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PATENTAILITY OF COMPUTER PROGRAMS & COMPUTER RELATED INVENTIONS (CRIs) AT UNITED STATES PATENT & TRADEMARKS OFFICE (USPTO)

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1.0 Overview

Under the US laws, the Federal Government grants patents to inventors or assignees of inventors. Every patent grants to the patentee for the term of the patent[1], beginning at the grant of the patent, the exclusive right, privilege, and liberty of making, constructing, and using the invention and selling it to others to be used.

A patent is sometimes described as a contract between the inventor and the government. In consideration for the inventor disclosing the invention in the patent and making it available to the public for use after the expiration of the patent, the government grants to the inventor the right to exclude others from making, using, or selling the invention during the term of the patent[2].

1.1 The Patent Specification

Every patent has a similar structure. The two main parts of the patent are the "description" (sometimes called the "disclosure") and the "claims", and together they are called the "specification". The description and the claims serve two very different purposes:

(a) the description tells the public how to make or use the invention when the patent expires; and

(b) the claims describe what it is that is not to be made or used during the term of the patent.

1.2 The Claims

The claims define the monopoly in words. A patent may have many claims, each defining the invention in different words and in broad or narrow functional language.

In Canada an invention may be defined by a process claim, or as an apparatus which carries out the process, or both.

1.3 The Description (Disclosure)

The nature of the invention, together with how to carry out the invention, must be defined in the description. It must be clear, accurate, simple and easy to understand by the person or persons to whom the patent is directed, namely the skilled workers in the relevant field

[1]20 years for patents filed after October 1, 1989 per s. 44 of the Patent Act.
[2]Patent Act, s. 42.

In the case of a machine (for example, a computer), the best mode of operation must be described. In the case of a process (for example, the implementation of an algorithm by a computer), the necessary sequence of steps must be explained to distinguish the invention from prior publications, including patents (the "prior art")[3].

1.4 Statutory Subject Matter

The Patent Act provides that patent protection may be acquired for any "invention" defined under section 2 as follows:

"invention" means any new and useful art, process, machine, manufacture or composition of matter, or any new and useful improvement in any art, process, machine, manufacture or composition of matter; subject to the prohibition of subsection 27(8) that:

No patent shall be granted for any mere scientific principle or abstract theorem. In the United States, 35 U.S.C § 101 define patentable subject matter in similar terms: Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain patent therefore, subject to the conditions and requirements of this title.

Similarly, in the United States, certain things are excluded from patentability: laws of nature, physical phenomena and abstract ideas. An idea of itself is not patentable. A principle, in the abstract, is a fundamental truth; an original cause; a motive; these cannot be patented, as no one can claim in either of them an exclusive right.[4]

The U.S. Supreme Court held that the following were non-patentable subject matter as being abstract ideas:

- an algorithm to convert binary-coded decimal numerals into pure binary code[5] which, if patented would have wholly pre-empted the mathematical formula and, in practical effect, would have been a patent on the algorithm itself.[6]
- a procedure for monitoring the conditions during the catalytic conversion process in the petrochemical and oil-refining industries.[7] The application's only innovation was reliance on a mathematical algorithm.[8] Once the algorithm was assumed to be within the prior art, the application, considered as a whole, contained no patentable invention.[9] The prohibition against patenting abstract ideas "cannot be circumvented by attempting to limit the use of the formula to a particular technological environment" or adding "insignificant post solution activity."[10]

[3]Patent Act, subs. 27(3).
[4]Diamond v. Diehr, 450 U.S. 175, (U.S.S.C., 1981)
[5]Gottschalk v. Benson, 409 U. S. 63, 70 (1972)
[6]Ibid, at p. 72
[7]Parker v. Flook, 437 U. S. 584 (1978).
[8]Ibid, at pp. 585-586.
[9]Ibid, at p. 594.
[10]Diamond v. Diehr, 450 U.S. 175, (U.S.S.C., 1981).at pp. 191-192

In contrast, a previously unknown method for "molding raw, uncured synthetic rubber into cured precision products," using a mathematical formula to complete some of its several steps by way of a computer[11] was an industrial process and was proper subject matter.[12]

The U.S. Supreme Court in Chakrabarty considered that the choice of the term "any" to define patentable subject matter meant that Congress intended that patent laws would receive wide scope and that patentable subject matter should include ***"anything under the sun that is made by man"***.[13]

By signing NAFTA and the Uruguay Round of GATT, Canada imposed upon itself an obligation to make patents available for "any inventions... in all fields of technology".[14] There is to be no discrimination as to the field of technology unless it is a field of technology that fits under a specific exclusion. Software-related inventions are not so excluded.

