

The opinion in support of the decision being entered today
is *not* binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte BJORN MARKUS JAKOBSSON

Appeal 2006-2107
Application 09/969,833
Technology Center 2100

Decided: April 16, 2007

Before JOSEPH F. RUGGIERO, LANCE LEONARD BARRY, and
ALLEN R. MacDONALD, *Administrative Patent Judges*.

MacDONALD, *Administrative Patent Judge*.

DECISION ON APPEAL

AFFIRMED

I. STATEMENT OF CASE

Appellant appeals under 35 U.S.C. § 134 from the Final Rejection entered May 4, 2005. We have jurisdiction under 35 U.S.C. § 6(b).

The appeal contains claims 1-22. Claims 1, 20, 21, and 22 are independent claims. Claims 1 and 20 are representative of the claimed invention and are reproduced as follows:

1. A method for generating one or more output values of a one-way chain in a processing device comprising a processor coupled to a memory, the one-way chain having at least one starting point and at least one endpoint, the method comprising the steps of:

computing in the processor a given one of the output values at a current position in the one-way chain utilizing a first helper value previously stored in the memory for another position in the one-way chain between the current position and the endpoint of the chain; and

computing in the processor at least a second helper value for a new position in the chain between the current position and the endpoint of the chain, the second helper value being stored in the memory and utilizable to facilitate subsequent computation of another one of the output values in the processor.

20. An apparatus for generating one or more output values of a one-way chain, the one-way chain having at least one starting point and at least one endpoint, the apparatus comprising:

a memory; and

a processor coupled to the memory;

the processor being operative to compute a given one of the output values at a current position in the one-way chain utilizing a first helper value previously stored in the memory for another position in the one-way chain between the current position and the endpoint of the chain; and to compute at least a second helper value for a new position in the chain between the current position and the endpoint of the chain, the second helper

Appeal 2006-2107
Application 09/969,833

value being stored in the memory and utilizable to facilitate subsequent computation of another one of the output values.

The Examiner rejected claims 1-22 under 35 U.S.C. § 101 because the claimed invention is directed to non-statutory subject matter.

The Examiner entered a Final Rejection on May 4, 2005.

Appellant appealed from the Final Rejection. An Appeal Brief (the Brief) was filed on November 8, 2005.

The Examiner entered an Examiner's Answer (the Answer) on January 26, 2006.

Appellant did not file a Reply Brief.

We affirm.

II. ISSUE

The sole issue before us is whether Appellant has established that the Examiner erred in rejecting claims 1-22 under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

III. FINDINGS OF FACT

The following findings of fact are supported by a preponderance of the evidence.

1. Appellant invented a method, apparatus, and machine readable medium (storing one or more programs) for generating one or more output values of a one-way chain. (Specification 4).

2. One-way chains are used in processor based cryptographic applications such as encryption, decryption, digital signatures, message authentication, user and device authentication, micro-payments, etc. (Specification 1:13-15 and 4:1-7).

3. A one-way function is a function f for which one can compute the value $y=f(x)$ given the value x , but for which it is computationally infeasible to compute the value x given y , unless a so-called “trap door” is known, where only particular one-way functions have trap doors. In the above context, the value x is called the pre-image of y , and the value y is called the image of x , both relative to the function f . (Specification 1:18-22).

4. The term “one-way function” as used by Appellant is intended to include, by way of example and without limitation, any function for which it is substantially more efficient to compute images from pre-images, than it is to compute pre-images from images, e.g., a function for which inversion is computationally expensive, infeasible or otherwise difficult to achieve. (Specification 6:11-14).

5. The term “chain” as used by Appellant is intended to be construed generally so as to include not only linear sequences of values, but also tree or graph structures having multiple branches, each of which may itself correspond to a linear sequence of values. (Specification 6:15-17).

6. The term “one-way chain” refers to a chain in which at least one pair of values are related to one another via a one-way function. (Specification 6:18-19).

7. A so-called one-way chain is a sequence of values $v_1 \dots v_s$ such that $v_{i-1}=f(v_i)$. More generally, $v_{i-1}=f(g(v_i))$, where g is a function that maps input of the size of the output of a hash chain or other one-way function h to the size of the input of the function h . In particular, g could be a truncation of information to the right length, a padding of information to the right length, or other similar mapping function, as is well known to those skilled in the art. It is also known that if h is a function that accepts input of arbitrary length, as hash functions do, then there is no need to use the

function g . Alternatively, one could say that g in such a situation is the identity function. (Specification 1:27-2:3).

