. Principles or Laws of Nature. Most Cited Cases

Subject matter of invention relating to means for creating smooth waveform display in digital oscilloscope, which employed "anti-aliasing" technique eliminating apparent discontinuity or oscillation in waveform, did not fall within "mathematical algorithm" exception to subject matter jurisdiction over machines.

[\[21\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k10 Machines

291k11 k. In General. Most Cited Cases

291 Patents [KeyCite this headnote](#)

291I Subjects of Patents

291k10 Machines

291k12 k. Improvements. Most Cited Cases

Plain and unambiguous meanings of patent law governing machines is that any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvements therefore may be patented if it meets patentability requirements.

[\[22\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k6 k. Principles or Laws of Nature. Most Cited Cases

Fact that courts have tried to carve out exception to patentability for mathematical computations did not equal broad category of subject matter excluded from patentability; certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, and, thus, subject matter is not in and of itself entitled to patent protection.

[\[23\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k5 k. In General. Most Cited Cases

It is irrelevant to patentability that claim may contain, as part of the whole, subject matter that would not be patentable by itself; claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses mathematical formula, computer program or digital computer.

[\[24\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k6 k. Principles or Laws of Nature. Most Cited Cases

Proper inquiry in dealing with "mathematical subject matter" exception to patentability of machines is to see whether claimed subject matter, as a whole, is disembodied mathematical concept, whether categorized as mathematical formula, equation, algorithm, or the like, which in essence represents nothing more than law of nature, natural phenomenon or abstract idea.

[\[25\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k4 Arts

291k6 k. Principles or Laws of Nature. Most Cited Cases

Invention relating to means for creating smooth waveform display in digital oscilloscope, which employed "anti-aliasing" technique eliminating apparent discontinuity or oscillation in waveform was not disembodied "mathematical concept" which would not be patentable, but rather invention was one to transform one set of data to another, although what may be viewed as series of mathematical calculations does not alone justify holding claim as one directed to nonstatutory subject matter.

[\[26\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k101 Claims

291k101(10) k. Combination Claims. Most Cited Cases

Claim which defined combination of elements constituting machine for producing antialiased waveform on computers defined combination of elements constituting machine for producing waveform.

[\[27\] KeyCite this headnote](#)

291 Patents

291IV Applications and Proceedings Thereon

291k101 Claims

291k101(8) k. Functions, Advantages or Results of Invention. Most Cited Cases

Fact that claimed invention would read on general purpose computer programmed to carry out claimed invention did not preclude finding that programming creates new machine, as general purpose computer became, in effect, special purpose computer once it was programmed to perform particular functions pursuant to instructions from program software.

[\[28\] KeyCite this headnote](#)

291 Patents

291I Subjects of Patents

291k10 Machines

291k11 k. In General. Most Cited Cases

Computer operating pursuant to software may represent patentable subject matter, as long as claimed subject matters meet all other statutory patentability claims; computer is "apparatus" and not mathematics.

*\*1529* [Alexander C. Johnson, Jr.](#), Marger, Johnson, McCollom & Stolowitz, P.C., Portland, OR, argued for appellants. With him on the brief was [Peter J. Meza](#). Also on the brief was [Francis I. Gray](#), Tektronix, Inc., Wilsonville, OR. [Allen M. Sokal](#), Finnegan, Henderson, Farabow, Garrett & Dunner, of Washington, DC, argued for amicus curiae, Federal Circuit Bar Association. With him on the brief were [Gerald H. Bjorge](#), [Herbert H. Mintz](#) and George E. Hutchinson.

[Fred E. McKelvey](#), Solicitor, Office of the Sol., Arlington, VA, argued for appellee. With him on the brief were Lee E. Barrett and Richard E. Schafer, Associate Sol. Of counsel were Albin F. Drost and John W. Dewhirst.

[Herbert C. Wamsley](#) and Richard C. Witte, Intellectual Property Owners, Inc., Washington, DC, were on the brief for amicus curiae, Intellectual Property Owners, Inc. [Richard H. Stern](#), Graham & James, Washington, DC, was on the brief for amicus curiae, Seagate Technology, Inc. Also on the *\*1530* brief was [Edward P. Heller, III](#), Patent Counsel.

[Fred I. Koenigsberg](#) and [Nancy J. Linck](#), Cushman, Darby & Cushman, Washington, DC, were on the brief for amicus curiae, American Intellectual Property Law Association. Also on the brief were [Harold C. Wegner](#) and [H. Ross Workman](#), Wegner, Cantor, Mueller & Player, Washington, DC. Of counsel was William S. LaFuze.

Before [ARCHER](#), Chief Judge, and [RICH](#), NIES, [NEWMAN](#), [MAYER](#), [MICHEL](#), [PLAGER](#), [LOURIE](#), [CLEVENGER](#), [RADER](#) and [SCHALL](#), Circuit Judges.

[RICH](#), Circuit Judge, with whom:

as to Part I (Jurisdiction): PAULINE NEWMAN, LOURIE and RADER, Circuit Judges, join; ARCHER, Chief Judge, NIES and PLAGER, Circuit Judges, concur in conclusion; and MAYER, MICHEL, CLEVINGER and SCHALL, Circuit Judges, dissent; and as to Part II (Merits): PAULINE NEWMAN, LOURIE, MICHEL, PLAGER and RADER, Circuit Judges, join; ARCHER, Chief Judge, and NIES, Circuit Judge, dissent; and MAYER, CLEVINGER and SCHALL, Circuit Judges, take no position.  
Kuriappan P. Alapatt, Edward E. Averill, and James G. Larsen (collectively Alappat)

appeal the April 22, 1992, reconsideration decision of the Board of Patent Appeals and Interferences (Board) of the United States Patent and Trademark Office (PTO), *Ex Parte Alappat*, [23 USPQ2d 1340 \(BPAI, 1992\)](#), which sustained the Examiner's rejection of claims 15-19 of application Serial No. 07/149,792 ('792 application) as being unpatentable under [35 U.S.C. § 101 \(1988\)](#).

## I. JURISDICTION

This court must determine whether the Board's reconsideration decision constitutes a valid decision over which this court may exercise subject matter jurisdiction pursuant to [28 U.S.C. § 1295\(a\)\(4\)\(A\) \(1988\)](#) and [35 U.S.C. § 141 \(1988\)](#). As discussed below, the legality of the Board panel which issued the reconsideration decision is in question, thus raising the issue of the validity of the decision itself and consequently our authority to review that decision. Therefore, before addressing the merits, it is appropriate that we first determine that the decision was rendered by a legally constituted panel to ensure that a jurisdictional cloud does not hang over our holding on the merits. See *In re Bose Corp.*, [772 F.2d 866, 869, 227 USPQ 1, 3-4 \(Fed.Cir.1985\)](#). [FN1]

[FN1]. In *Bose*, this court examined the composition of a panel of the Trademark Trial and Appeal Board (TTAB), holding that this court has jurisdiction to decide whether a TTAB panel was properly constituted when a decision from that panel is appealed. This court stated in pertinent part:

[I]t is appropriate for this court to determine whether a valid decision is before us before addressing the merits of that decision. The matter of the board's composition is logically related to, indeed, inseparable from the merits and can be raised in the appeal from the board's decision.

*Bose*, 772 F.2d at 866, 227 USPQ at 3.

[1] Although *Alappat* does not contest the validity of the Board's reconsideration decision, jurisdiction cannot be conferred on this court by waiver or acquiescence. *Coastal Corp. v. United States*, [713 F.2d 728, 730 \(Fed.Cir.1983\)](#). This court therefore has raised the issue of jurisdiction *sua sponte*, as is its duty. See *Mansfield, Coldwater & Lake Mich. Ry. Co. v. Swan*, [111 U.S. 379, 382, 4 S.Ct. 510, 511, 28 L.Ed. 462 \(1884\)](#); *Wyden v. Commissioner of Patents & Trademarks*, [807 F.2d 934, 935, 231 USPQ 918, 919 \(Fed.Cir.1986\)](#); see also [5 WRIGHT & MILLER, FEDERAL PRACTICE AND PROCEDURE § 1393 \(1990\)](#). To this end, this court, having decided to hear the case in banc, issued an Order on December 3, 1992, requesting briefing on the following three questions:

(1) When a three-member panel of the Board has rendered its decision, does the Commissioner have the authority to constitute a new panel for purposes of reconsideration?

(2) If the Commissioner lacks such authority, is the decision of such a new panel a

decision of the Board for purposes of [28 U.S.C. § 1295\(a\)\(4\)\(A\)](#)? If not, does this \*1531 court have jurisdiction to reach the merits of the appealed decision?

(3) What is the relationship, if any, between the "reconsideration" action taken in this case and "rehearings" by the Board provided for in [35 U.S.C. § 7\(b\)](#)?

Consistent with our discussion below, we hold that the answer to the first question is yes. Consequently, we need not address the second question. As to the third question, we hold, for the reasons explained later, that the "reconsideration" by the Board was a "rehearing" as provided for in [35 U.S.C. § 7\(b\) \(1988\)](#).

#### *A. Background*

In an Office Action mailed December 5, 1989, the Examiner finally rejected claims 15-19 under [35 U.S.C. § 101](#) as being directed to non-statutory subject matter. Alappat appealed this rejection to the Board pursuant to [35 U.S.C. § 134 \(1988\)](#), and a three-member panel made up of Examiners-in-Chief Lindquist, Thomas, and Krass reversed the Examiner's non-statutory subject matter rejection in a decision mailed June 26, 1991. The Examiner then requested reconsideration of this decision, pursuant to section 1214.04 of the *Manual of Patent Examining Procedure* (MPEP), stating that the panel's decision conflicted with PTO policy. The Examiner further requested that such reconsideration be carried out by an expanded panel.

An expanded eight-member panel, acting as the Board, granted both of the Examiner's requests. The expanded panel was made up of PTO Commissioner Manbeck, PTO Deputy Commissioner Comer, PTO Assistant Commissioner Samuels, Board Chairman Serota, Board Vice-Chairman Calvert, and the three members of the original panel. On April 22, 1992, the five new members of the expanded panel issued the majority decision now on appeal, authored by Chairman Serota, in which they affirmed the Examiner's [§ 101](#) rejection, thus ruling contrary to the decision of the original three-member panel. The three members of the original panel dissented on the merits for the reasons set forth in their original opinion, which they augmented in a dissenting opinion.

The majority stated that its reconsideration decision was a "new decision" for purposes of requesting reconsideration or seeking court review of that decision. It did not, however, vacate the original three-member panel decision. Instead, the majority indicated that the original, three-member panel decision was only "modified to the extent indicated." [Alappat, 23 USPQ2d at 1347](#). That "modification" was, however, a de facto reversal of the original panel's decision, affirming instead of reversing the examiner.