1.5 Other pre-requisites to Patentability

Besides statutory subject matter, there are three other pre-requisites to patentability:

(a) Novelty;

(b) Utility; and

(c) Non-obviousness.

In order for there to be an invention, there must be both a concept and an implementation (a way of putting the concept into practical form)[15]. The inventor must have at least reduced his or her idea to a definite and practical shape before it can be said that an invention has been made[16]. The date an invention is made is established by showing that the invention was either described in enabling writing (or drawing) or built. While the machine does not have to be built, it is one way of establishing a date of invention.

1.5.1 Novelty (New)

For an invention to be patentable, it must be "new"[17] and must not have been previously made available to the public [18].In other words, the invention must not have been built before or described in a single document which contained sufficient information to allow someone to make the invention[19].

The invention may comprise a novel combination of old things[20],so long as it is not merely the `side-by-side' placement of old devices[21].

[11]Diamond v. Diehr, 450 U.S. 175, (U.S.S.C., 1981).at p-177
[12]Ibid, at p. 192-193
[13]Diamond v. Chakrabarty, 447 U.S. 303, 206 U.S.P.Q. 193 (U.S. Sup. Ct., 1980) at 197 [U.S.P.Q.].
[14]R.S.C. (1985) c. C-42, as amended.
[15]Reynolds v. Herbert Smith & Co. (1903), 20 R.P.C. 123 (Eng. C.A.) at 127; Diversified Products Corp. v. Tye-Sil Corp. (1991), 35 C.P.R. (3d) 350 (Fed. C.A.) per Décarry J. at 364-5.
[16]Penmutit Co. v. Borrowman, [1926] 4 D.L.R. 285, 43 R.P.C. 356 (Canada P.C.).
[17]*Patent Act*, s. 2.
[18]*Patent Act*, s. 28.2
[19]Sometimes called an enabling disclosure.
[20]Thermionics Ltd. v. Philco Products Ltd., [1943] S.C.R. 396 (S.C.C.) at 412-413; Canadian General Electric Co. v. Fada Radio Ltd. (1930), 47 R.P.C. 69 (Canada P.C.) at 90.
[21]British Celanese v. Courtaulds (1935), 2 R.P.C. 171 at 193 (U.K. H.L.). See also Lester v. Canada (Commissioner of Patents) (1946), 6 C.P.R. 2 (Can. Ex. Ct.) and Domtar Ltd v. MacMillan Bloedel Packaging Ltd. (1977), 33 C.P.R.

1.5.2 Utility (Useful)

In order to be protectable by a patent, an invention must also be "useful"[22]for the purpose for which it was designed[23].An invention has utility if it:

(a) gives a benefit to the public;

(b) is useful in achieving a particular purpose;

(c) makes a process better or cheaper;

(d) is advantageous under certain circumstances; and

(e) works.

Older case law held that an invention had to result in a "vendible product" in order for it to be patentable. The trend in other jurisdictions, and in Canada, requires that the invention produce a "technical result" or "practical application". It appears that commercial utility in Canada is also established by a method of earning licensing fees[24].

1.5.3 Non-obviousness (Inventive)

Through the case law, and now by statute[25],the Courts added the requirement of non-obviousness or inventive ingenuity. This arose out of a desire by the Courts not to allow a patent to cover any routine improvement. The test for inventiveness in Canada asks whether the invention would have been obvious to a hypothetical individual, possessed of the relevant prior art but lacking any inventive abilities[26].