8. A one-way chain of the type described above can be computed by starting with value v_s and from that value computing v_{s-1} by application of the one-way function to v_s , then computing v_{s-2} by application of the one-way function to v_{s-1} , and so on. This is a general case of computation of the above value $y=f(x)$, since the value y is used as input to the one-way function, in the next “link” of the chain. One important reason for using such chains is to represent time. For example, if a one-way chain $v_1 \dots v_s$ is computed by a first party from an endpoint value v_s , and the value v_1 of the chain is given to a second party, then the first party can “increment time” by showing consecutive pre-images v_2, v_3 , etc. to the second party. Note that the second party cannot compute these consecutive pre-images from v_1 on its own. However, given a pre-image v_2 , the second party can verify the correctness of that pre-image by checking if $v_1=f(v_2)$. For v_3 , this verification would have two steps, a first in which v_2 is computed, and a second in which v_1 is computed and compared to the known value v_1 . (Specification 2:11-22).

9. In accordance with the invention, so-called helper values are positioned and utilized in a manner which substantially reduces the storage-computation product associated with generating chain values. (Specification 7:9-11).

10. Helper values are also generally referred by Appellant as “pegs.” Each peg may therefore be viewed as having a single helper value associated therewith, the helper value being the value v_i of the chain at the peg position. (Specification 8:16-19).

11. As filed, the application contained claims 1-22 including representative originally filed claim 1 which is reproduced below:

1. A method for generating one or more output values of a one-way chain, the one-way chain having at least one starting point and at least one endpoint, the method comprising the steps of:

computing a given one of the output values at a current position in the one-way chain utilizing a first helper value previously stored for another position in the one-way chain between the current position and the endpoint of the chain; and

computing at least a second helper value for a new position in the chain between the current position and the endpoint of the chain, the second helper value being utilizable to facilitate subsequent computation of another one of the output values.

12. On October 5, 2004, the Examiner entered a Non-Final Office Action.

13. Claims 1-22 were rejected under 35 U.S.C. § 101 essentially because claims 1-22 were directed to an abstract idea, and claims 1-22 failed to produce a useful, concrete, and tangible result.

14. Claims 1-5, 7-13, 18, and 20-22, were also rejected under 35 U.S.C. § 102(b) as being unpatentable over Chaum, U.S. Patent 5,434,919.

15. Chaum is prior art under 35 U.S.C. § 102(b).

16. On January 10, 2005, Appellant filed an Amendment (“the Amendment”) responding to the Examiner's First Office Action.

Appeal 2006-2107
Application 09/969,833

17. The Amendment similarly amended claims 1, 21, and 22.

Claim 1 as amended is reproduced below (matter underlined added by the Amendment):

1. A method for generating one or more output values of a one-way chain in a processing device comprising a processor coupled to a memory, the one-way chain having at least one starting point and at least one endpoint, the method comprising the steps of:

computing in the processor a given one of the output values at a current position in the one-way chain utilizing a first helper value previously stored in the memory for another position in the one-way chain between the current position and the endpoint of the chain; and

computing in the processor at least a second helper value for a new position in the chain between the current position and the endpoint of the chain, the second helper value being stored in the memory and utilizable to facilitate subsequent computation of another one of the output values in the processor.

18. After entry of the Amendment, the application claims were 1-22.

19. On May 4, 2005, the Examiner entered a Final Rejection.

20. Claims 1-22 were finally rejected under 35 U.S.C. § 101 essentially because claims 1-22 were directed to an abstract idea, and claims 1-22 failed to produce a useful, concrete, and tangible result.

21. Appellant appeals under 35 U.S.C. § 134 from the Final Rejection.

22. A copy of the claims 1-22 under appeal is set forth in the Claim Appendix of Appellant's Brief.

23. Appellant's method claims are not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use.

24. Appellant's method claims cover any use of the claimed method in a processor coupled to a memory, i.e., a general-purpose digital computer of any type.

IV. ANALYSIS – EXAMINER'S REJECTIONS

A. *Whether Appellant has established that the Examiner erred in rejecting claims 1-22 under 35 U.S.C. § 101?*

(1)

Introduction - 35 U.S.C. § 101

Four categories of patentable subject matter are enumerated in 35 U.S.C. § 101:

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.

