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United States Court of Appeals,
Federal Circuit.

In re Rex D. SCHRADER and Eugene D. Klingaman.

No. 92-1275.

April 13, 1994.
Rehearing Denied May 5, 1994.

Inventors appealed decision of the Patent and Trademark Office Board of Patent Appeals and Interferences rejecting, for lack of statutory subject matter, application for patent for method of competitively bidding on plurality of related items, such as contiguous tracts of land. The Court of Appeals, Plager, Circuit Judge, held that claims, in which mathematical algorithm was implicit, were properly rejected for lack of statutory subject matter.
Affirmed.
Pauline Newman, Circuit Judge, filed opinion dissenting.

West Headnotes

[1] Patents k7.14
291k7.14

Claims directed to method for competitively bidding on plurality of related items, such as contiguous tracts of land, were properly rejected for lack of statutory subject matter; mathematical algorithm was implicit in claims, and grouping and regrouping of bids did not constitute physical transformation of data representative of or constituting physical activity or objects. 35 U.S.C.A. ¤ 101.

[2] Patents k7.14
291k7.14

Under Freeman-Walter-Abele test for statutory subject matter when invention is described in terms of mathematical procedures, it is first determined whether mathematical algorithm is recited directly or indirectly in claim; if so, it is next determined whether claimed invention as whole is no more than algorithm itself, that is, whether claim is directed to mathematical algorithm that is not applied to or limited by physical elements or process steps, and is as such nonstatutory. 35 U.S.C.A. ¤ 101.

[3] Patents k7.14
291k7.14

Even simple summing may be an "algorithm," for purposes of rule that patent cannot be obtained for mathematical algorithm in abstract. 35 U.S.C.A. ¤ 101.

[4] Patents k7.14
291k7.14

Included in definition of patentable "process" are changes to intangible subject matter representative of or constituting physical activity or objects. 35 U.S.C.A. ¤¤ 100(b), 101.

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

Before NEWMAN, MAYER, and PLAGER, Circuit Judges.

PLAGER, Circuit Judge.

Rex D. Schrader and Eugene D. Klingaman (collectively Schrader or appellants) appeal the November 20, 1991 decision of the Patent and Trademark Office Board of Patent Appeals and Interferences (Board), Appeal No. 91-2650, affirming the rejection of all claims pending in U.S. Patent Application Serial No. 07/367,668 (the '668 application) for lack of statutory subject matter under 35 U.S.C. ¤ 101 (1988). Finding no reversible error in the Board's decision, we affirm.

BACKGROUND

Schrader filed the '668 application on June 19, 1989. That application is directed to a method for competitively bidding on a plurality of related items, such as contiguous tracts of land or the like. After the items have been offered to bidders, bids on one, some, or all of the items are received and entered into a "record." Then, the combination of winning bids is determined by assembling a "completion" from all the entered bids. As explained in the specification, a completion is the particular combination of bids which "would complete a sale of all of the items being offered at the highest offered total price." [FN1] The items are then sold in accordance with the "completion."

FN1. In some instances, the completion is formed from those bids that minimize the price of the items bid upon. For example, in a competitive bid for a defense contract, where multiple contractors are bidding to provide services at one or more military bases, the completion is formed from those bids that minimize the contract price, and thus the cost to the government.

For example, in an auction involving two contiguous tracts of land, tracts 1 and 2, the following bids might be received and recorded: Bid 1--$100,000 for tract 1 by bidder A; Bid 2--$200,000 for tract 2 by bidder B; and Bid 3-- $250,000 for both tracts 1 and 2 by bidder C. The combination of bids that maximizes the revenue to the seller, and thus the combination of bids that forms the "completion," would be bids 1 and 2.

Schrader claims that his method constitutes a novel way of conducting auctions. According to Schrader, the type of bids that are normally offered at auctions is dictated solely by the way in which the auctioneer organizes or groups the items to be sold. Through his method, claims Schrader, bids on any combination of the items being auctioned off are offered at the

discretion of the bidder. The purported benefit is greater sales revenue or profit to the seller. This is illustrated by the previous example, in which bids were offered on each of the individual tracts as well as on both tracts together. As a result, the seller attained total sales revenue of $300,000. If the seller had only been offered bids on the combined tracts, i.e., Bid 3, the seller would have derived $250,000 in revenue.