1.6 Computer-Implemented Inventions

The Basic Principles:

As mentioned above, patents are granted only for inventions that claim subject matter defined in the Patent Act, namely, an 'art', 'process', 'machine' or 'composition of matter'. This is subject to the prohibition of subsection 27(8) which states that, "no patent shall issue for any mere scientific principle, or abstract theorem".

Although computer programs, in one sense, are a series of steps or instructions in a method, thirty years ago, Patent Offices around the world were uniformly reluctant to include software-related inventions as statutory subject matter. That reluctance has mostly vanished in the United States, Japan, and Korea, and is lessening in other countries.

(2d) 182 (Fed. T.D.), aff'd (1978), 1978 CarswellNat 554 (Fed. C.A.) at 189-90 [C.P.R.].

[22]Patent Act, s. 2.

[23]Mullard Radio Valve Co. v. Philco Radio & Television Corp. of Great Britain Ltd. (1935), 52 R.P.C. 261 (per Maugham O.J.) at 287.

[24]Progressive Games Inc. v. Canada (Commissioner of Patents) (1999), 3 C.P.R. (4th) 517 (Fed. T.D.) per Denault, J., aff'd (2000), 9 C.P.R. (4th) 479 (Fed. C.A.): the method was a commercially useful improvement to playing poker.

[25]Patent Act, s. 28.3.

[26]Free World Trust c. Électro Santé Inc., [2000] 2 S.C.R. 1024, 194 D.L.R. (4th) 232, 263 N.R. 150, 9 C.P.R. (4th) 168 (S.C.C.) at para. 44.

The treatment of computer programs in different countries differs on the applicability of certain principles sometimes used to analyze the patentability of a computer software-related invention. These principles are given below:

(1) *You can't patent math or science. Therefore, is the invention math, science therefore, not patentable), or applied math or applied science (and, therefore, patentable)?*

(2) *Computer programs "as such" are specifically prohibited as statutory subject matter in some jurisdictions (e.g., European Patent Convention) but, if the program achieves a further technical effect, then it is patentable.*

(3) *If the invention is more than just math or science, is the invention "as a whole" patentable? In some countries the question is, if it is a process, is there a "technical result"?*

Software-related inventions are now patentable in the United States and constitute a large portion of all patent applications. The firms being awarded the most patents by the USPTO in 2011 were information technology related firms e.g., IBM, Samsung, Canon, Panasonic, Toshiba and Microsoft[27]. One of the most prominent patent infringement suits involved software patents[28]. By all accounts, the debate is settled in the United States in favour of granting software patents.

In terms of evaluating statutory subject matter, in Diehr, the U.S. Supreme Court emphasized the need to consider the invention as a whole, rather than "dissecting the claims into old and new elements and then ignoring the presence of the old elements in the analysis."[29]

U.S. Case Law

The case law has evolved from allowing patents on software-controlled industrial processes and signal processors, to software that improved the functionality of a general purpose computer, to data formats that did likewise, to signal formats, to software stored on a diskette, and most recently to computerized (and even non-computerized) business methods (discussed further below). Some of the leading US cases are discussed below.

1. Gottschalk v. Benson, 409 U.S. 63, 175 U.S.P.Q. 673 (1972)

In 1972, the Supreme Court refused to grant a patent for a computer program on the basis that the application was attempting to claim a mathematical formula and the analytical steps involved in solving the formula to convert binary-coded decimal form numbers into pure binary forms. The Court noted that the claims "purported

[27]http://www.uspto.gov/web/offices/ac/ido/oeip/taf/topo_11.htm

[28]For a chronology of events concerning the NTP v. Research in Motion dispute over wireless email technology, see <http://news.com.com/BlackBerry+saved/2100-1047 3-6045880.html>. The dispute ended in a highly-publicized $600M settlement.