#### *B. Discussion*

(1) *The Legality of the Board's Rehearing Panel*

[\[2\]](#) When statutory interpretation is at issue, the plain and unambiguous meaning of a statute prevails in the absence of clearly expressed legislative intent to the contrary. *See*

[Mansell v. Mansell](#), 490 U.S. 581, 592, 109 S.Ct. 2023, 2030, 104 L.Ed.2d 675 (1989); [Hoechst Aktiengesellschaft v. Quigg](#), 917 F.2d 522, 526, 16 USPQ2d 1549, 1552 (Fed.Cir.1990). In this case, the composition of the Board and its authority to reconsider its own decisions, and the Commissioner's authority over the Board, are governed by [35 U.S.C. § 7](#), which reads:

(a) The examiners-in-chief shall be persons of competent legal knowledge and scientific ability, who shall be appointed to the competitive service. *The Commissioner, the Deputy Commissioner, the Assistant Commissioners, and the examiners-in-chief shall constitute the Board of Patent Appeals and Interferences.*

(b) The Board of Patent Appeals and Interferences shall, on written appeal of an applicant, review adverse decisions of examiners upon applications for patents and shall determine priority and patentability of invention in interferences declared under section 135(a) of this title. *Each appeal and interference shall be heard by at least three members of the Board of Appeals and Interferences, who shall be designated by the Commissioner. Only the Board of Patent Appeals and Interferences has the authority to grant rehearings.* [35 U.S.C. § 7 \(1988\)](#) (emphasis added).

[\[3\]\[4\]](#) For the reasons set forth below, we hold that [§ 7](#) grants the Commissioner the *\*1532* authority to designate the members of a panel to consider a request for reconsideration of a Board decision. This includes, as in this case, the Commissioner designating an expanded panel made up of the members of an original panel, other members of the Board, and himself as such, to consider a request for reconsideration of a decision rendered by that original panel. The Board's reconsideration decision therefore constituted a valid decision over which this court may exercise subject matter jurisdiction.

(a)

[\[5\]\[6\]](#) At the outset, we note that [§ 7\(a\)](#) plainly and unambiguously provides that the Commissioner, the Deputy Commissioner, and the Assistant Commissioners are members of the Board. [Section 7\(b\)](#) plainly and unambiguously requires that the Commissioner designate "at least three" Board members to hear each appeal. By use of the language "at least three," Congress expressly granted the Commissioner the authority to designate expanded Board panels made up of more than three Board members. [\[FN2\]](#)

[FN2.](#) Both this court and the Court of Customs and Patent Appeals (CCPA), one of this court's predecessors, have reviewed Board decisions rendered by panels made up of more than three Board members without questioning the validity of such panels. See e.g. [Hahn v. Wong](#), 892 F.2d 1028, 1031, 13 USPQ2d 1313, 1316 (Fed.Cir.1989) (seven-member panel because of significance of issues raised); [In re Lundak](#), 773 F.2d 1216, 1219, 227 USPQ 90, 92 (Fed.Cir.1985) (eighteen-member panel); [In re Durden](#), 763 F.2d 1406, 1409 n. 3, 226 USPQ 359, 360 n. 3 (Fed.Cir.1985) (sixteen-member panel); [In re Henriksen](#), 399 F.2d 253, 254 n. 1, 158 USPQ 224, 225 n. 1 (CCPA

[1968](#)) (nine-member panel because of "the nature of the legal issues raised"). Other instances wherein the Commissioner has convened an expanded panel include *Ex parte Alpha Indus. Inc.*, [22 USPQ2d 1851, 1852 \(Bd.Pt.App. & Inter.1992\)](#) (five-member panel); *Ex parte Fujii*, [13 USPQ2d 1073, 1074 \(Bd.Pat.App. & Inter.1989\)](#) (five-member panel because of significance of issue raised); *Ex parte Kristensen*, [10 USPQ2d 1701, 1702 \(Bd.Pat.App. & Inter.1989\)](#) (five-member panel); *Ex parte Kitamura*, [9 USPQ2d 1787, 1788 \(Bd.Pat.App. & Inter.1988\)](#) (five-member panel because of possible conflict in case law); *Lamont v. Berguer*, [7 USPQ2d 1580, 1581 \(Bd.Pat.App. & Inter.1988\)](#) (five-member panel because of novelty of issue raised); *Kwon v. Perkins*, [6 USPQ2d 1747, 1748 \(Bd.Pat.App. & Inter.1988\)](#) (nine-member panel because of novelty of issues raised); *Ex parte Horton*, [226 USPQ 697, 698 \(Bd.Pat.App. & Inter.1985\)](#) (five-member panel); *Ex parte Tytgat*, [225 USPQ 907, 908 \(Bd.Pat.App. & Inter.1985\)](#) (five-member panel); and *Ex parte Jackson*, [217 USPQ 804, 806 \(Bd.Pat.App. & Inter.1982\)](#) (nine-member panel because legal issue was one of first impression).

[7] There is no evidence in the legislative history of [§ 7, or Title 35](#) as a whole, clearly indicating that Congress intended to impose any statutory limitations regarding which Board members the Commissioner may appoint to an expanded panel or when the Commissioner may convene such a panel. [FN3] The Commissioner thus has the authority to convene an expanded panel which includes, or as in this case is predominately made up of, senior executive officers of the PTO such as the Deputy Commissioner, the Assistant Commissioner, the Board's Chairman and Vice-Chairman, and himself. [FN4]

[FN3]. The Commissioner has interpreted his authority to convene an expanded panel as granting him the authority to expand a three-member panel to include additional Board members after oral hearing. *See e.g. Ex parte Kuklo*, [25 USPQ2d 1387, 1388 \(Bd.Pat.App. & Inter.1992\)](#) (five-member panel); *Larson v. Johanning*, [17 USPQ2d 1610, 1610 \(Bd.Pat.App. & Inter.1991\)](#) (five-member panel); *Ex parte Lyell*, [17 USPQ2d 1548, 1549 \(Bd.Pat.App. & Inter.1990\)](#) (five-member panel); *Ex parte Remark*, [15 USPQ2d 1498, 1498 \(Bd.Pat.App. & Inter.1990\)](#) (five-member panel); *Ex parte Kumagai*, [9 USPQ2d 1642, 1643 \(Bd.Pat.App. & Inter.1988\)](#) (five-member panel).

[FN4]. This is not to say that the Commissioner's authority to designate the members of a Board panel may or may not be constrained by principles of due process or by Title 5, the Administrative Procedure Act (APA). However, as noted herein, Alappat has not raised any such arguments in this appeal, and therefore we need not address such issues.

(b)

[8] The focus of the jurisdictional inquiry in this case is the last sentence of [§ 7\(b\)](#) which provides: "Only the Board of Patent Appeals and Interferences has the authority to grant rehearings." The Commissioner contends that the reconsideration action taken in this case constituted a type of "rehearing" as mentioned in the last sentence of [§ 7\(b\)](#). For the reasons set forth below, we find the Commissioner's interpretation of [§ 7 \\*1533](#) to be a reasonable one entitled to deference, given that neither the statute itself nor the legislative history thereof indicates Congressional intent to the contrary.

[9] We interpret the term "rehearings" in [§ 7](#) as encompassing any reconsideration by the Board of a decision rendered by one of its panels. The fact that [§ 7](#) refers to "rehearings" whereas [37 C.F.R. 1.197](#) (PTO Rule 197) [FN5] refers to "reconsideration" is of no significance. The differing terminology appears to be nothing more than the result of imprecise regulation drafting. [FN6] We have been unable to find any evidence suggesting that, in promulgating Rule 197, the PTO intended to create a review process separate and distinct from that provided by statute. In addition, our interpretation finds support in *In re Schmidt*, 377 F.2d 639, 641, 153 USPQ 640, 642 (CCPA 1967), wherein the CCPA accepted, without criticism, the PTO's treatment of a Board reconsideration pursuant to Rule 197, on an examiner's request, as a "rehearing" provided for in [§ 7\(b\)](#). [FN7]

[FN5]. Rule 197(b) reads in pertinent part:

A single request for reconsideration or modification of the decision may be made if filed within one month from the date of the original decision,....

[FN6]. The terms "rehearing" and "reconsideration" are often used interchangeably. In some contexts, a distinction is made between the two. We see no basis, however, for imposing any such distinctions in the context of PTO Board proceedings, especially considering that the Commissioner argues that the PTO does not make such distinctions, citing McCrady, *Patent Office Practice*, § 235 (3d ed. 1950). We note that McCrady's *Patent Office Practice*, 4th ed. (1959) states in § 235: "These two terms 'reconsideration' and 'rehearing' seem to be treated by Rule 197 as interchangeable, and are so treated here." Although not legislative history per se, we also note that Karl Fenning, at the time a former Assistant Commissioner of Patents, stated during the 1926 House hearing on the bill to include the rehearing provision in the statute that "It says rehearing, and rehearing, used in the technical or legal sense, is reconsideration." *Procedure in the Patent Office, Hearing on H.R. 7563 and H.R. 13487 Before the Committee on Patents, United States House of Representatives*, 69th Cong., 2d Sess. 29 (1926) (1926 House Hearing ). Finally, we additionally note that Black's Law Dictionary defines "rehearing" in part as a "[s]econd consideration of cause for purpose of calling to court's or administrative board's attention any error, omission, or oversight in first consideration." Black's Law Dictionary (6th ed. 1990). Black's defines "reconsideration" as follows: "[a]s normally used in the context of administrative

adjudication 'reconsideration' implies reexamination, and possibly a different decision by the entity which initially decided it."

[FN7](#). Apparently, the Board's reconsideration decision in the present case was based on the same record that was before the original three-member panel, and Alappat was not allowed an opportunity to add to that record. We do not intend to suggest herein that "rehearings" under [§ 7\(b\)](#) are limited to such situations. Indeed, it would not be unreasonable to

construe "rehearings" under [§ 7\(b\)](#) broadly as also encompassing reconsideration by the Board wherein the Board allows an applicant to supplement the existing record or wherein the Board allows both the applicant and the examiner to brief the issues anew.

[\[10\]](#) We also interpret the Commissioner's express statutory authority to designate the members of a panel hearing an appeal as extending to designation of a panel to consider a request for a rehearing pursuant to [§ 7\(b\)](#). [\[FN8\]](#) There is no indication to the contrary in the statute, and we have found no legislative history indicating a clear Congressional intent that the Commissioner's authority to designate the members of a Board panel be limited to the designation of an original panel or that the Board be limited to exercising its rehearing authority only through the panel which rendered an original decision. In those cases where a different \*1534 panel of the Board is reconsidering an earlier panel decision, the Board is still the entity reexamining that earlier decision; it is simply doing so through a different panel.