As filed, the application contained 36 claims, of which only two, claims 1 and 34, were independent. Claim 1 is representative:

*292 1. A method of competitively bidding on a plurality of items comprising the steps of identifying a plurality of related items in a record, offering said plurality of items to a plurality of potential bidders, receiving bids from said bidders for both individual ones of said items and a plurality of groups of said items, each of said groups including one or more of said items, said items and groups being any number of all of said individual ones and all of the possible combinations of said items, entering said bids in said record, indexing each of said bids to one of said individual ones or said groups of said items, and assembling a completion of all said bids on said items and groups, said completion identifying a bid for all of said items at a prevailing total price, identifying in said record all of said bids corresponding to said prevailing total price.

During prosecution, the examiner rejected the claims for lack of statutory subject matter under 35 U.S.C. ¤ 101. [FN2] After this rejection was made final, Schrader appealed to the Board. On appeal, the Board sustained the rejection [FN3] apparently on three different grounds: First, "[t]he claimed subject matter is, in our opinion, directed to subject matter that falls within a judicially determined exception to a process set forth in ¤ 101. The claimed process involves only information exchange and data processing and does not involve a process of transforming or reducing an article to a different state or thing...."

FN2. The examiner also rejected the claims for lack of enablement under 35 U.S.C. ¤ 112 ¦ 2 (1988). However, the Board did not sustain this rejection, and it is not before us on appeal.

FN3. Schrader never argued the patentability of the dependent claims separately from that of the independent claims. Thus, they stand or fall together. See 37 C.F.R. ¤ 1.192(c)(5) (1992).

Second, the claimed method "involves a mathematical algorithm or mathematical calculation steps, as the method includes a procedure for solving a given type of mathematical problem.... [T]he mathematical computations of the summation of the possible bidding combinations is at the heart of the invention." Third, the issues in the case relating to the ¤ 101 rejection are analogous to the issues in Ex parte Murray, 9 USPQ2d 1819 (Bd.Pat.App. & Inter.1988), which also involved a ¤ 101 rejection; Murray was held to be binding precedent. Schrader appealed the decision of the Board to this court.

DISCUSSION

[1][2] Schrader argues that the Board incorrectly invoked the rule that a patent cannot be obtained for a mathematical algorithm in the abstract. See Parker v. Flook, 437 U.S. 584, 594, 98 S.Ct. 2522, 2527, 57 L.Ed.2d 451 (1978); Gottschalk v. Benson, 409 U.S. 63, 71-72, 93 S.Ct. 253, 257, 34 L.Ed.2d 273 (1972). [FN4] That rule can be applied by following a two-step protocol developed by our predecessor court and dubbed the Freeman-Walter-Abele test. Arrythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 1058, 22 USPQ2d 1033, 1037 (Fed.Cir.1992). According to that test:

FN4. We are aware of the criticism that has been leveled at the Benson decision, see Donald S. Chisum, The Patentability of Algorithms, 47 U.Pitt.L.Rev. 959 (1986), and the possible implications for the holding in that decision following the decisions in Diamond v. Diehr, 450 U.S. 175, 101 S.Ct. 1048, 67 L.Ed.2d 155 (1981) and Diamond v. Chakrabarty, 447 U.S. 303, 100 S.Ct. 2204, 65 L.Ed.2d 144 (1980), as well as the fact that court decisions regarding the circumstances under which algorithms are patentable have not been wholly consistent. See In re Musgrave, 431 F.2d 882, 167 USPQ 280 (CCPA 1970). Our citation to Benson and related cases is for historical and analytical purposes related to the decision in this case, and is not intended to be read as suggesting any conclusions regarding the patentability of computer programming in general. See note 8, infra, and Arrythmia Research Technology, Inc. v. Corazonix Corp., 958 F.2d 1053, 22 USPQ2d 1033 (Fed.Cir.1992).