[29]Diamond v. Diehr, 450 U.S. 175, (U.S.S.C., 1981) at p. 188

to cover any use of the claimed method in a general-purpose digital computer"[30] and were not limited to any particular embodiment.[31]

Although expressed as an "abstract idea" case, the case was decided on the basis of pre-emption. The Court concluded that the invention was not eligible subject matter due to the abstract idea exception: the algorithm or generalized formulation to convert binary-coded decimal to pure binary was the abstract idea. Even though the claims required a computer, that was not a meaningful limitation, as the formula had no substantial practical application except in connection with a computer. The patent would wholly preempt the mathematical formula and, in practical effect, would be a patent on the formula itself.

Although the Court specifically stated that its decision did not preclude a patent for any program, it created that effect.[32]

2. Parker v. Flook, 437 US. 584, 198 U.S.P.Q. 193 (1978)

Flook attempted to patent a method for updating an alarm limit of at least one variable involved in a process for the catalytic conversion of hydrocarbons: industrial process variables were measured, a mathematical formula was used to calculate a new alarm limit and the previous alarm limit was adjusted to the newly calculated limit. Instead of analyzing the invention "as a whole" (as it should have at the time, and now correctly does), the Court in Flook applied a "point of novelty test". The only thing "new" in the Flook claims was the mathematical formula for calculating the updated alarm limit. The court considered the other steps in the process to be well-known. The claim did not wholly pre-empt the mathematical formula.

The Court viewed the process as an abstract idea: "if a claim is directed essentially to a method of calculating, using a mathematical formula, even if the solution is for a specific purpose, the claimed method is non-statutory".[33]

3. Diamond v. Diehr, 450 U.S. 175, 209 U.S.P.Q. 1 (1981)

Diamond v. Diehr was the first decision of the U.S. Supreme Court that held that a computer-controlled process was statutory subject matter. The Supreme Court restated the commonplace principle that "an application of a law of nature or mathematical formula to a known structure … may well be deserving of patent protection."27 The patent claimed a method of operating a rubber-moulding press by using a well known thermodynamic equation (Arrhenius) to control the curing time of synthetic rubber. The invention continuously measured the temperature in the press by using of a thermocouple and calculated continuously the predicted time when the cure would be completed using the Arrhenius equation and opening the press when the cure time had elapsed.

[30]Gottschalk v. Benson, 409 U.S. 63 at pp. 73-74.
[31]Gottschalk v. Benson, 175 U.S.P.Q. at 675.
[32]Ibid, 175 U.S.P.Q at 676.
[33]Parker v. Flook, 437 US. 584 at pp. 594-595.

In passing, the Court stated that an algorithm for execution by general purpose digital computer was like a law of nature, which could not be the subject of a patent. (This makes little, if any sense. A law of nature is a description of nature. An applied algorithm is a practical application of something.)

The Court distanced itself from the "point of novelty" analytical technique and held that the claims must be considered as a whole. Evidence of statutory subject matter included the transforming or reducing of an article to a different state or thing. The Court warned that merely limiting a mathematical formula to a particular technological environment or reciting insignificant post-solution activity will not render patentable what was an unpatentable principle. At the same time, the Court held that statutory subject matter does not become non-statutory merely due to the existence of a mathematical formula or computer program in the claim language.

The key in the allowance of the patent in the Diehr case appeared to be that the claims were only attempting to foreclose the use of the mathematical equation in conjunction with all the other steps in the claimed process and "did not seek to pre-empt the use of that equation".

The Supreme Court emphasized that, claims must be considered as a whole and that it is inappropriate to dissect the claims into old and new elements and then to ignore the presence of the old elements in the analysis.29

4. The Mathematical Loop: Freeman-Walter-Abele30

Beginning with Freeman, the U.S. Courts entered a many-yeared excursion (from1978 until Allapat in 1994) into creating a category of non-statutory subject matter: the mathematical algorithm. This excursion prevented or delayed the allowance of many software-related patents.

5. In Re: Freeman, F.2d 1237, 197 U.S.P.Q. 464 (C.C.P.A. 1978).

In 1978 in Freeman, the C.C.P.A. formulated a two-step process determining whether a claim preempted non-statutory subject matter: first, does the claim directly or indirectly recite an algorithm; second, does the claim, in its entirety, wholly preempt that algorithm[34].