[FN8](#). The Commissioner has consistently interpreted his statutory authority to designate the constituency of a Board panel as allowing him to change or augment an originally designated panel in response to a request for reconsideration. *See e.g. Ex parte Johnson*, Appeal No. 91-0143 (Bd.Pat.App. & Inter.1991) (on request for reconsideration, augmented panel of seven examiners-in-chief granted the request and voted four to three to affirm the examiner, contrary to the original three-member panel); *Ex parte Holt*, 218 USPQ 747, 747 (Bd.App.1982) (on request for reconsideration by Group Director, rehearing granted by an augmented fifteen-member panel); *Ex parte Scherer*, 103 USPQ 107, 107-08 (Bd.App.1954) (rehearing by an augmented eleven-member panel granted because of probable importance of issues); *Ex parte Ball*, 99 USPQ 146, 146 (Bd.App.1953) (reconsideration granted to allow further consideration by an augmented eight-member panel including the Commissioner); *Ex parte Wiegand*, 61 USPQ 97, 99 (Bd.App.1944) (rehearing by a different three-member panel).

[\[11\]](#) The last sentence of [§ 7\(b\)](#) is nothing more than an exclusionary statement vesting the Board with the sole authority to grant a rehearing. Thus, for example, the Commissioner cannot personally grant a rehearing, notwithstanding the general authority

that he has over the operation of the PTO. For a general history of the Board and of appeals within and from the PTO, see Michael W. Blommer, *The Board of Patent Appeals and Interferences*, AIPLA Bulletin 188 (1992), P.J. Federico, *The Board of Appeals 1861-1961*, 43 JPOS 691 (1961), and *Evolution of Patent Office Appeals*, 22 JPOS 838-64, 920- 49 (1940).

The predecessor of [§ 7](#) was section 482 of the Revised Statutes, as amended by the Act of March 2, 1927. The 1927 Act added to the Board the Commissioner, the First Assistant Commissioner, and the Assistant Commissioner. It also eliminated the right of an applicant to appeal to the Commissioner from an adverse Board decision, by adding to the statute the language "[t]he the Board of Appeals shall have sole power to grant rehearings," essentially the same provision as in today's [§ 7\(b\)](#). Act of March 2, 1927, ch. 273, § 3, 44 Stat. 1335. Prior to this amendment, the Commissioner acted on petitions for rehearing of adverse Board decisions. Through this amendment, Congress effectively eliminated the onerous burden placed on the Commissioner regarding reviewing such appeals, instead steering applicants to the Board with such requests.

The events surrounding the enactment of the 1927 Act do not indicate any Congressional intent to lessen the great supervisory power that the Commissioner possessed over the PTO prior to that Act. [\[FN9\]](#) Indeed, at the end of the 1926 House and Senate hearings during which the last sentence of what is now [§ 7\(b\)](#) was discussed, the Senate Committee on Patents concluded:

[FN9](#). The Commissioner's supervisory authority under Section 482 of the Revised Statutes prior to the 1927 Act was described aptly as follows:

The law has provided certain official agencies to aid and advance the work of the Patent Office, such as the Primary Examiners, the Examiners of Interferences [now obsolete], and the Examiners-in-Chief; but they are all subordinate, and subject to the official direction of the Commissioner of Patents, except in the free exercise of their judgments in the matters submitted for their examination and determination. The Commissioner is the head of the bureau, and he is responsible for the general issue of that bureau.

[Moore v. United States](#), 40 App.D.C. 591, 596 (D.C.Cir.1913), quoting [In re Drawbaugh](#), 9 App.D.C. 219, 240 (D.C.Cir.1896).

One lawyer [remarks of Fenning, chairman of the committee on laws and rules of the American Patent Law Association, *Procedure in the Patent Office, Hearing on S. 4812 Before the Committee on Patents, United States Senate*, 69th Con.2d Sess. 19, 21-22 (1926) ] has expressed the fear that in providing in lines 16- 17, page 2 (sec. 482) [the precursor to [section 7\(b\)](#) ], that the board of appeals shall have the sole power to grant "rehearings," the bill may lessen the present supervisory power of the commissioner, but

it was agreed by the other lawyers at the hearing, *and the Committee on Patents concurs in this view, that the supervisory power of the commissioner, as it has existed for a number of decades, remains unchanged by the bill.*

S.Rep. No. 1313, 69th Cong., 2d Sess. 4 (1927) (emphasis added). Fenning expressed the same concerns to the House Committee on Patents. *1926 House Hearing* at 22-23. The *House Committee Report, H.R. No. 1889*, 69th Cong., 2d Sess. (1927), is silent on the issue, thus suggesting that the House did not intend to give the last sentence of [§ 7\(b\)](#) a different meaning than was ascribed to it by the Senate. We believe the foregoing illustrates the lack of intent on the part of Congress in enacting the last sentence of [§ 7\(b\)](#) to place any limitations on the Commissioner's ability to designate Board panels, including Board panels for "rehearing" purposes.

(c)

[\[12\]\[13\]](#) Our holding is consistent with the broad supervisory authority that Congress has granted the Commissioner under [\\*1535 Title 35](#) regarding the operation of the PTO. Exemplary thereof is [§ 6\(a\)](#), which reads in pertinent part:

The Commissioner, under the direction of the Secretary of Commerce, *shall superintend or perform all duties required by law respecting the granting and issuing of patents.* [35 U.S.C. § 6\(a\) \(1988\)](#) (emphasis added). The Commissioner also may establish regulations not inconsistent with the law, with the approval of the Secretary of Commerce, [35 U.S.C. § 6 \(1988\)](#), cause an examination to be made of an application, [35 U.S.C. § 131 \(1988\)](#), declare an interference, [35 U.S.C. § 135 \(1988\)](#), and issue a patent when authorized by law, [35 U.S.C. §§ 131, 145 \(1988\), 151 \(1988\), 153 \(1988\)](#).

Moreover, the Commissioner is not bound by a Board decision that an applicant is entitled to a patent. Only a court can order the Commissioner to act, not the Board. Even though Board members serve an essential function, they are but examiner-employees of the PTO, and the ultimate authority regarding the granting of patents lies with the Commissioner. [\[FN10\]](#) For example, if the Board rejects an application, the Commissioner can control the PTO's position in any appeal through the Solicitor of the PTO; the Board cannot demand that the Solicitor attempt to sustain the Board's position. Conversely, if the Board approves an application, the Commissioner has the option of refusing to sign a patent; an action which would be subject to a mandamus action by the applicant. The Commissioner has an obligation to refuse to grant a patent if he believes that doing so would be contrary to law. The foregoing evidences that the Board is merely the highest level of the Examining Corps, and like all other members of the Examining Corps, the Board operates subject to the Commissioner's overall ultimate authority and responsibility.

[FN10.](#) Examiners-in-chief are appointed by the Secretary of Commerce upon nomination by the Commissioner. Thus, principles respecting the independence of judges or other concepts associated with the judicial process are not necessarily

applicable to Board members. The fact that we apply the clearly erroneous standard of review rather than the more restrictive substantial evidence standard usually applied to administrative boards illustrates the purely administrative nature of the Board.

One also should not overlook the asymmetry of [§ 141](#), which grants applicants, but not the Commissioner, the right to appeal a decision of the Board to this court. Since Congress has reenacted [§ 141](#) several times since the 1927 debates about the Board's independence, *see 1926 House Hearing* at 22-29, it is safe to infer that Congress believed the Commissioner did not need a right of appeal in view of his limited control over the Board pursuant to [§ 7](#) and in view of his rulemaking authority pursuant to [§ 6\(a\)](#).

(d)

Contrary to suggestions by Amicus Curiae Federal Circuit Bar Association (FCBA), our holding does not conflict with this court's previous statements in [Animal Legal Defense Fund v. Quigg](#), 932 F.2d 920, 928-29, 18 USPQ2d 1677, 1684 (Fed.Cir.1991), that the Board is not the alter ego or agent of the Commissioner. In that case, this court merely pointed out that the Board derives its adjudicatory authority from a statutory source independent of the Commissioner's rulemaking authority, and that, although the Commissioner may sit on the Board, "in that capacity he serves as any other member." [Animal Legal Defense Fund](#), 932 F.2d at 929 n. 10, 18 USPQ2d at 1684 n. 10. In other words, the Commissioner has but one vote on any panel on which he sits, and he may not control the way any individual member of a Board panel votes on a particular matter. However, the present statutory scheme does allow the Commissioner to determine the composition of Board panels, and thus he may convene a Board panel which he knows or hopes will render the decision he desires, even upon rehearing, as he appears to have done in this case.

[14] Such a result does not reduce the Board to an alter ego or agent of the Commissioner. To the contrary, the fact remains that the Commissioner may not unilaterally overturn a decision of a Board panel or instruct other Board members how to vote. The Commissioner's limited control in this *\*1536* manner over the Board and the decisions it issues is not offensive to [Title 35](#) as a whole, given that Congress clearly did not intend the Board to be independent of any and all oversight by the Commissioner. *See e.g. Lindberg v. Brenner*, 399 F.2d 990, 992-93, 158 USPQ 380, 381-82 (D.C.1968). The plain and unambiguous wording of [§ 7](#) intertwining the powers of the Board and the Commissioner clearly indicates that Congress did not intend the Board to have such complete independence.

(e)

Amicus Curiae FCBA suggests that the Commissioner's redesignation practices in this case violated Alappat's due process rights, citing [Utica Packing Co. v. Block](#), 781 F.2d 71

[\(6th Cir.1986\)](#). In addition, an issue was raised at oral argument as to whether the Commissioner's designation practices are governed by any provisions of the Administrative Procedure Act (APA), and if so, whether the Commissioner's actions in this case violated any of these provisions. We need not address either of these issues. [\[15\]](#) The FCBA does not have standing to make a due process argument, *see* [Broadrick v. Oklahoma](#), 413 U.S. 601, 610, 93 S.Ct. 2908, 2915, 37 L.Ed.2d 830 (1973) ("constitutional rights are personal and may not be asserted vicariously") and [United Parcel Service, Inc. v. Mitchell](#), 451 U.S. 56, 60 n. 2, 101 S.Ct. 1559, 1562 n. 2, 67 L.Ed.2d 732 (1981) (amicus may not rely on new arguments not presented below), and Alappat has waived any due process argument by acquiescing to the Commissioner's actions in this case. Thus, there is no case or controversy before this court with respect to any alleged due process violation. There also is no case or controversy as to whether the Commissioner's actions in this case violated any provision of the APA, given that Alappat does not contest these actions, and this is not an issue which this court may raise *sua sponte*. Moreover, neither of these issues is germane to the jurisdictional issue this court raised *sua sponte*, i.e., whether the Board's reconsideration decision constituted a statutorily valid decision under [35 U.S.C. § 141](#) over which this court may exercise subject matter jurisdiction pursuant to [28 U.S.C. § 1294\(a\)\(4\)\(A\)](#).