It is first determined whether a mathematical algorithm is recited directly or indirectly in the claim. If so, it is next determined whether the claimed invention as a whole is no more than the algorithm itself; that is, whether the claim is directed to a mathematical algorithm that is not applied to or limited by physical elements or process steps. Such claims are nonstatutory. However, when the mathematical algorithm is applied to one or more elements of an otherwise statutory process claim, ... the requirements of section 101 are met.
Id.
*293 Schrader's first point is that there is no mathematical algorithm implicit in the claim. [FN5] We disagree. Benson defines a "mathematical algorithm" for purposes of ¤ 101 as a "procedure for solving a given type of mathematical problem...." 409 U.S. at 65, 93 S.Ct. at 254. See also Diamond v. Diehr, 450 U.S. 175, 186, 101 S.Ct. 1048, 1056, 67 L.Ed.2d 155 (1981). The claim language "assembling a completion" is such a procedure because it describes the solving of a mathematical problem: determining the optimal combination of bids. [FN6] This conclusion is supported by an admission in Schrader's brief that the following two-step mathematical process is inherent in the phrase:

FN5. The definition of "algorithm" is not universally agreed. One working definition is that "[a]n algorithm is an unambiguous specification of a conditional sequence of steps or operations for solving a class of problems." Allen Newell, Response: The Models Are Broken, The Models Are Broken, 47 U.Pitt.L.Rev. 1023, 1024 (1986). The same author notes that the label "mathematical algorithm" is a source of confusion: "The first confusion is using involvement with numbers as the hallmark for distinguishing mathematics from nonmathematics, as an aid to determining what is an algorithm.... [M]athematics deals with both nonnumerical things and numerical things.... [T]here are both numerical and nonnumerical algorithms.... Therefore, any attempt to find a helpful or cutting distinction between mathematics and nonmathematics, as between numerical or nonnumerical, is doomed." Id.

FN6. The precedent of our predecessor court is in accord. In In re Gelnovatch, 595 F.2d 32, 201 USPQ 136 (CCPA 1979), the CCPA held that a method for choosing a set of optimal microwave circuit elements was a mathematical algorithm.

Perform a mathematical calculation which
a) determines possible combinations of items and/or groups with the provision that each item only appear once in each combination.

b) selects the combination with prevailing (i.e. highest or lowest) value.
This process, although expressed in general terms, is within or similar to a class of well-known mathematical optimization procedures commonly applied to business problems called linear programming. [FN7] Thus, a mathematical algorithm is implicit in the claim. [FN8]

FN7. Defined in Webster's New International Dictionary to mean "a theory of maximization of linear functions of a large number of variables subject to constraints used esp. in the administrative and economic planning of industrial and military operations." Linear programming is a known procedure for solving business problems involving profit maximization. See 12 McGraw Hill Encyclopedia of Science & Technology, at 385-387 (6th ed. 1987).

FN8. There is no inconsistency between this conclusion and the statement in Diehr, 450 U.S. at 185-86 & 186 n. 9, 101 S.Ct. at 1056 & 1056 n. 9, that the mathematical algorithm exception is limited to those algorithms that express a law of nature, a natural phenomenon, or an abstract idea. Schrader's algorithm relates to two obvious and familiar modes of human behavior: that potential buyers naturally may submit bids on one, some, or all of the items available for sale, and that sellers may naturally choose that combination of bids that maximize their profits.