Freeman's invention related to a typesetting system which retrieved mathematical characters or symbols from a font library and oriented them with respect to each other in order to be displayed and printed. The claimed process assigned concatenation points to each character and generated position signals specifying the relative position of the characters to the concatenation points in light of a local positioning algorithm that was described in the Freeman specification.

Freeman's invention was held not to be an algorithm in the Benson sense and, therefore, the second part of the test was not considered.

6. In re Walter, 618 F.2d 758m 205 U.S.P.Q. 397 (C.C.P.A. 1980)

In Walter, the scope of the second part of the Freeman step was restricted. Walter had invented a method of correlating signals from seismic prospecting using "partial product signals". (The method merely created new numbers calculated from collected real data.)

In Walter, the C.C.P.A. held that to be statutory subject matter, the mathematical algorithm must either define structural relationships between physical elements of the claim in an apparatus claim or refine or limit claim

[34]Ibid 197 U.S.P.Q. at 471.

steps in a process claim. Field of use limitations in the preamble and post-solution activity of a calculation would not render the claim statutory. The algorithm had to be applied in some manner to physical elements or process steps.[35]

The method claims in the Walter application contained data-gathering steps, a mathematical method of correlation and post-solution activity consisting of outputting partial product signals. The Court concluded that Walter's "partial product signals" did not relate to a physical structure.

In the Walter case, there were apparatus claims that essentially recited the language of the method claims but used the language "means for" to describe the apparatus carrying out the specific function. The Court concluded that Walter had not demonstrated that his apparatus was drawn to a specific apparatus. Under s. 112(6), the "means for" were to be limited to what was disclosed. If the "means" are defined functionally in the disclosure and their equivalents are so broad (i.e. a general purpose computer) that they encompass any and every means for performing the functions, the apparatus claim is really attempting to monopolize the functions themselves.

7. In re Abele, 684 F.2d 902, 214 U.S.P.Q. 682 (C.C.P.A. 1982)

In Abele, the invention related to a method of displaying an x-ray image. A weighting function was used to eliminate artifacts. Abele modified the second step of the Freeman-Walter test by requiring that the algorithm merely be applied in any manner to physical elements or process steps. If the claim was "otherwise statutory" without the algorithm, the claim would still present statutory subject matter when the algorithm was included.

In examining one of the claims in the Abele application, the Court noted that the claim presented production, detection and display steps of a conventional CAT-scan process. The mathematical algorithm acted on real data (x-ray attenuation data). Claim 6 in the Abele application adequately recited an application of an algorithm to process steps which were themselves part of an overall process which was statutory.

8. Arrhythmia Research Technology v. Corazonix Corp., 958 F.2d 1053, U.S.P.Q. 2d 1033 (Fed. Cir. 1992)

In the Arrhythmia case, the patent related to an invention to monitor a patient's electrocardiograph signals for the presence of high-frequency energy in a trailing portion of the QRS complexes. This allowed doctors to predict the patient's susceptibility to ventricular tachycardia. (The system was processing real data – data collected from a physical phenomenon: electrical signals from the human heart.)

The plaintiff ("ART") argued that the electrocardiograph signals were physical electrical signals, and the recited method steps redefined those electrical signals. The defendant argued that the patent merely related to comparing one number to another and that the claimed output was much like the binary numbers of the Benson case, or the alarm limit of Flook. The only "structure" disclosed in the plaintiff's patent was a computer. Thus, the defendant argued that there was no limit to the scope of the claims.

The Court applied the Freeman-Walter-Abele standard, holding that the steps of converting, applying, determining and comparing were physical process steps that transformed one physical electrical signal into another. The product in the ART patent was not a mathematical abstraction. It was a measure in microvolts of a specified heart activity.

[35]In re Walter, 205 U.S. P.Q. at 407.

In a preview of decisions to come, the Court recognized that in Diehr, the Supreme Court had indicated that a subject matter determination could be expressed in terms of being "abstract" or not:

> *"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."*[36]

Thus a claim to a specific process or apparatus that is implemented in accordance with a mathematical algorithm will generally satisfy s. 101 as statutory subject matter.