(2)

Examiner's Prima Facie Case

The Examiner prima facie case is set forth at pages 4-9 of the Answer.

(3)

Appellant's Arguments in the Brief

With respect to independent method claim 1, Appellant argues "Claim 1 . . . recites steps which do not involve use of any particular abstract idea or mathematical algorithm." (Br. 5). Further, Appellant argues "there is no particular mathematical algorithm involved [in the claimed method]"

Appeal 2006-2107
Application 09/969,833

and “[the method of claim 1] does not implicate any particular mathematical algorithm(s).” (Br. 6).

Additionally with respect to claim 1, Appellant admits “[l]ike the statutory claim at issue in State Street, claim 1 does involve computations.” (Br. 6). Appellant then argues “output values of one-way chains . . . are in and of themselves useful, concrete and tangible results in the field of cryptography” because “such values, in and of themselves, can be used as passwords.” (Br. 6).

With respect to dependent method claim 6, Appellant argues the recited limitation on the complexity of the storage-computation product “is a useful, concrete and tangible result because it allows one-way chains to be implemented in lightweight devices [, i.e., devices having limited memory and processor resources].” (Br. 7).

With respect to dependent method claim 13, Appellant argues “the recited limitation on the computational budget associated with generation of an output value and relocation of pegs is itself a useful, concrete and tangible result” because “it allows a given one-way chain to be implemented in a lightweight device having limited memory and processor resources.” (Br. 8).

With respect to dependent method claim 19, Appellant repeats the argument of claim 13. Appellant again argues “the recited limitation on the computational budget associated with generation of an output value and relocation of pegs is itself a useful, concrete and tangible result” because “it allows a given one-way chain to be implemented in a lightweight device having limited memory and processor resources.” (Br. 8).

With respect to independent apparatus claim 20, Appellant argues “[t]he claim at issue is directed to a machine, one of the statutory categories

Appeal 2006-2107
Application 09/969,833

explicitly recited in § 101.” (Br. 9). Appellant also repeats the second argument of claim 1. Appellant argues “useful, concrete and tangible results are indeed produced” which are “in the form of one or more output values of a one-way chain” and “[which] may be used as passwords.” (Br. 9).

With respect to independent machine-readable medium claim 21, Appellant repeats the two arguments of claim 20. First, Appellant argues the claim at issue is directed to “a type of manufacture, one of the statutory categories explicitly recited in § 101.” (Br. 9). Second, Appellant argues “useful, concrete and tangible results are indeed produced” which are “in the form of one or more output values of a one-way chain” and “[which] may be used as passwords.” (Br. 9).

Finally with respect to independent method claim 22, Appellant repeats the second argument of claims 20 and 21. Appellant argues “useful, concrete and tangible results are indeed produced” which are “in the form of one or more output values of a one-way chain” and “[which] may be used as passwords.” (Br. 10).

(4)

*Reading the Supreme Court’s and Federal Circuit’s Precedents Together,
A Section 101 “Process” Has Always Transformed Subject Matter,
Whether Tangible or Intangible, Or Has Been a Process
That Involved The Other Three Statutory Categories*

The scope of patentable subject matter under section 101 is broad, but not infinitely broad. “Congress included in patentable subject matter *only* those things that qualify as ‘any ... process, machine, manufacture, or composition of matter, or any ... improvement thereof....’” *In re Warmerdam*, 33 F.3d 1354, 1358, 31 USPQ2d 1754, 1757 (Fed. Cir. 1994) (quoting 35 U.S.C. § 101) (emphasis added). Thus, “[d]espite the oft-quoted

Appeal 2006-2107
Application 09/969,833

statement in the legislative history of the 1952 Patent Act that Congress intended that statutory subject matter ‘include anything under the sun that is made by man,’[citation omitted], Congress did not so mandate.” *Id.*