[3] Schrader further argues that the claim implies no more than the step of summing, hardly a mathematical algorithm in Schrader's view. This is too narrow a view. As we have discussed, the claim implies a procedure for determining the optimal combination of bids. While that procedure may involve summing, it is certainly not limited to it. In any event, this is not a dispositive argument because even simple summing may be an algorithm. See In re Taner, 681 F.2d 787, 790, 214 USPQ 678, 681 (CCPA 1982).
Schrader's next point is that, even if a mathematical algorithm is implicit in the claim, the claim recites or implies sufficient physical activity to meet the second prong of the Freeman-Walter-Abele test. Thus, he argues the method physically regroups raw bids into new groupings and ultimately 'completions'; physically transforms bid data into completion data or display data; and makes physical changes to a "display." In the specification, Schrader says that the claim envisages an auction environment in which "all of the bidders are assembled in one large room with a display in front of the room" or with the bidders "assembled in several rooms either adjacent or in different cities interconnected by a closed-circuit television system or the like using large screen displays."
We find this argument unpersuasive. The word "display" is nowhere mentioned in the claim. Moreover, there is nothing physical *294 about bids per se. Thus, the grouping or regrouping of bids cannot constitute a physical change, effect, or result. Also, the terms "bid data," "completion data," or "display data" are nowhere mentioned in the claim and there is no basis to read them into the claim. See Intervet America, Inc. v. Kee-Vet Lab., Inc., 887 F.2d 1050, 1053, 12 USPQ2d 1474, 1476 (Fed.Cir.1989); E.I. duPont de Nemours & Co. v. Phillips Petroleum Co., 849 F.2d 1430, 1433, 7 USPQ2d 1129, 1131 (Fed.Cir.), cert. denied, 488 U.S. 986, 109 S.Ct. 542, 102 L.Ed.2d 572 (1988). Therefore, we do not find in the claim any kind of data transformation. Finally, the notion of bidders assembled in a single location in front of a display, or in several locations interconnected by closed-circuit television through a large-screen display is not recited in the claim.
The only physical effect or result which is required by the claim is the entering of bids in a "record," a step that can be accomplished simply by

writing the bids on a piece of paper or a chalkboard. For purposes of ¤ 101, such activity is indistinguishable from the data gathering steps which we said in In re Grams, 888 F.2d 835, 12 USPQ2d 1824 (Fed.Cir.1989), were insufficient to impart patentability to a claim involving the solving of a mathematical algorithm. [FN9] Id. at 840, 12 USPQ2d at 1828; see also In re Meyer, 688 F.2d 789, 794, 215 USPQ 193, 197 (CCPA 1982).

FN9. In re Grams, 888 F.2d 835, 12 USPQ2d 1824 (Fed.Cir.1989), held that it is incorrect to apply the second prong of the Freeman-Walter- Abele test by viewing in isolation the claim steps which "refine" or "limit" the steps involving the solving of the mathematical algorithm. Id. at 839, 12 USPQ2d at 1827. When applied in such a manner, the test is not dispositive. The dispositive issue is whether the claim as a whole recites sufficient physical activity to constitute patentable subject matter. Id.

Moreover, the step of entering data into a "record" is implicit in any application of a mathematical algorithm. The recitation of such a step in a claim involving the solving of a mathematical algorithm merely makes explicit what had been implicit. A conclusion that such activity is sufficient to impart patentability to a claim involving the solving of a mathematical algorithm would exalt form over substance. A similar point was recognized in Flook, in which the Court concluded that the recitation of insignificant post-solution activity in a claim involving the solving of a mathematical algorithm could not impart patentability to the claim:
The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance. A competent draftsman could attach some form of post-solution activity to almost any mathematical formula; .... The concept of patentable subject matter under ¤ 101 is not "like a nose of wax which may be turned and twisted in any direction...." White v. Dunbar, 119 U.S. 47, 51, 7 S.Ct. 72, 74, 30 L.Ed. 303; Flook, 437 U.S. at 590, 98 S.Ct. at 2525-26.
Schrader's claims are thus not patentable.
Arrythmia is not to the contrary. The claims in Arrythmia involved the manipulation of electrical signals and data representative of human cardiac activity; it was held that they recited patentable subject matter. 958 F.2d at 1053, 22 USPQ2d at 1033. For purposes of ¤ 101, the claims were indistinguishable from the claims involving the manipulation of data representing CAT scan images held patentable in In re Abele, 684 F.2d 902, 214 USPQ 682 (CCPA 1982); or the claims involving the manipulation of signals representative of reflected seismic energy held patentable in In re Taner, 681 F.2d 787, 214 USPQ 678 (CCPA 1982).
These claims all involved the transformation or conversion of subject matter representative of or constituting physical activity or objects. In Arrythmia, it was electrocardiograph signals representative of human cardiac activity; in Abele, it was X-ray attenuation data representative of CAT scan images of physical objects; and in Taner, it was seismic reflection signals representative of discontinuities below the earth's surface. Schrader's claims, except for incidental changes to a "record," do not reflect any transformation or conversion of subject matter representative of or constituting physical activity or objects.
*295 [4] The requirement that in a process claim compliance with ¤ 101 requires some kind of transformation or reduction of subject matter is not in violation of the Supreme Court's admonition in Diehr that "courts 'should not read into the patent laws limitations and conditions which the legislature has not expressed.' " Id. at 182, 101 S.Ct. at 1054 (quoting Diamond v. Chakrabarty, 447 U.S. at 308, 100 S.Ct. at 2207). When Congress approved