9. In Re Alappat, 23 U.S.P.Q. 2d 1340(Bd. Pat. App. & Intf. 1992) - Back to the Primary Authorities

Alappat reflected a return to the primary authorities and effectively put an end to the Freeman-Walter-Abele test.

The invention of Alappat was a rasterizer. It processed a digitally-sampled input waveform to provide anti-aliased pixel illumination intensity data for display on a cathode ray tube. The specification in the Alappat application described well-known digital circuits which correlated to each of the "means plus function" elements of the claims. The patent was directed to a machine, one of the four categories of statutory subject matter.

The majority held that claim 15 (the claim to a rasterizer) was patentable. The preamble specifically recited the claimed rasterizer converted waveform data into output illumination data for display. The means elements recited in the body of the claim made reference not only to the inputted waveform data recited in the preamble, but also to the output illumination data recited in the preamble. The claim therefore defined a combination of elements constituting a machine for producing an anti-aliased waveform.

10. AT&T v. Excel Communications, CAFC, 1999

In AT&T v. Excel Communications[37], AT&T sued Excel Communications on a patent entitled "Call Message Recording for Telephone Systems". The United States District Court for the District of Delaware granted summary judgment to Excel Communications, holding that the patent was invalid for failure to claim statutory subject matter. The U.S. Court of Appeals for the Federal Circuit reversed that decision, and remanded the case for further proceedings.

The invention related to a message record for long-distance telephone calls that was enhanced by adding a primary inter-exchange carrier ("PIC") indicator. The indicator aids long-distance carriers in providing differential billing treatment for subscribers, depending upon whether a subscriber called someone with the same or a different long-distance carrier. The PIC carries the long-distance calls between local exchange carriers.

The court echoed their reasoning from the State Street Bank & Trust Co. v. Signature Financial Group, Inc. decision, where they held that "unpatentable mathematical algorithms are identifiable by showing that they are merely abstract ideas constituting disembodied concepts or truths that are not 'useful' to be patentable, an algorithm must be applied in a 'useful' way"[38].

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[36]Arrhythmia Research Technology v. Corazonix Corp., 22 U.S.P.Q. 2d 1033 at 1036.

[37]172 F.3d 1352 (Fed. Cir. 1999)

[38]149 F. 3d at 1374, 47 U.S.P.Q. 2d 1596 (Fed. Cir. 1998) at 1601 [hereinafter State Street]; cert denied by the U.S. Supreme Court, January 11, 1999

In analysing AT&T's invention, it noted that AT&T was claiming only a process that used the principle in order to determine the value of the PIC indicator. Because the claim process applied the principle to produce a useful, concrete, tangible result without preempting other uses of the mathematical principle, on its face, the claimed process was statutory subject matter. The Court noted that "physical transformations" is not an invariable requirement of statutory subject matter, but is merely one example of how a mathematical algorithm may bring about a useful application.

The U.S. Court of Appeal for the Federal Circuit stated:

> *"Whatever may be left of the earlier test [Freeman-Walter-Abele], if anything, this type of physical limitations analysis seems of little value because, after Diehr and Alappat, the mere fact that a claimed invention involves inputting numbers, calculating numbers, outputting numbers, and storing numbers, in and of itself, would not render it non-statutory subject matter, unless, of course, its operation does not produce a 'useful, concrete and tangible result'."*[39]

Data Structures in Computer Programmes and Computer implemented Inventions

The following are some of the leading cases related to Data Structures:

11. In re Beauregard, Decision of Board of Appeals and Interferences, dated September 29, 1993, Appeal No. 93-0378

The invention in the Beauregard application was a computer program used in a computer system to fill polygons displayed on a graphics display device. The invention minimized the time taken to fill in the pixels in a polygon. The "article of manufacture" and "product" claims recited a "computer-usable medium, having computer readable program code means embodied therein" followed by a functional description of the software. The Federal Circuit remanded Beauregard to the Patent Office in accordance with some concessions from the Commissioner of Patents, namely, that computer programs embodied in a tangible medium, such as floppy diskettes, are patentable subject matter and, further, that the printed matter doctrine is not applicable.