In the case where a claim is nominally for a process (i.e., a series of steps), as opposed to a product, “[t]he line between a patentable ‘process’ and an unpatentable ‘principle’ is not always clear. Both are ‘conception[s] of the mind, seen only by [their] effects when being executed or performed.’” *Parker v. Flook*, 437 U.S. 584, 589, 198 USPQ 193, 198 (1978) (quoting *Tilghman v. Proctor*, 102 U.S. 707, 728 (1880)). “The holding that the discovery of [*Benson*’s] method could not be patented as a ‘process’ forecloses a purely literal reading of § 101.” *Flook*, 437 U.S. at 589, 198 USPQ at 197. The Supreme Court has recognized only two instances in which a method may qualify as a section 101 process: when the process “either [1] was tied to a particular apparatus or [2] operated to change materials to a ‘different state or thing.’” *Id.* at 588 n.9, 198 USPQ at 196 n.9 (quoting *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876) (“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”)). “[W]hen a claim containing [an abstract idea] implements or applies that [idea] 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.” *Diamond v. Diehr*, 450 U.S. 175, 192, 209 USPQ 1, 10 (1981); see also *Gottschalk v. Benson*, 409 U.S. 64, 70, 175 USPQ 673, 676 (1972) (“Transformation and reduction of an article ‘to a different state or thing’ is

Appeal 2006-2107
Application 09/969,833

the clue to the patentability of a process claim that does not include particular machines.”).¹

The Supreme Court, however, presumably concerned about barring patents for future, unforeseeable technologies, declined to rule on whether its precedent foreclosed any other possible avenues for a method claim to qualify as a section 101 process: “It is argued that a process patent must either be tied to a particular machine or apparatus or must operate to change articles or materials to a ‘different state or thing.’ We do not hold that no process patent could ever qualify if it did not meet the requirements of our prior precedents.” *Benson*, 409 U.S. at 71, 175 USPQ 676. Rather than rule on this question in *Benson* and *Flook*, the Supreme Court decided those cases based on the abstract idea exception to patentability. *Benson*, 409 U.S. at 71-72, 175 USPQ at 676-77; *Flook*, 437 U.S. at 594-95, 198 USPQ at 199-200.

Since *Diehr*, the Federal Circuit has reviewed several computer technology cases, and in acknowledgment of the innovations occurring in this technological field, identified a third category of method claims that qualify as a “process.” Extrapolating from the Supreme Court’s “transformation and reduction of an article” test, the Federal Circuit has held

¹ The principal exception to this rule, as explained *infra*, is when the machine-implemented method merely manipulates abstractions. *See Benson*, 409 U.S. at 71-72, 175 USPQ at 676-77. In addition, merely attaching a machine to an otherwise ineligible method may not be sufficient and would depend on how the machine actually implemented the recited steps. For example, if a nonstatutory claim were amended so that a recited step of registering a customer was performed by entering data into a computer rather than using a sign-up sheet, it is hard to imagine how that alone would satisfy the requirements of § 101 and convert an otherwise ineligible claim into an eligible one.

Appeal 2006-2107
Application 09/969,833

that transformation of intangible subject matter (*i.e.*, data or signals) may also qualify as a § 101 process. *See, e.g., State Street Bank & Trust Co. v. Signature Fin. Group, Inc.*, 149 F.3d 1368, 1373, 47 USPQ2d 1596, 1601 (Fed. Cir. 1998). Responding to the argument that process claims must recite a “physical transformation,” the Federal Circuit in *AT&T* ruled that “physical transformation” “is not an invariable requirement, but merely one example of how a mathematical algorithm may bring about a useful application.” *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352, 1358, 50 USPQ2d 1447, 1452 (Fed. Cir. 1999). Quoting the Supreme Court’s language, “*e.g.*, transforming or reducing an article to a different state or thing” from *Diehr*, the *AT&T* court noted the usage of “*e.g.*” “denotes an example, not an exclusive requirement.” *Id.* at 1359, 50 USPQ2d at 1452. *AT&T* went on to cite the transformation of intangible data signals in the method claim of *Arrhythmia Research Technology Inc. v. Corazonix Corp.*, 958 F.2d 1053, 1059, 22 USPQ2d 1033, 1038 (Fed. Cir. 1992), as an example that qualifies as a § 101 “process” in addition to the Supreme Court’s test. *See id.* at 1359, 50 USPQ2d at 1452.