(f)

[\[16\]](#) Finally, we acknowledge the considerable debate and concern among the patent bar and certain Board members regarding the Commissioner's limited ability to control Board decisions through his authority to designate Board panels. [\[FN11\]](#) Our responsibility, however, is merely to adjudge whether the Commissioner's designation practices as they were applied in this particular case resulted in a valid decision over which this court may exercise subject matter jurisdiction, not to assess whether they were sound from a public policy standpoint. We leave to the legislature to determine whether any restrictions should be placed on the Commissioner's authority in this regard. Absent any congressional intent to impose such restrictions, we decline to do so *sua sponte*.

[FN11](#). *See e.g. En Banc Federal Circuit Will Consider Board of Appeals Issues in Alappat Case*, 45 PTCJ 107 (1992); [Changes Urged in Structure and Operation of PTO Appeals Board](#), 45 PTCJ 75 (1992); *Independence of the Board of Patent Appeals and Interferences*, Federal Circuit Bar Journal, Vol. 2, No 2, pg. 215 (1992); *CLE Weekend Highlights*, 33 NYPTC Bull. 6 (1992); *Patent and Trademark Office Authorization Act*, 138 Cong.Rec. S16, 614 (1992), reprinted in 44 PTCJ 618-19 (1992);

[Review of Patent and Trademark Office Appeal Procedure](#), 57 FR 34123 (1992), reprinted in 44 PTCJ 352 (1992); [Comments Sought on Commissioner's Relationship with Appellate Boards](#), 44 PTCJ 325 (1992); [PTO's Automation and Board Autonomy at Issue in House Hearing on PTO Budget](#), 44 PTCJ 102, 103 (1992); [Correspondence Between Board Members and PTO Commissioner on Board Independence](#), 44 PTCJ 43 (1992); [Members of Board of Appeals Complain about Interference with Independence](#), 44 PTCJ 33 (1992); Michael W. Blommer, *The Board of Patent Appeals and Interferences*, AIPLA Bulletin 188 (1992).

## II. THE MERITS

Our conclusion is that the appealed decision should be reversed because the appealed claims are directed to a "machine" which is one of the categories named in [35 U.S.C. § 101](#), as the first panel of the Board held.

### *\*1537 A. Alappat's Invention*

Alappat's invention relates generally to a means for creating a smooth waveform display in a digital oscilloscope. The screen of an oscilloscope is the front of a cathode-ray tube (CRT), which is like a TV picture tube, whose screen, when in operation, presents an array (or raster) of pixels arranged at intersections of vertical columns and horizontal rows, a pixel being a spot on the screen which may be illuminated by directing an electron beam to that spot, as in TV. Each column in the array represents a different time period, and each row represents a different magnitude. An input signal to the oscilloscope is sampled and digitized to provide a waveform data sequence (vector list), wherein each successive element of the sequence represents the magnitude of the waveform at a successively later time. The waveform data sequence is then processed to provide a bit map, which is a stored data array indicating which pixels are to be illuminated. The waveform ultimately displayed is formed by a group of vectors, wherein each vector has a straight line trajectory between two points on the screen at elevations representing the magnitudes of two successive input signal samples and at horizontal positions representing the timing of the two samples.

Because a CRT screen contains a finite number of pixels, rapidly rising and falling portions of a waveform can appear discontinuous or jagged due to differences in the elevation of horizontally contiguous pixels included in the waveform. In addition, the presence of "noise" in an input signal can cause portions of the waveform to oscillate between contiguous pixel rows when the magnitude of the input signal lies between values represented by the elevations of the two rows. Moreover, the vertical resolution of the display may be limited by the number of rows of pixels on the screen. The noticeability and appearance of these effects is known as *aliasing*.

To overcome these effects, *Alappat's invention employs an anti-aliasing system* wherein each vector making up the waveform is represented by modulating the illumination intensity of pixels having center points bounding the trajectory of the vector. The intensity at which each of the pixels is illuminated depends upon the distance of the center point of each pixel from the trajectory of the vector. Pixels lying squarely on the waveform trace receive maximum illumination, whereas pixels lying along an edge of the trace receive illumination decreasing in intensity proportional to the increase in the distance of the center point of the pixel from the vector trajectory. Employing this *anti-aliasing* technique eliminates any apparent discontinuity, jaggedness, or oscillation in the waveform, *thus giving the visual appearance of a smooth continuous waveform*. In short, and in lay terms, the invention is an improvement in an oscilloscope comparable to a TV having a clearer picture.

Reference to Fig. 5A of the '792 application, reproduced below, better illustrates the manner in which a smooth appearing waveform is created.

**\*1538**

Image 1 (2.75" X 1.25") Available for Offline Print

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Each square in this figure represents a pixel, and the intensity level at which each pixel is illuminated is indicated in hexadecimal notation by the number or letter found in each square. Hexadecimal notation has sixteen characters, the numbers 0-9 and the letters A-F, wherein A represents 10, B represents 11, C represents 12, D represents 13, E represents 14, and F represents 15. The intensity at which each pixel is illuminated increases from 0 to F. Accordingly, a square with a 0 (zero) in it represents a pixel having no illumination, and a square with an F in it represents a pixel having maximum illumination. Although hexadecimal notation is used in the figure to represent intensity illumination, the intensity level is stored in the bit map of Alappat's system as a 4-bit binary number, with 0000 representing a pixel having no illumination and 1111 representing a pixel having maximum illumination.

Points 54 and 52 in Fig. 5A represent successive observation points on the screen of an oscilloscope. Without the benefit of Alappat's anti-aliasing system, points 54 and 52 would appear on the screen as separate, unconnected spots. In Alappat's system, the different intensity level at which each of the pixels is illuminated produces the appearance of the line 48, a so-called vector.

The intensity at which each pixel is to be illuminated is determined as follows, using pixel 55 as an example. First, the vertical distance between the y coordinates of observation points 54 and 52 ( $y_i$ ) is determined. In this example, this difference equals 7 units, with one unit representing the center-to-center distance of adjacent pixels. Then, the elevation of pixel 55 above pixel 54 ( $y_{i,j}$ ) is determined, which in this case is 2 units. The  $y_i$  and  $y_{i,j}$  values are then "normalized," which Alappat describes as converting these values to larger values which are easier to use in mathematical calculations. In Alappat's example, a barrel shifter is used to shift the binary input to the left by the number of bits required to set the most significant (leftmost) bit of its output signal to "1." The  $y_i$  and  $y_{i,j}$  values are then plugged into a mathematical equation for determining the intensity at which the particular pixel is to be illuminated. In this particular example, the equation  $I(i, j) = [1 - (y_{i,j}/y_i)]F$ , wherein F is 15 in hexadecimal notation, suffices. The intensity of pixel 55 in this example would thus be calculated as follows:

$$[1 - (2/7)]15 = (5/7)15 = 10.71 \approx 11 \text{ (or B)}.$$

Accordingly, pixel 55 is illuminated at 11/15 of the intensity of the pixels in which observation points 54 and 52 lie. Alappat discloses that the particular formula used will vary depending on the shape of the waveform.

## B. *The Rejected Claims*

Claim 15, the only independent claim in issue, reads:

A rasterizer for converting vector list data representing sample magnitudes of an \*1539 input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means comprising:

- (a) means for determining the vertical distance between the endpoints of each of the vectors in the data list;
- (b) means for determining the elevation of a row of pixels that is spanned by the vector;
- (c) means for normalizing the vertical distance and elevation; and
- (d) means for outputting illumination intensity data as a predetermined function of the normalized vertical distance and elevation.

Each of claims 16-19 depends directly from claim 15 and more specifically defines an element of the rasterizer claimed therein. Claim 16 recites that means (a) for determining the vertical distance between the endpoints of each of the vectors in the data list, <<triangle>> $y_i$  described above, comprises *an arithmetic logic circuit* configured to perform an absolute value function. Claim 17 recites that means (b) for determining the elevation of a row of pixels that is spanned by the vector, <<triangle>> $y_{i,j}$  described above, comprises *an arithmetic logic circuit* configured to perform an absolute value function. Claim 18 recites that means (c) for normalizing the vertical distance and elevation comprises *a pair of barrel shifters*. Finally, claim 19 recites that means (d) for outputting comprises *a read only memory (ROM)* containing illumination intensity data. As the first Board panel found, each of (a)-(d) was a *device* known in the electronics arts before Alappat made his invention.

## C. *The Examiner's Rejection and Board Reviews*

The Examiner's final rejection of claims 15-19 was under [35 U.S.C. § 101](#) "because the claimed invention is non statutory subject matter," and the original three-member Board panel reversed this rejection. That Board panel held that, although claim 15 *recites* a mathematical algorithm, *the claim as a whole is directed to a machine* and thus to statutory subject matter named in [§ 101](#). In reaching this decision, the original panel construed the means clauses in claim 15 pursuant to [35 U.S.C. § 112](#), paragraph six (§ 112 ¶ 6), as corresponding to the respective structures disclosed in the specification of Alappat's application, and equivalents thereof.

In its reconsideration decision, the five-member majority of the expanded, eight-member Board panel "modified" the decision of the original panel and affirmed the Examiner's [§ 101](#) rejection. The majority *held that the PTO need not apply § 112 ¶ 6 in rendering patentability determinations*, characterizing this court's statements to the contrary in *In re Iwahashi*, 888 F.2d 1370, 1375, 12 USPQ2d 1908, 1912 (Fed.Cir.1989), "as dicta," and dismissing this court's discussion of [§ 112 ¶ 6](#) in *Arrhythmia Research Technology, Inc.*

[v. Corazonix Corp., 958 F.2d 1053, 1060, 22 USPQ2d 1033, 1038 \(Fed.Cir.1992\)](#) on the basis that the rules of claim construction in infringement actions differ from the rules for claim interpretation during prosecution in the PTO. The majority stated that, during examination, the PTO gives means-plus-function clauses in claims their broadest interpretation and does not impute limitations from the specification into the claims. See *Applicability of the Last Paragraph of 35 USC § 112 to Patentability Determinations Before the Patent and Trademark Office*, 1134 TMOG 633 (1992); *Notice Interpreting In Re Iwahashi (Fed.Cir.1989)*, 1112 OG 16 (1990). Accordingly, the majority held that each of the means recited in claim 15 reads on any and every means for performing the particular function recited.