the addition of the term "process" [FN10] to the categories of patentable subject matter in 1952, it incorporated the definition of "process" that had evolved in the courts. [FN11] As of 1952, that term included a requirement that there be a transformation or reduction of subject matter. We first see the requirement reflected in an early case, Cochrane v. Deener, 94 U.S. 780, 787-788, 24 L.Ed. 139 (1877), in which the Court stated:

FN10. 35 U.S.C. ¤ 101 reads in relevant part:
Whoever invents or discovers any new ... process ... may obtain a patent therefor....
The term "process" is defined by 35 U.S.C. ¤ 100(b) to mean:
... process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.

FN11. This conclusion is drawn from three sources. The first is 35 U.S.C. ¤ 100(b), which defines "process" circularly to mean "process." The second is the legislative history, which shows Congress approved the substitution of the term "process" for the term "art" used in all previous patent statutes because it had a more "readily grasped" meaning that had evolved in the courts. See S.Rep. No. 1979, 82nd Cong., 2d Sess. 5, 17 (1952), reprinted in 1952 U.S.C.C.A.N. 2394, 2398-99 & 2409-10; H.Rep. No. 1923, 82nd Cong., 2d Sess. 6, 17 (1952). See also P.J. Federico, Commentary on the New Patent Act, 35 U.S.C.A. ¤ 1 et seq., at 15-16 (1954 ed. West) reprinted in 75 JPOS 161, 176 (1993). The third is the presumption that when a statute uses a term of art, such as "process", Congress intended it to have its established meaning. See McDermott Int'l, Inc. v. Wilander, 498 U.S. 337, 342, 111 S.Ct. 807, 810, 112 L.Ed.2d 866 (1991); Barber v. Gonzales, 347 U.S. 637, 641, 74 S.Ct. 822, 824, 98 L.Ed. 1009 (1954).

A process is ... an act, or a series of acts, performed upon the subject matter to be transformed and reduced to a different state or thing. (Emphasis added)
We then see it reflected, albeit imperfectly [FN12], in Professor Robinson's classic treatise, written when the statute said art:

FN12. Professor Robinson cites to Cochrane for the above definition but inexplicably speaks in terms of changes to a physical "object" while Cochrane speaks in terms of changes to "subject matter." The distinction is significant. In the Telephone Cases, 126 U.S. 1, 8 S.Ct. 778, 31 L.Ed. 863 (1887), the Court upheld the validity of a claim directed to a method for transmitting speech by impressing acoustic vibrations representative of speech onto electrical signals. If there was a requirement that a physical object be transformed or reduced, the claim would not have been patentable. The point was recognized by our predecessor court in In re Prater, 415 F.2d 1393, 162 USPQ 541, 549 (CCPA 1969): "[The Cochrane passage] has sometimes been misconstrued as a 'rule' or 'definition' requiring that all processes, to be patentable, must operate physically upon substances. Such a result misapprehends the nature of the passage...." Id. at 1403, 162 USPQ at 549, modifying on rehearing, 415 F.2d 1378, 1387-88, 159 USPQ 583, 592 (CCPA 1968); see also In re Musgrave, 431 F.2d 882, 892, 167 USPQ 280, 289 (CCPA 1970). Thus, it is apparent that changes to intangible subject matter representative of or constituting physical activity or objects are included in the definition. See Tilghman v. Proctor, 102 U.S. 707, 728, 26 L.Ed. 279 (1881); Corning v. Burden, 56 U.S. (15 How.) 252, 14 L.Ed. 683 (1854).