Accordingly, the Federal Circuit has consistently used its own “data transformation” test in assessing the eligibility of various machine-implemented claims. In *Alappat*, the court held that “data, transformed by a machine” “to produce a smooth waveform display” “constituted a practical application of an abstract idea.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601. Specifically, the court in *Alappat* stated that the claimed invention as a whole was directed to a machine for “converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means.” 33 F.3d 1526, 1544, 31 USPQ2d 1545, 1557 (Fed. Cir. 1994) (*en banc*). In *Arrhythmia*, the court held “the transformation of

Appeal 2006-2107
Application 09/969,833

electrocardiograph signals” “by a machine” “constituted a practical application of an abstract idea.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601. Specifically, the court in *Arrhythmia* stated “the number obtained is not a mathematical abstraction; it is a measure in microvolts of a specified heart activity, an indicator of the risk of ventricular tachycardia.” 958 F.2d at 1062, 22 USPQ2d at 1039. Likewise, in *State Street*, the court held that “the transformation of data” “by a machine” “into a final share price, constitutes a practical application of a mathematical algorithm” because “a final share price [is] momentarily fixed for recording and reporting purposes and even accepted and relied upon by regulatory authorities and in subsequent trades.” 149 F.3d at 1373, 47 USPQ2d at 1601. Thus, while *Diehr* involved the transformation of a tangible object – curing synthetic rubber – Federal Circuit also regards the transformation of intangible subject matter to similarly be eligible, so long as data or signals represent some real world activity.

The Federal Circuit has never held or indicated that a non-machine implemented process involving no transformation can qualify as a “process” under § 101. In fact, confronted with such claims, it has rejected them consistently. *See In re Schrader*, 22 F.3d 290, 294-295, 30 USPQ2d 1455, 1458 (Fed. Cir. 1994); *In re Grams*, 888 F.2d 835, 837, 12 USPQ2d 1824, 1826 (Fed. Cir. 1989) (rejecting claims to method of evaluating a system that incorporated a mathematical algorithm, where the only physical step was a data gathering step that was not tied to the algorithm); *In re Maucorps*, 609 F.2d 481, 484, 203 USPQ 812, 815 (CCPA 1979); *In re Meyer*, 688 F.2d 789, 796, 215 USPQ 193, 198 (CCPA 1982); *see also In re Alappat*, 33 F.3d at 1543, 31 USPQ2d at 1556 (“*Maucorps* dealt with a business methodology for deciding how salesmen should best handle respective

Appeal 2006-2107
Application 09/969,833

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.”²

In *Schrader*, the court affirmed the 101 rejection of a method of competitively bidding on a plurality of related items, relying in part on the *Freeman-Walter-Abele* (“FWA”) test. However, consistent with *Arrhythmia*, *Alappat*, *State Street*, and *AT&T*, the court also inquired into whether *Schrader*’s non-machine implemented method claim performed any kind of transformation. *Schrader*, 22 F.3d at 294, 30 USPQ2d at 1458 (“we do not find in the claim any kind of data transformation.”). The court then distinguished *Schrader*’s claim from the statutorily eligible claims in *Arrhythmia*, *In re Abele*, 684 F.2d 902, 214 USPQ 682 (CCPA 1982), and *In re Taner*, 681 F.2d 787, 214 USPQ 678 (CCPA 1982), pointing out that in these cases, “[t]hese claims all involved the transformation or conversion of subject matter representative of or constituting *physical activity or objects*. *Id.* (emphasis in original). *Schrader* expressly concludes that “a process claim [in] compliance with Section 101 requires some kind of transformation or reduction of subject matter.”³ *Id.* at 295, 30 USPQ2d at

² *But see State Street*, 149 F.3d at 1376 n.14, 47 USPQ2d at 1603 n.14 (observing that “[*Maucorp* and *Meyer*] were subject to the *Benson* era *Freeman-Walter-Abele* test – in other words, analysis as it existed before *Diehr* and *Alappat*,” without addressing the fact that it was the *Alappat* decision itself that made the observation that these inventions were “clearly” nonstatutory).

³ Although the FWA test is no longer considered particularly probative in the context of computer-implemented process inventions in view of *Diehr* (see, e.g., *State Street*, 149 F.3d at 1374, 47 USPQ2d at 1601), the erosion of FWA provides no support for the position that a non-machine implemented process, not involving any transformation, might be patentable. The answer

1459. In sum, the Federal Circuit has never ruled that methods without any transformation or machine implementation are eligible, and appears in *Schrader* to have rejected that proposition.