The majority further held that, because claim 15 is written completely in "means for" language and because these means clauses are read broadly in the PTO to encompass each and every means for performing the recited functions, claim 15 amounts to nothing more than a process claim wherein each means clause represents only a step in that process. The majority stated that each of the steps in this postulated process claim recites a mathematical operation, which steps combine to form a "mathematical algorithm for computing pixel information," [Alappat, 23 USPQ2d at 1345](#), and that, "when the claim is viewed without the steps of this mathematical algorithm, no other elements or steps are \*1540 found." [Alappat, 23 USPQ2d at 1346](#). The majority thus concluded that the claim was directed to nonstatutory subject matter. [\[FN12\]](#)

[FN12. See also Patent and Trademark Practice is Reviewed at PTO](#)

[Day, 45 PTCJ 245, 246 \(1993\); IP Laws Attempt to Adapt to Changes of New Technologies, 45 PTCJ 49 \(1993\); Federal Circuit Will Hear In Re Alappat Case En Banc, 45 PTCJ 56 \(1992\); "Means For" Claim Recites Non-Statutory Algorithm When Treated as Method Claim, 44 PTCJ 69 \(1992\); MPEP § 2110.](#)

*In its analysis, the majority further stated:*

*It is further significant that claim 15, as drafted, reads on a digital computer "means" to perform the various steps under program control. In such a case, it is proper to treat the claim as if drawn to a method. We will not presume that a stored program digital computer is not within the [§ 112 ¶ 6](#) range of equivalents of the structure disclosed in the specification. The disclosed ALU, ROM and shift registers are all common elements of stored program digital computers. Even if appellants were willing to admit that a stored program digital computer were not within the range of equivalents, [§ 112 ¶ 2](#) requires that this be clearly apparent from the claims based upon limitations recited in the claims. [Alappat, 23 USPQ2d at 1345. \[FN13\]](#) The Board majority also stated that dependent claims 16-19 were not before them for consideration because they had not been argued by Alappat and thus not addressed by the Examiner or the original three-member Board panel. [Alappat, 23 USPQ2d at 1341 n. 1. \[FN14\]](#)*

[FN13. See also PTO Report on Patentable Subject Matter: Mathematical Algorithms and Computer Programs, 1106 TMOG 5 \(1989\), reprinted in 38 PTCJ 551, 563 \(1989\).](#)

[FN14](#). Nevertheless, we note that the Examiner stated during prosecution: "the use of physical elements to provide the 'number crunching' is not considered patentable. The mere display of illumination intensity data is not considered significant post solution activity." *12/05/89 Office action*, pg. 4. Thus, even if the specific structures recited in dependent claims 16-19 had been incorporated into claim 15, the Examiner presumably would have found claim 15 to be directed to nonstatutory subject matter.

#### D. Analysis

##### Section 112, Paragraph Six

[\[17\]](#) As recently explained in [In re Donaldson, 16 F.3d 1189, 1193, 29 USPQ2d 1845, 1050 \(Fed.Cir.1994\)](#), the PTO is not exempt from following the statutory mandate of [§ 112 ¶ 6](#), which reads:

*An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. 35 U.S.C. § 112, paragraph 6 (1988) (emphasis added).* [\[FN15\]](#) The Board majority therefore erred as a matter of law in refusing to apply [§ 112 ¶ 6](#) in rendering its [§ 101](#) patentable subject matter determination.

[FN15](#). Accord, [In re Bond, 910 F.2d 831, 833, 15 USPQ2d 1566, 1568 \(Fed.Cir.1990\)](#); [In re Iwahashi, 888 F.2d 1370, 1375, 12 USPQ2d 1908, 1912 \(Fed.Cir.1989\)](#); [In re Meyer, 688 F.2d 789, 796, 215 USPQ 193, 199 \(CCPA1982\)](#); [In re Knowlton, 481 F.2d 1357, 1366, 178 USPQ 486, 492-93 \(CCPA1973\)](#); [In re Foster, 438 F.2d 1011, 1014, 169 USPQ 99, 102 \(CCPA1971\)](#); [In re Bernhart, 417 F.2d 1395, 1399, 163 USPQ 611, 615 \(CCPA1969\)](#); [In re Prater, 415 F.2d 1393, 1406, 162 USPQ 541, 551-52 \(CCPA1969\)](#). See also generally R. Carl Moy, *The Interpretation of Means Expressions During Prosecution*, 68 JPOS 246 (1986).

[\[18\]](#) Given Alappat's disclosure, it was error for the Board majority to interpret each of the means clauses in claim 15 so broadly as to "read on any and every means for performing the functions" recited, as it said it was doing, and then to conclude that claim 15 is nothing more than a process claim wherein each means clause represents a step in that process. Contrary to suggestions by the Commissioner, this court's precedents do not support the Board's view that the particular apparatus claims at issue in this case may be viewed as nothing more than process claims. The cases relied upon by the Commissioner, namely, [In re Abele, 684 F.2d 902, 214 USPQ 682 \(CCPA 1982\)](#), [In re Pardo, 684 F.2d 912, 214 USPQ 673 \(CCPA 1982\)](#), [In re Meyer, 688 F.2d 789, 215 USPQ 193 \(CCPA 1982\)](#), [In re Walter, 618 F.2d 758, 205 USPQ 397 \(CCPA 1980\)](#), and [\\*1541 In re](#)

*Maucorps, 609 F.2d 481, 203 USPO 812 (CCPA 1979), differ from the instant case. In Abele, Pardo, and Walter, given the apparent lack of any supporting structure in the specification corresponding to the claimed "means" elements, the court reasonably concluded that the claims at issue were in effect nothing more than process claims in the guise of apparatus claims. This is clearly not the case now before us. As to Maucorps and Meyer, despite suggestions therein to the contrary, the claimed means-plus-function elements at issue in those cases were not construed as limited to those means disclosed in the specification and equivalents thereof. As reaffirmed in Donaldson, such claim construction is improper, and therefore, those cases are of limited value in dealing with the issue presently before us. We further note that Maucorps dealt with a business methodology for deciding how salesmen should best handle respective customers and Meyer involved a "system" for aiding a neurologist in diagnosing patients. Clearly, neither of the alleged "inventions" in those cases falls within any [§ 101](#) category. When independent claim 15 is construed in accordance with [§ 112 ¶ 6](#), claim 15 reads as follows, the subject matter in brackets representing the structure which Alappat discloses in his specification as corresponding to the respective means language recited in the claims:*

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

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

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

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

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

*As is evident, claim 15 unquestionably recites a machine, or apparatus, made up of a combination of known electronic circuitry elements.*

*Despite suggestions by the Commissioner to the contrary, each of dependent claims 16-19 serves to further limit claim 15. [Section 112 ¶ 6](#) requires that each of the means recited in independent claim 15 be construed to cover at least the structure disclosed in the specification corresponding to the "means." Each of dependent claims 16-19 is in fact limited to one of the structures disclosed in the specification.*

*(2) [Section 101](#)*

*[19] The reconsideration Board majority affirmed the Examiner's rejection of claims 15-19 on the basis that these claims are not directed to statutory subject matter as defined in [§ 101](#), which reads:*

*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. [Emphasis ours.] As discussed in section II.D.(1), supra, claim 15, properly construed, claims a machine, namely, a rasterizer "for converting vector list data representing sample magnitudes of an input waveform into anti-aliased pixel illumination intensity data to be displayed on a display means," which machine is made up of, at the very least, the specific structures disclosed in Alappat's specification corresponding to the means-plus-function elements (a)-(d) recited in the claim. According to Alappat, the claimed rasterizer performs the same overall function as prior art rasterizers, [\[FN16\]](#) but does so in a different way, \*1542 which is represented by the combination of four elements claimed in means-plus-function terminology. [\[FN17\]](#) Because claim 15 is directed to a "machine," which is one of the four categories of patentable subject matter enumerated in [§ 101](#), claim 15 appears on its face to be directed to [§ 101](#) subject matter.*

[FN16](#). Representative examples of prior art rasterizers are illustrated in [U.S. Patent No. 4,215,414](#), [U.S. Patent No. 4,540,938](#), [U.S. Patent No. 4,586,037](#), and [U.S. Patent No. 4,672,369](#).

[FN17](#). Alappat further notes that the Examiner found the particularly claimed combination to be patentably distinct from prior art rasterizers.

*[20] This does not quite end the analysis, however, because the Board majority argues that the claimed subject matter falls within a judicially created exception to [§ 101](#) which the majority refers to as the "mathematical algorithm" exception. Although the PTO has failed to support the premise that the "mathematical algorithm" exception applies to true apparatus claims, we recognize that our own precedent suggests that this may be the case. See [In re Johnson](#), 589 F.2d 1070, 1077, 200 USPQ 199, 206 (CCPA 1978) ("Benson [referring to [Gottschalk v. Benson](#), 409 U.S. 63, 93 S.Ct. 253, 34 L.Ed.2d 273 (1972)] applies equally whether an invention is claimed as an apparatus or process, because the form of the claim is often an exercise in drafting."). Even if the mathematical subject matter exception to [§ 101](#) does apply to true apparatus claims, the claimed subject matter in this case does not fall within that exception.*

(a)

*[21] The plain and unambiguous meaning of [§ 101](#) is that any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may be patented if it meets the requirements for patentability set forth in [Title 35](#), such as those found in [§§ 102](#), [103](#), and [112](#). The use of the expansive term "any" in [§](#)*

101 represents Congress's intent not to place any restrictions on the subject matter for which a patent may be obtained beyond those specifically recited in § 101 and the other parts of Title 35. Indeed, the Supreme Court has acknowledged that Congress intended § 101 to extend to "anything under the sun that is made by man." Diamond v. Chakrabarty, 447 U.S. 303, 309, 100 S.Ct. 2204, 2208, 65 L.Ed.2d 144 (1980), quoting S.Rep. No. 1979, 82nd Cong., 2nd Sess., 5 (1952); H.R.Rep. No. 1923, 82nd Cong., 2nd Sess., 6 (1952). Thus, it is improper to read into § 101 limitations as to the subject matter that may be patented where the legislative history does not indicate that Congress clearly intended such limitations. See Chakrabarty, 447 U.S. at 308, 100 S.Ct. at 2207 ("We have also cautioned that courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed.'"), quoting United States v. Dubilier Condenser Corp., 289 U.S. 178, 199, 53 S.Ct. 554, 561, 77 L.Ed. 1114 (1933).