An art or operation is an act or a series of acts performed by some physical agent upon some physical object, and producing in such object some change

either of character or of condition. It is also called a "process,"....
(Emphasis added)
1 William C. Robinson, The Law of Patents For Useful Inventions ¤ 159 (1890).
We also see it reflected, again imperfectly [FN13], in Benson, in which the Court stated:

FN13. Cochrane is cited in Benson for the above definition, yet, as noted, Cochrane speaks in terms of changes to "subject matter" rather than changes to an "article."

Transformation and reduction of an article "to a different state or thing" is the clue to the patentability of a process claim
....
409 U.S. at 70, 93 S.Ct. at 256.
Finally, we see it cited with approval in Diehr, 450 U.S. at 183-84, 101 S.Ct. at 1055. This basic requirement preceded and remains a part of the requirements incorporated in the 1952 Act. See Astoria Federal Sav. and Loan Ass'n v. Solimino, 501 U.S. 104, *296 106-08, 111 S.Ct. 2166, 2169, 115 L.Ed.2d 96 (1991) (presumption that well-established common law principles are left unchanged by statutory enactment).
CONCLUSION

Accordingly, we conclude the Board properly rejected the claims for lack of statutory subject matter. [FN14] The decision of the Board sustaining the rejection of claims 1-36 is affirmed.

FN14. As noted, the Board affirmed the rejection of Schrader's claims on three alternative grounds. And the dissent suggests other grounds on which the rejection might have been based. Since we are obligated to decide the case on the grounds invoked by the Board, we cannot reach the issues suggested by the dissent, and, in view of our disposition of the appeal on the mathematical algorithm ground, we need not address the other grounds offered by the Board.

AFFIRMED

PAULINE NEWMAN, Circuit Judge, dissenting.
I respectfully disagree with my colleagues on this panel, for I do not view this subject matter as nonstatutory in terms of 35 U.S.C. ¤ 101. However, on the record before us I do not deem the claims allowable. In view of the inadequate examination for patentability under sections 102 and 103 of the patent act, I would remand to the Patent and Trademark Office for further processing of the application.
A

The applicant Schrader is claiming a method whereby parcels of real property or other things are sold at auction by a procedure of bidding and determining optimum prices that, according to Schrader's brief, is usefully but not necessarily performed with the aid of a computer. Schrader's method involves more than mental steps or theories or plans, see Arrythmia Research Technology Inc. v. Corazonix Corp., 958 F.2d 1053, 1057, 22 USPQ2d 1033, 1037 (Fed.Cir.1992) (claim must be directed to physical elements or process steps), and is not a scientific principle, law of nature, natural phenomenon, or abstract idea, the terms generally used to delineate unpatentable subject matter.

Although Schrader's claimed process requires computational steps, the fact that mathematical procedures are performed does not preclude patentability. It is necessary to ascertain whether the claim as a whole defines statutory subject matter, whether or not mathematical procedures are invoked along the way. Diamond v. Diehr, 450 U.S. 175, 187, 101 S.Ct. 1048, 1057, 67 L.Ed.2d 155, 209 USPQ 1, 8 (1981). In deciding this question
it must be determined whether a scientific principle, law of nature, idea, or mental process, which may be represented by a mathematical algorithm, is included in the subject matter of the claim. If it is, it must then be determined whether such principle, law, idea, or mental process is applied in an invention of a type set forth in 35 U.S.C. 101.
In re Meyer, 688 F.2d 789, 795, 215 USPQ 193, 198 (CCPA 1982).
Even if the Schrader claims are viewed as encompassing a mathematical algorithm [FN1], it is applied in a statutory process as set forth in 35 U.S.C. ¤ 101, in this case a process of conducting an auction of multiple lots of separable elements. Although one may debate whether the claimed process is a "method of doing business", as the Board found, see post, I can not agree that the claimed invention is no more than a mathematical algorithm.

FN1. I do not believe that they do. The Supreme Court has defined mathematical algorithm as a "procedure" or "formulation" for solving a particular mathematical problem. Gottschalk v. Benson, 409 U.S. 63, 65, 93 S.Ct. 253, 254, 34 L.Ed.2d 273, 175 USPQ 673, 674 (1972). The only mathematical problem in Schrader's invention is identifying that combination of bids which yields the highest return, and he does not claim any particular procedure or formula for solving that problem. Neither the trivial procedure of adding up the returns on all permissible combinations of bids and selecting the combination with the highest return, nor some more elegant mathematical manipulation, is claimed. One must distinguish the answer to be found from the method of finding that answer. The latter might be a mathematical algorithm; the former is not.