We believe that “process” should not be broadened so as to include any method that may be deemed useful only in a general sense. The Supreme Court’s and Federal Circuit’s articulated eligibility tests keep the interpretation of “process” *in pari materia* with the other three categories of inventions – manufacture, machine, and composition of matter.⁴ In other

to that question is still provided by *Schrader*, and that answer, so far, is negative. While *AT&T* indicated that *Schrader* is “unhelpful” because it did not reach the question whether a “useful, concrete, and tangible result” occurred, the reason that case did not need to reach that question was because it found that *Schrader*’s method claims were unpatentable for lack of any transformation. In addition, *Schrader*’s claims did not require machine-implementation, unlike *AT&T*’s claims. See *AT&T*, 172 F.3d at 1358, 50 USPQ2d at 1452 (“*AT&T*’s claimed process” uses “switching and recording mechanisms to create a signal useful for billing purposes.”). Moreover, it is axiomatic that dicta in one Federal Circuit panel decision cannot overrule the holding of an earlier panel decision. *George E. Warren Corp. v. United States*, 341 F.3d 1348, 1351 (Fed. Cir. 2003) (“We cannot simply overrule [a prior panel] decision, even if we were persuaded . . . that it is appropriate; to overrule a precedent, the court must rule en banc” (citing *Newell Cos. v. Kenney Mfg. Co.*, 864 F.2d 757, 765, 9 USPQ2d 1417, 1423 (Fed.Cir.1988))).

⁴ “A machine is a concrete thing, consisting of parts, or of certain devices and combination of devices.” *Burr v. Duryee*, 68 U.S. 531, 570 (1863). The term “manufacture” refers to “the production of articles for use from raw or prepared materials by giving to these materials new forms, qualities, properties, or combinations, whether by hand-labor or by machinery.” *Diamond v. Chakrabarty*, 447 U.S. 303, 308, 206 USPQ 193, 196-97 (1980) (quoting *American Fruit Growers, Inc. v. Brogdex Co.*, 283 U.S. 1, 11, 8 USPQ 131, 133 (1931)). A “composition of matter” by its own terms requires matter. *Chakrabarty*, 447 U.S. at 308, 206 USPQ at 196-97.

Appeal 2006-2107
Application 09/969,833

words, interpreting “process” as either transforming subject matter or implemented by one of the other three categories of inventions is rationally consistent with and proportional to the types of inventions patented under the other categories.⁵ See *Tilghman v. Proctor*, 102 U.S. 707, 722 (1880) (“where the result or effect is produced by chemical action, by the operation or application of some element or power of nature, or of one substance to another, such modes, methods, or operations are called processes.”); see also *AT&T*, 172 F.3d at 1356, 50 USPQ2d at 1450 (“any step-by-step process, be it electronic, chemical, or mechanical, involves an ‘algorithm’ in the broad sense of the term.”). Accordingly, we do not believe that the boundaries of “process” should be so expansive as to accommodate all “useful” methods.

(5)

Appellant’s Method Claims Are Nominally a Process

Appellant’s claims recite a method that employs computations to transform data in a processor coupled to a memory. Accordingly, the claims are nominally a process. See 35 U.S.C. § 100:

(“The term “process” means process, art or method, and includes a new use of a known process, machine, manufacture, composition of matter, or material.”)

However, no matter which of the four statutory categories a claim nominally fall within, we must still determine whether the claim is truly within the

⁵ We do not propose in this decision a comprehensive rule for defining patentable subject matter in all circumstances. Rather, this decision looks to whether Appellant’s claims fall outside the currently existing tests for eligibility and sees no reason to expand the existing tests should this prove to be the case.

Appeal 2006-2107
Application 09/969,833

meaning of the statute. We do so by determining whether the claimed invention:

- (i) Produces a “useful, concrete and tangible result.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1600-1601; and
- (ii) Is directed to one of the three categories of unpatentable subject matter: “laws of nature, natural phenomena, and abstract ideas.” *Diehr*, 450 U.S. at 185, 209 USPQ at 7.

(6)
*Appellant’s Method Claims Do Not Produce
“Useful, Concrete, and Tangible Result”*

As discussed above, the development of the Federal Circuit’s data transformation test was in response to a series of cases concerning the eligibility of machines and machine-implemented methods employing a mathematical algorithm. In assessing the eligibility of these specific types of claims, the court adopted a rule requiring such claims to produce a “useful, concrete and tangible result.” *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1600-1601.