[22][23] Despite the apparent sweep of § 101, the Supreme Court has held that certain categories of subject matter are not entitled to patent protection. In Diamond v. Diehr, 450 U.S. 175, 101 S.Ct. 1048, 67 L.Ed.2d 155 (1981), its most recent case addressing § 101, the Supreme Court explained that there are three categories of subject matter for which one may not obtain patent protection, namely "laws of nature, natural phenomena, and abstract ideas." Diehr, 450 U.S. at 185, 101 S.Ct. at 1056. [FN18] Of relevance \*1543 to this case, the Supreme Court also has held that certain mathematical subject matter is not, standing alone, entitled to patent protection. See Diehr, 450 U.S. 175, 101 S.Ct. 1048; Parker v. Flook, 437 U.S. 584, 98 S.Ct. 2522, 57 L.Ed.2d 451; Gottschalk v. Benson, 409 U.S. 63, 93 S.Ct. 253, 34 L.Ed.2d 273. [FN19] A close analysis of Diehr, Flook, and Benson reveals that the Supreme Court never intended to create an overly broad, fourth category of subject matter excluded from § 101. Rather, at the core of the Court's analysis in each of these cases lies an attempt by the Court to explain a rather straightforward concept, namely, that certain types of mathematical subject matter, standing alone, represent nothing more than abstract ideas until reduced to some type of practical application, and thus that subject matter is not, in and of itself, entitled to patent protection. [FN20]

FN18. Laws of nature and natural phenomena are in essence "manifestations of ... nature [i.e., not "new"], free to all men and reserved exclusively to none," see Chakrabarty 447 U.S. at 309, 100 S.Ct. at 2208, quoting Funk Bros. Seed Co. v. Kalo Inoculant Co., 333 U.S. 127, 130, 68 S.Ct. 440, 441, 92 L.Ed. 588 (1948), whereas abstract ideas constitute disembodied concepts or truths which are not "useful" from a practical standpoint standing alone, i.e., they are not "useful" until reduced to some practical application. Of course, a process, machine, manufacture, or composition of matter employing a law of nature, natural phenomenon, or abstract idea may be patentable even though the law of nature, natural phenomenon, or abstract idea employed would not, by itself, be entitled to such protection. See e.g. Parker v. Flook, 437 U.S. 584, 590, 98 S.Ct. 2522, 2526, 57 L.Ed.2d 451 (1978) ("a process is not unpatentable simply because it contains a law of nature or a mathematical algorithm."); Funk Bros. Seed, 333 U.S. at 130, 68 S.Ct. at 441 ("He who discovers a hitherto unknown phenomenon of nature has no claim to a

monopoly of it which the law recognizes. If there is to be invention from such a discovery, it must come from the application of the law to a new and useful end."); [Mackay Radio & Telegraph Co. v. Radio Corp. of America](#), 306 U.S. 86, 94, 59 S.Ct. 427, 431, 83 L.Ed. 506 (1939) ("While a scientific truth, or the mathematical expression of it, is not a patentable invention, a novel and useful structure created with the aid of knowledge of scientific truth may be.").

[FN19](#). The Supreme Court has not been clear, however, as to whether such subject matter is excluded from the scope of [§ 101](#) because it represents laws of nature, natural phenomena, or abstract ideas. See [Diehr](#), 450 U.S. at 186, 101 S.Ct. at 1056 (viewed mathematical algorithm as a law of nature); [Benson](#), 409 U.S. at 71-72, 93 S.Ct. at 257 (treated mathematical algorithm as an "idea"). The Supreme Court also has not been clear as to exactly what kind of mathematical subject matter may not be patented. The Supreme Court has used, among others, the terms "mathematical algorithm," "mathematical formula," and "mathematical equation" to describe types of mathematical subject matter not entitled to patent protection standing alone. The Supreme Court has not set forth, however, any consistent or clear explanation of what it intended by such terms or how these terms are related, if at all.

[FN20](#). The Supreme Court's use of such varying language as "algorithm," "formula," and "equation" merely illustrates the understandable struggle that the Court was having in articulating a rule for mathematical subject matter, given the esoteric nature of such subject matter and the various definitions that are attributed to such terms as "algorithm," "formula," and "equation," and not an attempt to create a broad fourth category of excluded subject matter.

[\[24\]](#) *Diehr* also demands that the focus in any statutory subject matter analysis be on the claim as a whole. Indeed, the Supreme Court stated in *Diehr*:

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

[Diehr](#), 450 U.S. at 192, 101 S.Ct. at 1059-60 (emphasis added). [In re Iwahashi](#), 888 F.2d at 1375, 12 USPQ2d at 1911; [In re Taner](#), 681 F.2d 787, 789, 214 USPQ 678, 680 (CCPA 1982). It is thus not necessary to determine whether a claim contains, as merely a part of the whole, any mathematical subject matter which standing alone would not be entitled to patent protection. Indeed, because the dispositive inquiry is whether the claim as a whole is directed to statutory subject matter, it is irrelevant that a claim may

contain, as part of the whole, subject matter which would not be patentable by itself. [\[FN21\]](#) "A claim \*1544 drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula, [mathematical equation, mathematical algorithm,] computer program or digital computer." [Diehr, 450 U.S. at 187, 101 S.Ct. at 1057.](#)

[FN21.](#) We note, however, that an analysis wherein one attempts to identify whether any part of a claim recites mathematical subject matter which would not by itself be patentable is not an improper analysis. Such a dissection of a claim may be helpful under some circumstances to more fully understand the claimed subject matter. Nevertheless, even in those cases wherein courts have applied a variant of the two-part analysis of [In re Freeman, 573 F.2d 1237, 197 USPQ 464 \(CCPA1978\)](#), as amended by [In re Walter, 618 F.2d 758, 205 USPQ 397](#), the ultimate issue always has been whether the claim as a whole is drawn to statutory subject matter. See e.g. [In re Grams, 888 F.2d at 838, 12 USPQ2d at 1827; In re Meyer, 688 F.2d at 796, 215 USPQ at 198; In re Pardo, 684 F.2d at 915, 214 USPQ at 676; In re Abele, 684 F.2d at 907, 214 USPQ at 687; In re Walter, 618 F.2d at 767, 205 USPQ at 407.](#) In *In re Pardo*, the CCPA described the *Freeman-Walter* two-part test as follows: "First, the claim is analyzed to determine whether a mathematical algorithm is directly or indirectly recited. Next, if a mathematical algorithm is found, the claim *as a whole* is further analyzed to determine whether the algorithm is 'applied in any manner to physical elements or process steps,' and, if it is, it 'passes muster under [§ 101](#).'" [In re Pardo, 684 F.2d at 915, 214 USPQ at 675-76](#) (emphasis added) (quoting [In re Walter, 618 F.2d at 767, 205 USPQ at 407](#)).

(b)

[\[25\]](#) Given the foregoing, the proper inquiry in dealing with the so called mathematical subject matter exception to [§ 101](#) alleged herein is to see whether the claimed subject matter as a whole is a disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a "law of nature," "natural phenomenon," or "abstract idea." If so, *Diehr* precludes the patenting of that subject matter. That is not the case here.

Although many, or arguably even all, [\[FN22\]](#) of the means elements recited in claim 15 represent circuitry elements that perform mathematical calculations, which is essentially true of all digital electrical circuits, the claimed invention as a whole is directed to a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means. [\[FN23\]](#) This is not a disembodied mathematical concept which may be characterized as an "abstract idea," but rather a specific machine to produce a useful, concrete, and tangible result.

[FN22.](#) The Board majority stated that each of the means of claim 15 represents a

mathematical operation. The majority failed, however, to point out any particular mathematical equations corresponding to elements (c) and (d) of claim 15. In addition, we note the Board majority's irreconcilable position that it is free to impute mathematical equations from Alappat's specification into claim 15, yet it refuses to impute the electrical structure designed to carry out the arithmetic operations.

[FN23](#). Although means (a) and (b) are independent of each other as claimed, each utilizes the same inputs and is connected to element (c), as means (c) normalizes the output of means (a) and (b). Means (c) is in turn connected to means element (d) which outputs illumination intensity data in response to an input from means (c).

[\[26\]](#) *The fact that the four claimed means elements function to transform one set of data to another through what may be viewed as a series of mathematical calculations does not alone justify a holding that the claim as a whole is directed to nonstatutory subject matter. See [In re Iwahashi](#), 888 F.2d at 1375, 12 USPQ2d at 1911. [\[FN24\]](#) Indeed, claim 15 as written is not "so abstract and sweeping" that it would "wholly pre-empt" the use of any apparatus employing the combination of mathematical calculations recited therein. See [Benson](#), 409 U.S. at 68-72, 93 S.Ct. at 255-58 (1972). Rather, claim 15 is limited to the use of a particularly claimed combination of elements performing the particularly claimed combination of calculations to transform, i.e., rasterize, digitized waveforms (data) into anti-aliased, pixel illumination data to produce a smooth waveform.*

[FN24](#). The Board majority's attempts to distinguish *Iwahashi* on the basis that the claim at issue in that case recited a ROM are unavailing. The *Iwahashi* court clearly did not find patentable subject matter merely because a ROM was recited in the claim at issue; rather the court held that the claim as whole, directed to the combination of the claimed means elements, including the claimed ROM as one element, was directed to statutory subject matter. It was not the ROM alone that carried the day.

[\[27\]](#) *Furthermore, the claim preamble's recitation that the subject matter for which Alappat seeks patent protection is a rasterizer for creating a smooth waveform is not a mere field-of-use label having no significance. Indeed, the preamble specifically recites that the claimed rasterizer converts waveform data into output illumination data for a display, and the means elements recited in the body of the claim make reference not only to the inputted waveform data recited in the preamble but also to the output illumination data also recited in the preamble. Claim 15 thus defines a combination of elements constituting a machine for producing an anti-aliased waveform.*

[\[28\]](#) *The reconsideration Board majority also erred in its reasoning that claim 15 is unpatentable merely because it "reads on a general purpose digital computer 'means' to*

perform the various steps under program \*1545 control." [\[FN25\] Alappat, 23 USPQ2d at 1345](#). The Board majority stated that it would "not presume that a stored program digital computer is not within the [§ 112 ¶ 6](#) range of equivalents of the structure disclosed in the specification." [\[FN26\] Alappat, 23 USPQ2d at 1345](#). Alappat admits that claim 15 would read on a general purpose computer programmed to carry out the claimed invention, but argues that this alone also does not justify holding claim 15 unpatentable as directed to nonstatutory subject matter. We agree. We have held that such programming creates a new machine, because a general purpose computer in effect becomes a special purpose computer once it is programmed to perform particular functions pursuant to instructions from program software. [In re Freeman, 573 F.2d 1237, 1247 n. 11, 197 USPQ 464, 472 n. 11 \(CCPA 1978\)](#); [In re Noll, 545 F.2d 141, 148, 191 USPQ 721, 726 \(CCPA 1976\)](#); [In re Prater, 415 F.2d at 1403 n. 29, 162 USPQ at 549-50 n. 29](#).