Indeed, the Schrader claims easily satisfy the Freeman-Walter-Abele test. See In re *297 Abele, 684 F.2d 902, 214 USPQ 682 (CCPA 1982). This court has made clear that the Freeman-Walter-Abele test is not the only test for the existence of statutory subject matter when computation is involved. Arrhythmia, 958 F.2d at 1057, 22 USPQ2d at 1037; In re Grams, 888 F.2d 835, 838-39, 12 USPQ2d 1824, 1827 (Fed.Cir.1989). However, the test is useful and, when met, ends the inquiry, for it implements the principle set forth in Diamond v. Diehr, 450 U.S. at 182, 101 S.Ct. at 1054, 209 USPQ at 7, that "Congress intended statutory subject matter to 'include anything under the sun that is made by man' " (quoting legislative history of 1952 Patent Act).
As stated in In re Musgrave, 431 F.2d 882, 893, 167 USPQ 280, 289-90 (CCPA 1970), a statutory "process" is limited only in that it must be technologically useful. A process does not become nonstatutory because of the nature of the subject matter to which it is applied, or the nature of the product produced. In re Toma, 575 F.2d 872, 877-78, 197 USPQ 852, 857 (CCPA 1978). The nation has benefitted from the adaptability of the patent system to new technologies, as was recognized in Diamond v. Chakrabarty, 447 U.S. 303, 316, 100 S.Ct. 2204, 2211, 65 L.Ed.2d 144, 206 USPQ 193, 200 (1980) ("Mr. Justice Douglas reminded that the inventions most benefiting mankind are those which 'push back the frontiers of chemistry, physics and the like.' ")
The majority now imposes fresh uncertainty on the sorts of inventions that will meet the majority's requirements. All mathematical algorithms transform data, and thus serve as a process to convert initial conditions or

inputs into solutions or outputs, through transformation of information. Data representing bid prices for parcels of land do not differ, in section 101 substance, from data representing electrocardiogram signals (Arrhythmia) or parameters in a process for curing rubber (Diehr). All of these processes are employed in technologically useful arts [FN2]. Even were a mathematical formula viewed as "like a law of nature", Diehr, 450 U.S. at 186, 101 S.Ct. at 1056, 209 USPQ at 8, or as an abstract idea, see Gottschalk v. Benson, 409 U.S. 63, 71-72, 93 S.Ct. 253, 257, 34 L.Ed.2d 273, 175 USPQ 673, 676 (1972), the requirements of section 101 are met when the formula is applied in a technological process to produce a useful result. The Freeman-Walter-Abele test facilitates this analysis, for once one has determined that a mathematical algorithm is implicated in the claimed invention, the inquiry proceeds to the invention as a whole, as the statute requires. The test is simply whether the mathematical formula or equation is all that is claimed, or whether the procedures involving the specified mathematics are part of a useful process. When the latter requirement is met the subject matter is statutory.

FN2. By enlarging section 101 beyond its statutory scope, the majority implies that it is more desirable, from the viewpoint of social policy, to withhold the patent incentive from innovative activity such as that here illustrated. Such policy decisions have been made for a variety of reasons, as exemplified in the denial of patents on inventions relating to nuclear weapons, perpetual motion machines, and, until 1977, gambling machines.

In the continuum wherein the jurisprudence relating to computer- implemented inventions has evolved, as noted in Arrythmia, 958 F.2d at 1057 n. 4, 22 USPQ2d at 1036 n. 4, judge-made law has retreated from specifying how a mathematical algorithm must interact in the claimed invention in order to constitute statutory subject matter, and advanced toward the test of whether the overall process is for a technologically useful art. See Freeman and Walter and Abele.