The “useful, concrete, and tangible result” test first appeared in *Alappat*, which states: “This [claimed invention] 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.” *Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1557. The court in *Alappat* thus devised a standard to partition patentable inventions using mathematical algorithms from claims for disembodied mathematical concepts. *State Street* also involved claims to a machine employing a mathematical algorithm, but in this instance for managing a mutual fund investment portfolio. Finding the claim to be valid under § 101, *State Street* held that “transformation of

Appeal 2006-2107
Application 09/969,833

data ... by a machine through a series of mathematical calculations into a final share price, constitutes a practical application of a mathematical algorithm, formula, or calculation, because it produces ‘a useful, concrete and tangible result.’” *State Street* at 1373, 47 USPQ2d at 1601. Likewise, *AT&T* also ties this test to applications of mathematical algorithms:

“Because the claimed process applies the Boolean principle to produce a useful, concrete, and tangible result without pre-empting other uses of the mathematical principle, on its face the claimed process comfortably falls within the scope of § 101.” *AT&T*, 172 F.3d at 1358, 50 USPQ2d at 1452; *see also id.* at 1361, 50 USPQ2d at 1453 (concluding that “the focus is understood to be not on whether there is a mathematical algorithm at work, but on whether the algorithm-containing invention, as a whole, produces a tangible, useful result.”).

Accordingly, our understanding of the precedents at present is: Any computer program claimed as a machine implementing the program (*Alappat*, *State Street*) or as a method of a machine implementing the program (*AT&T*), is patentable if it transforms data and achieves a useful, concrete and tangible result (*State Street*, *AT&T*). Exceptions occur when the invention in actuality pre-empts an abstract idea, as in a mathematical algorithm (*Benson*, 409 U.S. at 71-72, 175 USPQ at 676-677).

We see the question before us to be, whether Appellant’s claimed “one or more values of a one-way chain”, is a useful, tangible, and concrete result? As discussed *supra*, the Federal Circuit regards the transformation of intangible subject matter to be such a useful, tangible, and concrete result, so long as data or signals represent some real world activity. However, we do not find data or signals in Appellant’s method claims which represent a real world activity such as found in *Arrhythmia*, *Alappat*, or *State Street*.

Appellant argues “output values of one-way chains . . . are in and of themselves useful, concrete and tangible results in the field of cryptography” because “such values, in and of themselves, can be used as passwords.” (Br. 6). We disagree. Contrary to Appellant’s arguments, the claims before us do not recite either an intended use of “cryptography” or a result where the output values are “passwords.” Further, even if both of these limitations alone were added to the claims, without additional limitations there would still be nothing in the claims that would meet the requirement of data or signals which represent some real world activity.

Also with respect to claims 6, 13, and 19, Appellant argues the recited limitation on the complexity or computational budget associated with generation of an output value and relocation of pegs is itself a useful, concrete and tangible result because it allows a given one-way chain to be implemented in a lightweight device having limited memory and processor resources. We disagree. Limiting the complexity or computational budget does not change the result of the method. Rather than adding to the “result” of the method as a whole, claims 6, 13, and 19, merely limit their results to a subset of the results of the claims from which they depend. As above, we do not find data or signals in these method claims which represent a real world activity.

(7)

Appellant’s Method Claims Run Afoul of the “Abstract Idea” Exception

The Supreme Court has held that “[e]xcluded from such patent protection are laws of nature, natural phenomena, and abstract ideas.” *Diehr*, 450 U.S. at 185, 209 USPQ at 7. “An idea of itself is not patentable.” *Diehr*, 450 U.S. at 185, 209 USPQ at 7 (quoting *Rubber-Tip Pencil Co. v.*

Appeal 2006-2107
Application 09/969,833

Howard, 20 Wall. 498, 507, 22 L.Ed. 410 (1874); *Benson*, 409 U.S. at 67, 175 USPQ at 675 (“[M]ental processes, and abstract intellectual concepts are not patentable.”); *see also id.* at 71, 175 USPQ at 676 (“It is conceded that one may not patent an idea.”). In contrast, “[i]t is now commonplace that an *application* of a law of nature or mathematical formula [or abstract idea] to a known structure or process may well be deserving of patent protection.” *Diehr*, 450 U.S. at 187, 209 USPQ at 8 (emphasis in original).

Clever claim drafting cannot circumvent these principles. That is, even when a claim appears to apply an idea or concept as part of a seemingly patentable process, one must ensure that it does not in reality seek patent protection for that idea in the abstract. *Diehr*, 450 U.S. at 191, 209 USPQ at 10. Similarly, one cannot patent a process that comprises “every substantial practical application” of an abstract idea, because such a patent “in practical effect would be a patent on the [abstract idea] itself.” *Benson*, 409 U.S. at 71-72, 175 USPQ 676.⁶ Such limitations on process patents are important because without them, “a competent draftsman [could] evade the recognized limitations on the type of subject matter eligible for patent protection.” *Diehr*, 450 U.S. at 192, 209 USPQ at 10.