[FN25](#). The Board majority argued that the fact that claim 15 reads on a programmed digital computer further justifies treating claim 15 as a process claim. We disagree. Our discussion in section II.D.(1) sufficiently sets forth why claim 15 must be construed as an apparatus claim as it is illustrated in section II.D.(2).

[FN26](#). The disclosed ALU, ROM and shift registers are all common elements of stored program digital computers.

*Under the Board majority's reasoning, a programmed general purpose computer could never be viewed as patentable subject matter under [§ 101](#). This reasoning is without basis in the law. The Supreme Court has never held that a programmed computer may never be entitled to patent protection. Indeed, the Benson court specifically stated that its decision therein did not preclude "a patent for any program servicing a computer." [Benson, 409 U.S. at 71, 93 S.Ct. at 257](#). Consequently, a computer operating pursuant to software may represent patentable subject matter, provided, of course, that the claimed subject matter meets all of the other requirements of [Title 35](#). In any case, a computer, like a rasterizer, is apparatus not mathematics.*

#### CONCLUSION

*For the foregoing reasons, the appealed decision of the Board affirming the examiner's rejection is  
REVERSED.*

[ARCHER](#), Chief Judge, [\[FN1\]](#) with whom NIES, Circuit Judge, joins, concurring in part and dissenting in part.

[FN1](#). Chief Judge Archer assumed the position of Chief Judge on March 18, 1994.

## I. OUR JURISDICTION

### II.

*None of the parties has challenged at any time the legality of the composition of the board, and, in fact, both parties to this appeal defend the procedure by which the board was composed. According to our precedent and that of the Supreme Court, a challenge to the validity of the board's composition is a procedural matter that can be waived by the parties. It is not a "jurisdictional" matter. But even if some sua sponte jurisdictional inquiry into the composition of the board were permissible, it must be strictly limited to the single question whether [35 U.S.C. § 7](#) has been clearly contravened.*

*Because we should not be deciding the so-called issue of "jurisdiction" at all in this case, and alternatively because I am not persuaded that the statute clearly has been violated, I concur in the conclusion of the majority that Alappat's appeal is from a final decision of the board within the meaning of our jurisdictional statute, [28 U.S.C. § 1295\(a\)\(4\)\(A\)](#); see also [35 U.S.C. § 141](#), and that therefore the merits of Alappat's [\[FN2\]](#) appeal are properly before us for disposition.*

[FN2](#). Throughout this opinion I shall refer to appellants Kuriappan P. Alappat, Edward E. Averill, and James G. Larsen collectively in the singular as "Alappat."

### A.

*Issues arising out of the combination of adjudicative and administrative functions within a single administrative agency, such **\*1546** as partiality of adjudicative officers and unfairness to parties, are by no means uncommonly litigated. See S. Breyer & R. Stewart, *Administrative Law and Regulatory Policy* 815-900 (3d ed. 1992); C. Koch, *Administrative Practice and Procedure* 324-75 (2d ed. 1991). Here, two questions have been raised arising out of such a combination of functions: (1) may an expanded panel of members of the Board of Patent Appeals and Interferences, designated by the Commissioner of Patents and Trademarks, grant an examiner's petition for reconsideration; and (2) may that expanded panel rehear an appeal and render a decision thereon?*

*What makes this case unusual, however, is that only the court has raised these questions. The Patent and Trademark Office rendered what it viewed to be final action on Alappat's appeal in his application for a patent--rejection of claims 15-19--and Alappat and the Commissioner both desire judicial resolution of whether this action was correct on the merits. Regardless of our view, the party appealing from the agency action does not feel at all that the agency gave him inadequate process. [\[FN3\]](#)*

[FN3](#). As the majority recognizes, Alappat does not challenge the action of the Commissioner or board under, for example, the Administrative Procedure Act, [5 U.S.C. § 551](#) *et seq.*, the Due Process Clause of the Fifth Amendment of the Constitution, or as part of its appeal on the merits of the board's decision, *e.g.*, [In re Bose Corp.](#), 772 F.2d 866, 227 USPQ 1 (Fed.Cir.1985).

*Administrative agencies' sole source of power to act is statutory; therefore any unlawful act of an administrative agency is in a sense performed without jurisdiction. But not every act of the Commissioner or the board that might possibly be contrary to a constitutional, statutory, or regulatory provision raises a jurisdictional matter that must be addressed in every case.*

*Beyond any constitutional restraints, there is good reason not to decide the procedural issues that are not disputed by the parties. Where the parties have not challenged the agency's action, and when asked, both parties argue to support it, the court lacks the benefit of advocacy that a controversy otherwise engenders and should proceed with caution in setting out any very-broad rules. In addition, the agency has not been given an opportunity to resolve or consider the challenge in the first instance, and this court might be condemning the agency for action which, had objection been raised, it might not have taken or done differently.*

**B.**

*Precedent precludes us from holding that the composition of the agency's board is illegal where none of the parties has raised the issue. Therefore, we need not and should not address whether the board was composed according to law.*

*In [United States v. L.A. Tucker Truck Lines, Inc.](#), 344 U.S. 33, 73 S.Ct. 67, 97 L.Ed. 54 (1952), the Supreme Court held that a decision of the Interstate Commerce Commission rendered by an invalidly appointed hearing examiner was not an error "which deprives the Commission of power or jurisdiction, so that even in the absence of timely objection its order should be set aside as a nullity." [344 U.S. at 38](#). The Supreme Court cautioned: "[C]ourts should not topple over administrative decisions unless the administrative body not only has erred but has erred against objection made at the time appropriate under its practice." [Id. at 37, 73 S.Ct. at 69](#). Tucker Truck Lines has recently been interpreted by Justice Scalia as holding "that, in the administrative context, the use of unauthorized personnel to conduct a hearing ... would not justify reversal of the agency decision where no objection was lodged before the agency itself." [Freytag v. Commissioner of Internal Revenue](#), 501 U.S. 868, 898 n. 3, 111 S.Ct. 2631, 2649 n. 3, 115 L.Ed.2d 764 (1991) (Scalia, J., concurring).*

*Our predecessor court the Court of Customs and Patent Appeals expressly followed Tucker Truck Lines in a case involving a situation similar to Alappat's, [In re Wiechert](#), 370 F.2d 927, 152 USPQ 247 (CCPA 1967). Wiechert involved an appeal from a Patent Office Board of Appeals decision. The court in Wiechert refused to consider the question whether a board composed of an examiner-in-chief, a primary examiner, and a supervisory examiner of higher grade than a primary examiner, was illegal under [\\*1547 35 U.S.C. § 7](#). The stated reason was that the parties had not properly raised the issue in the appeal from the merits of that board's decision. Citing Tucker Truck Lines we held: "[A]n invalid appointment [of a board member by the Commissioner] would not so vitiate a board's decision that neither waiver nor abandonment of the defect would be possible." [Id. at 936 n. 6, 152 USPQ at 253 n. 6](#). [\[FN4\]](#) Wiechert expressly holds that a defect in the composition of the board is a waivable matter.*

FN4. We are not the only circuit to have so held. See [NLRB v. Newton-New Haven Co.](#), 506 F.2d 1035, 1038 (2d Cir.1974) (party can abandon challenge to illegality of composition of NLRB); [We Shung v. Brownell](#), 207 F.2d 132, 133 (D.C.Cir.) (party can abandon challenge to composition of immigration Board of Special Inquiry), *vacated on other grounds*, [346](#)

U.S. 906, 74 S.Ct. 237, 98 L.Ed. 405 (1953).

*We followed Wiechert in later cases. In [In re Marriott-Hot Shoppes, Inc.](#), 411 F.2d 1025, 162 USPO 106 (CCPA 1969), the Court of Customs and Patent Appeals refused to consider the question whether the Trademark Trial and Appeal Board was by statute or regulation required to be composed of all of its members in order to hear an appeal and render a decision, where the appellant had not appealed the merits of the allegedly improperly constituted board's decision. The court stated:*

*While we might be able to reach that question [whether three-member panels of the board had or have jurisdiction to hear ex parte appeals in the sense of being legally constituted boards], if properly raised, in an appeal from one or more board decisions on the merits of the [applications, In re Wiechert](#), 370 F.2d 927, 54 CCPA 957 (1967), appellant has made it amply clear that this is not such an appeal....*

*[411 F.2d at 1029, 162 USPO at 110](#) (emphasis added, footnote and original emphasis omitted). [\[FN5\]](#) So too here Alappat has "made it amply clear" that he is not challenging the board composition.*

FN5. The statutes relating to the composition of the Trademark Trial and Appeal Board and the Commissioner's powers *vis-à-vis* that board are, for purposes of the issues here involved, substantially the same as the statute relating to the Board of Patent Appeals and Interferences. Compare [35 U.S.C. § 7 \(patents\)](#) with [15 U.S.C. §§ 1067, 1070 \(trademarks\)](#).

*And lastly, in [In re Bose Corp.](#), 772 F.2d 866, 227 USPO 1 (Fed.Cir.1985), the appellant challenged the composition of the Trademark Trial and Appeal Board as part of its appeal on the merits. In addition to appealing from the board decision on its merits, the appellant argued that that board was improperly constituted because the Commissioner substituted one of the three members for another member after oral argument but before the decision of the board. [\[FN6\]](#) We permitted the appellant to challenge the composition of the board, following [Marriott and Wiechert](#), and stated: "The matter of the board's composition is ... inseparable from the merits and can be raised in the appeal from the board's decision." [772 F.2d at 869, 227 USPO at 3](#). We characterized the alleged illegality of the board, not as a defect that could void the board decision, but merely as a "technical claim of procedural error" subject to the harmless error rule. [Id. at 870, 227 USPO at 4](#).*

FN6. Compare MPEP § 1201 (1993): If a board member becomes incapacitated

after a hearing but before the decision, the Chairman of the Board, at his discretion, may without rehearing substitute a different board member for the incapacitated one, or offer the applicant an opportunity for rehearing; if a member becomes unavailable to reconsider a decision, normally the Chairman of the Board will designate another member as a substitute.

*Under the Wiechert-Marriott-Bose decisions, a party can waive a challenge to the legality of the composition of the board. Since that has been done in this case, we are precluded from considering any composition question not raised in the appeal brought under [28 U.S.C. § 1295\(a\)\(4\)\(A\)](#). Wiechert is binding precedent unless we overrule it in banc. [South Corp. v. United States, 690 F.2d 1368, 1369, 215 USPQ 657, 657 \(Fed.Cir.1982\)](#) (in banc). Although the other judges address the board composition questions that have not been raised by the parties, in apparent contravention of Wiechert, they do not \*1548 explain why they may do so. [\[FN7\]](#) I believe that stare decisis demands that this court either adhere to Wiechert in this case or expressly justify its overruling. Therefore, I would not address the board composition question at all.*

[FN7](#). Any reliance on *In re Bose* to reach the composition question in the present case is misplaced. The CCPA's decision in *Wiechert* precludes consideration of composition questions that are not properly raised by the parties, and the Federal Circuit's later panel decision in *Bose* could not have overruled that CCPA decision. In any event, *Bose* was consistent with *Wiechert*'s holding that board composition challenges are waivable because the party in *Bose* challenged the composition of the board as a procedural challenge raised as part of its appeal from the merits of the board's decision. In the present case, however, Alappat has purposefully waived the procedural challenge and therefore *Wiechert* applies, not *Bose*.