Schrader's claimed process requires the performance of specified steps and procedures, including calculations, to achieve a technologically useful result; it is not a mathematical abstraction. As stated in Diamond v. Diehr, 450 U.S. at 187, 101 S.Ct. at 1057, 209 USPQ at 8, subject matter does not become nonstatutory "simply because it uses a mathematical formula" in an otherwise statutory process. Thus I respectfully dissent from the panel majority's view that Schrader's claims do not comply with 35 U.S.C. ¤ 101.

B

The Board also relied on the "method of doing business" ground for finding Schrader's *298 subject matter non-statutory under section 101. In so doing the Board remarked that the "method of doing business" is a "fuzzy" concept, observed the inconclusiveness of precedent, and sought guidance from this court. Indeed it is fuzzy; and since it is also an unwarranted encumbrance to the definition of statutory subject matter in section 101, [FN3] my guidance is that it be discarded as error-prone, redundant, and obsolete. It merits retirement from the glossary of section 101.

FN3. 35 U.S.C. ¤ 101 Inventions patentable.
Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

The decisions that have spoken of "methods of doing business" have, or could have, resolved the issue in each case simply by relying on the statutory requirements of patentability such as novelty and unobviousness. An illustration is the CCPA's analysis in In re Howard, 394 F.2d 869, 157 USPQ 615 (CCPA 1968), wherein the court affirmed the Board of Appeals' rejection of the claims for lack of novelty, the court finding it unnecessary to reach the Board's section 101 ground that a method of doing business is "inherently unpatentable". Id. at 872, 157 USPQ at 617.

Ex parte Murray, 9 USPQ2d 1819 (Bd.Pat.App. & Interf.1988), relied on herein by the Board, can be viewed similarly, for the Murray holding that "the claimed accounting method [requires] no more than the entering, sorting, debiting and totaling of expenditures as necessary preliminary steps to issuing an expense analysis statement", 9 USPQ2d at 1820, states grounds of obviousness or lack of novelty, not of non-statutory subject matter. Indeed, in Dann v. Johnston, 425 U.S. 219, 96 S.Ct. 1393, 47 L.Ed.2d 692 189 USPQ 257 (1976) the Supreme Court declined to discuss the section 101 argument concerning the computerized financial record-keeping system, in view of the Court's holding of patent invalidity under section 103.

A case often cited as establishing the business methods "exception" to patentable subject matter is Hotel Security Checking Co. v. Lorraine Co., 160 F. 467 (2nd Cir.1908); however, the court discussed the "obviousness" of the system of records kept to prevent embezzlement by waiters at considerably greater length than whether the subject matter was "statutory". Although a clearer statement was made in In re Patton, 127 F.2d 324, 327, 53 USPQ 376, 379 (CCPA 1942) that a system for transacting business, separate from the means for carrying out the system, is not patentable subject matter, the jurisprudence does not require the creation of a distinct business class of unpatentable subject matter.

The cases simply reaffirm that the patent system is directed to tangible things and procedures, not mere ideas. See Rubber-Tip Pencil Co. v. Howard, 87 U.S. (20 Wall.) 498, 507, 22 L.Ed. 410 (1874) ("An idea of itself is not patentable, but a new device by which it may be made practically useful is"). Any historical distinctions between a method of "doing" business and the means of carrying it out blur in the complexity of modern business systems. See Paine, Webber, Jackson and Curtis v. Merrill Lynch, 564 F.Supp. 1358, 218 USPQ 212 (D.Del.1983), wherein a computerized system of cash management was held to be statutory subject matter.

I discern no purpose in perpetuating a poorly defined, redundant, and unnecessary "business methods" exception, indeed enlarging (and enhancing the fuzziness of) that exception by applying it in this case. All of the "doing business" cases could have been decided using the clearer concepts of Title 35. Patentability does not turn on whether the claimed method does "business" instead of something else, but on whether the method, viewed as a whole, meets the requirements of patentability as set forth in Sections 102, 103, and 112 of the Patent Act.

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Although I conclude that the requirements of section 101 were met, the examination in this case was not adequate to determine the *299 merits of patentability. The record does not show analysis in terms of sections 102 and 103. It is not reasonable to believe that the activity here described is devoid of prior art, particularly in view of the breadth with which it is claimed. It would be improper for this court to authorize issuance of a patent in these circumstances.

22 F.3d 290, 30 U.S.P.Q.2d 1455

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