Appellant has asked this Board to find that the Examiner erred because the claims do not involve a “particular” mathematical algorithm. In essence, Appellant has asked this Board to conclude that even when a claim pre-empting a “particular” mathematical algorithm would not be statutory

⁶ The observation in *State Street* that “[w]hether the patent’s claims are too broad to be patentable is not to be judged under § 101, but rather under §§ 102, 103, and 112” did not, nor could it, overrule the Supreme Court’s pre-emption doctrine. *See State Street*, 149 F.3d at 1377, 47 USPQ2d at 1604.

Appeal 2006-2107
Application 09/969,833

subject-matter, the claim would be statutory subject-matter if it instead pre-empted an “entire class” of mathematical algorithms. We do not agree.

The mere fact that the claims do not involve a “particular” mathematical algorithm is not by itself sufficient to show that the Examiner erred. Pre-empting an “entire class” of mathematical algorithms inherently includes pre-empting all “particular” mathematical algorithms included within that class.

Appellant’s method claims are directed to “generating one or more output values of a one-way chain.” That a “one-way chain” is a class of mathematical algorithms is readily apparent from Findings of Fact 3-10. Specifically, as shown in Finding of Fact 7, a so-called one-way chain is a sequence of values $v_1 . . . v_s$ such that $v_{i-1}=f(v_i)$.

Further, Appellant’s method claims were not limited to any particular art or technology, to any particular apparatus or machinery, or to any particular end use. Rather, Appellant’s method claims cover any use of the claimed method in a processor coupled to a memory, i.e., a general-purpose computer of any type. Because Appellant’s claimed “generating one or more output values of a one-way chain” has no substantial practical application except in applications (see Finding of Fact 2) performed by a computer (processor coupled to a memory), the method claims would “wholly pre-empt” all substantial applications of the claimed mathematical algorithm and in practical effect would be a patent on the algorithm itself. *See Benson*, 409 U.S. at 68-72, 175 USPQ at 675-677; *see also Alappat*, 33 F.3d at 1544, 31 USPQ2d at 1558 (quoting *Benson*).

(8)

Appellant's Method Claims Fall Outside The Scope Of 35 U.S.C. § 101

Therefore, we conclude Appellant's method claims are unpatentable under section 101 because, while they nominally fall into a statutory category, (i) they do not satisfy the "useful, concrete, and tangible result" test, and (ii) they seek to patent an abstract idea. Thus, claims 1-19 and 22 fall outside the scope of § 101.

(9)

Apparatus claim 20 Falls Outside The Scope Of 35 U.S.C. § 101

Appellant's apparatus claim is nominally a machine; however, for the same reasons discussed *supra* with respect to claim 1, we conclude the apparatus of claim 20 does not apply its abstract idea to produce a useful, concrete, and tangible result. Thus, the claimed apparatus falls outside the scope of § 101.

Additionally, for the same reasons discussed *supra* with respect to claim 1, we conclude the apparatus of claim 20 covers ("preempts") every substantial practical application of the abstract idea. We conclude that the claim is so broad that it is directed to the "abstract idea" itself, rather than a practical implementation of the concept.

(10)

Medium claim 21 Falls Outside The Scope Of 35 U.S.C. § 101

Appellant's apparatus claim is nominally a manufacture; however, for the same reasons discussed *supra* with respect to claim 1, we conclude the medium of claim 21 does not apply its abstract idea to produce a useful,

Appeal 2006-2107
Application 09/969,833

concrete, and tangible result. Thus, the claimed medium falls outside the scope of § 101.

Additionally, for the same reasons discussed *supra* with respect to claim 1, we conclude the medium of claim 21 covers (“preempts”) every substantial practical application of the abstract idea. We conclude that the claim is so broad that it is directed to the “abstract idea” itself, rather than a practical implementation of the concept.

V. CONCLUSIONS OF LAW

Appellant has failed to establish that the Examiner erred in rejecting claims 1-22 under 35 U.S.C. § 101.

Claims 1-22 are not patentable.

VI. DECISION

The decision of the Examiner, rejecting claims 1-22 under 35 U.S.C. § 101, is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

rwk

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