### C.

*Even if it were permissible and appropriate to treat the composition of this board as a jurisdictional matter, I am not persuaded that any statutory provision has clearly been violated. [35 U.S.C. §§ 6 and 7](#) set out the administrative and adjudicative functions within the Patent and Trademark Office. They provide as follows: "The Commissioner [of Patents and Trademarks] ... shall superintend or perform all duties required by law respecting the granting and issuing of patents.... He may ... establish regulations, not inconsistent with law, for the conduct of proceedings in the Patent and Trademark Office." [35 U.S.C. § 6\(a\)](#). "The Commissioner, the Deputy Commissioner, the Assistant Commissioners, and the examiners-in-chief shall constitute the Board of Patent Appeals and Interferences." *Id.* [§ 7\(a\)](#). "The Board of Patent Appeals and Interferences shall, on written appeal of an applicant, review adverse decisions of examiners upon applications for patents...." *Id.* [§ 7\(b\)](#). "Each appeal ... shall be heard by at least three members of the Board of Patent Appeals and Interferences, who shall be designated by the Commissioner." *Id.* "Only the Board of Patent Appeals and Interferences has the authority to grant rehearings." *Id.**

Two other statutes are relevant: "An applicant dissatisfied with the decision in an appeal to the Board of Patent Appeals and Interferences ... may appeal the decision to" this court. [35 U.S.C. § 141](#). This court has "jurisdiction ... of an appeal from a decision of ... the Board of Patent Appeals and Interferences." [28 U.S.C. § 1295\(a\)\(4\)\(A\)](#).

There is no question but that the board had subject matter jurisdiction of Alappat's appeal, that the parties regard the expanded reconsideration board's decision to be the final "decision in [Alappat's] appeal to the Board," [35 U.S.C. § 141](#), and that that "decision of ... the Board" was appealed to us. There is no question but that all the persons who sat as the expanded panel which rendered the appealed-from decision were statutory members of the board, [35 U.S.C. § 7\(a\)](#), [\[FN8\]](#) and that the number of members was greater than two, [id. § 7\(b\)](#). There has been no showing that these particular members were designated to act for the board by a person other than the Commissioner of Patents and Trademarks, [id. § 7\(b\)](#). Finally, there is no question but that a group designated by the Commissioner to act for the board consisting of more than two statutory members of the board granted a petition so as to rehear an initial appeal, and that that group rendered a decision thereon.

[FN8](#). The members of the reconsideration board were the Commissioner of Patents and Trademarks, the Deputy Commissioner, an Assistant Commissioner, the Board Chairman and Vice-Chairman, and three examiners-in-chief.

The precise question then is whether the board that granted the rehearing and rendered a decision was designated by the Commissioner of Patents and Trademarks in a manner clearly prohibited by the enabling statute. In determining *sua sponte* whether there has been a "decision of ... the Board," we are not to be guided by general considerations of whether the board's or Commissioner's actions were fair or in compliance with due process, or the product of bias, prejudice, partiality, or the like. These are important procedural matters but only the parties may properly raise them; they are not matters for us to raise and impose on the parties.

[\\*1549 35 U.S.C. § 7\(b\)](#) states expressly that for "each appeal" to the board, the persons that may hear that appeal and act as the board are to be designated by the Commissioner at his discretion (so long as he chooses at least three members from the set defined in [§ 7\(a\)](#)). The statute then says "[o]nly" the board has authority to grant a rehearing. Then, the statute stops.

Consequently [§ 7](#) says nothing about the rehearing itself. Unlike for "each appeal," the statute does not expressly describe how "the board" is to grant rehearings and is totally silent on who may act as the board to rehear the appeal. The "board" must act through people, its members. Thus, the language of the last sentence of [§ 7\(b\)](#) could be interpreted to mean that only all the members of the board acting together have authority to grant rehearings (and perhaps must also vote unanimously in order to decide the merits of the rehearing), or the statute could be interpreted to mean that only the members of the board who first heard the appeal have authority to grant rehearing. [\[FN9\]](#) Or, if the "rehearing" is considered to be a form of "appeal," the statute must be interpreted to mean that the Commissioner may designate members of the board who,

acting together, are the only ones to have authority to grant rehearings and decide appeals. Though reasonable persons may disagree as to which of the above is the better or best interpretation, none is compelled or prohibited by the sparse language contained in the statute. In the backdrop of these possible interpretations are [35 U.S.C. § 6](#), which gives the Commissioner broad administrative powers, and [35 U.S.C. § 7](#), which contemplates that the Commissioner will play some but not a controlling role in the adjudicative aspect of the agency. See [Lindberg v. Brenner, 399 F.2d 990, 158 USPQ 380 \(D.C.Cir.1968\)](#).

**FN9.** Under either of these interpretations, [§ 7](#) would still offer no guidance whatsoever on the actual rehearing itself.

Finally, the legislative history of [§ 7](#) does not clearly advance the narrowest interpretation of the Commissioner's powers. Although the legislative history shows a transfer of some functions from the Commissioner to a Board of Patent Appeals, there is nothing indicating that the board was to be completely independent of the influence of the Commissioner. Originally, under the first patent act, a board composed of the Secretary of State, the Secretary of the Department of War, and the Attorney General, or any two of them, examined and issued patents. Act of April 10, 1790, ch. 7, § 1, 1 Stat. 109, 109-10. The refusal of a petition for patent had no appeal. It was said that Thomas Jefferson, then Secretary of State, dominated the board with his high standards of patentability. W. Wyman, *Thomas Jefferson and the Patent System*, 1 J.Pat.Off.Soc'y 5 (1918), cited in R. Hantman, *The Doctrine of Equivalents*, 70 J.Pat.Off.Soc'y 511, 513 (1988); see [Graham v. John Deere Co., 383 U.S. 1, 7-10, 86 S.Ct. 684, 688-90, 15 L.Ed.2d 545, 148 USPQ 459, 463-64 \(1966\)](#). In 1793, Congress dispensed with examination altogether: if a petition to the Secretary of State met the formal technical requirements of the statute, a patent was granted, leaving the responsibility for striking down invalid patents to the courts. Patent Act of 1793, ch. 11, § 3, 1 Stat. 318-23. Concerned with the need for examination, the Patent Act of 1836, ch. 357, 5 Stat. 117, established the Patent Office as a distinct bureau with a Commissioner of Patents as its head. Until 1861, the Commissioner heard all appeals from applicants for patents dissatisfied with an *ex parte* rejection by an examiner.

In 1861, Congress established a board of three examiners-in-chief to hear appeals from examiners' rejections in order to secure "greater uniformity of action in the grant and refusal of letters-patent" and to assist the Commissioner with appellate work. Act of March 12, 1861, ch. 88, § 2, 12 Stat. 246. A further appeal could be taken from the board to "the Commissioner of Patents in person." *Id.* The Commissioner's power under this scheme was understood to be plenary:

The allowance of an application by the examiner, or by the examiners-in-chief upon appeal, does not oblige the Commissioner to grant the patent for which it \*1550 prays. The law empowers him to withhold a patent whenever in his judgment the invention is not patentable, or the issue of the patent is forbidden by the statutes, or the patent if granted would probably be held invalid by the courts.

W. Robinson, *The Law of Patents* § 583 (1890). [\[FN10\]](#)

[FN10](#). Although we need not decide, Congress may intend that it still be plenary under the present statute. *See infra*, Senate Report No. 1313, at 4.

*With the increasing number of patent applications being filed, the two levels of appeal within the Patent Office were thought to be an "antiquated procedure." H.R.Rep. No. 1889, 69th Cong., 2d Sess. 1-2 (1927); S.Rep. No. 1313, 69th Cong., 2d Sess. 3 (1927). By Act of 1927, the two levels of appeal--first to a board then to the Commissioner--were combined into one appeal mixing the flavor of the earlier two: an appeal could be had to a Board of Appeals; the board was given the "sole power to grant rehearings." Act of March 2, 1927, ch. 273, § 3, 44 Stat. 1335, 1335-36. But, under the Act of 1927, the Commissioner was one of the members of the board, and the Commissioner was given the power to designate at least three members of the board who together would act as the board and hear each appeal. The Act of 1927 corresponds in substance to [35 U.S.C. § 7](#), the act applicable today.*

*The events surrounding the enactment of the 1927 Act do not indicate that Congress intended to eliminate entirely the great power understood to have been possessed by the Commissioner prior to the act. For example, during debate in the House of Representatives it was agreed that the statute did not require the entire membership of the board to act on and decide every rehearing, which of course would be unmanageable. Procedure in the Patent Office: Hearing Before the House Comm. on Patents, 69th Cong., 2d Sess. 19-29 (1926) (statement of Mr. Barnett, President, American Patent Law Association). On the other hand, discussions in the Senate focused on the ability under the statute to have in appropriate cases more than the original three-member panel rehear an appeal. Procedure in the Patent Office: Hearing Before the Senate Comm. on Patents, 69th Cong., 2d Sess. 22-23 (1926) ("Senate Hearing "). As previously discussed, the language of the statute is unclear on the manner of exercising the "power to grant rehearings," and is silent on the rehearing itself. This lack of clear expression is what could have enabled the House and Senate to view the prospective legislation as permitting either the full board or less than the full board to rehear a case, notwithstanding the inclusion of the word "sole." In other words, by requiring the "board" to be the formal body to act on rehearings, instead of the Commissioner, yet at the same time reposing in the Commissioner discretionary power to define that board within certain express confines, the statute created "something that is flexible," Senate Hearing, *supra*, at 23. In this way, the Senate was able to report that "the supervisory power of the Commissioner, as it has existed for a number of decades, remains unchanged." Senate Report No. 1313, at 4 (emphasis added).*

*Because the decision appealed in this case was not obtained in clear contravention of [§ 7](#), and because the parties agree that it was a decision of the board that should be reviewed, I would decline to analyze further the board composition issue. By doing so, this court would not be announcing as does the majority that in all respects it approves the manner by which the rehearing was granted in this case or in another similar case. Nor would it be condemning as does the dissent the Commissioner or board for supposedly*

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