12. In Re: Warmerdam, 33 F. 3d 1354, 31 U.S.P.Q. 2d 1754 (Fed. Cir. 1994)

Warmerdam claimed to have invented a data structure which was a hierarchy of spheres on the medial axis of a robot. The invention assisted the robot in avoiding collisions with other moving or stationary objects. The spheres approximated the envelope of the space occupied by the robot. Collisions could be predicted if the path of the robot's movement intersected with a sphere. Warmerdam claimed that the computation of the hierarchy of spheres on a medial axis was more efficient that what was disclosed in the prior art.

The Court concluded that the proper test was not finding whether there was a mathematical algorithm, but rather in determining whether the claimed invention, considered as a whole, is in one of the three non-statutory categories as determined by Diehr, namely "laws of nature, natural phenomena and abstract ideas". Claim 5 (a machine having a memory which contains data representing a bubble hierarchy generated by the method of any of claims 1 through 4) was for a machine and was clearly patentable subject matter.

Programs stored on memory

[39]Ibid 149 F. 3d at 1368, 47 U.S.P.Q. 2d at 1602 quoting Alappat, 33 F.3d at 1544, 31 U.S.P.Q. 2d at 1557 as quoted in AT&T v. Excel.

13. In re Lowry, 32 U.S.P.Q. 2d 1031 (Fed. Cir. 1994)

In Lowry[40], the Federal Circuit held that a claim reciting essentially a memory with data stored thereon was patentable subject matter. The stored data was a data structure that organized information in the data base according to an attributive data model.

The Court rejected the "printed matter" cases for the claim data structures, because the Lowry invention required that the information be processed, not by the mind, but by a machine, the computer. Furthermore, the data structures in the Lowry application were not analogous to printed matter. The claimed data structure dictated how application programs managed information and, therefore, Lowry's claims defined the functional characteristics of the memory[41]. The court considered that Lowry's data structures imposed a physical organization on the data. The data structures are specific electrical or magnetic structural elements in a memory. The data structures provided tangible benefits. It was more easily accessed, stored and erased. The date elements allowed the computer to operate more efficiently.

More recently, however, in Re Nuijten[42], after the USPTO allowed claims to a method of embedding a digital watermark into an audio file to prevent or control copying, an arrangement for embedding supplemental data in a signal and a storage medium having stored thereon a signal with embedded supplemental data, the CAFC held that the signal itself – physical but transitory forms of signal transmission such as radio broadcasts, electrical signals through a wire, and light pulses through a fiber-optic cable – were not statutory subject matter.[43] While a transitory signal made of electrical or electromagnetic variances is physical and real, it is not a "machine" as that term is used in 35 U.S.C. §101 because it is not made of parts or devices in any mechanical sense[44] nor is it an article of manufacture as being tangible articles or commodities,[45]nor, as energy, a composition of matter.[46]

On February 23, 2010, a notice[47] was issued by the USPTO Director suggesting, because broadly worded claim to computer-readable media could include signals and would be rejected, that such claims be narrowed to be made statutory subject matter under 35 U.S.C. § 101 by adding the limitation "non-transitory" to the claim.

1.7 USPTO Guidelines

In the United States Patent and Trademarks Office (USPTO), the Examiners determine whether an invention is statutory subject matter with reference to the Manual of Patent Examining Procedure ("MPEP") as modified by:

- The Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. § 101 dated August 24, 2009[48] (***the "August 2009 Interim Instructions***") with respect to machine, composition and manufacture claims; and

[40]In re Lowry, 32 F.3d 1579, 32 U.S.P.Q.2d 1031 (Fed. Cir. 1994)
[41]Ibid at 1034.
[42]500 F.3d 1346 (Fed. Cir. 2007).
[43]Ibid, at p. 1353.
[44]Ibid, at pp. 1355-56.
[45]Ibid, at pp. 1356.
[46]Ibid, at pp. 1357.
[47]Subject Matter Eligibility of Computer Readable Media (2010) at http://www.uspto.gov/web/offices/com/sol/og/2010/week08/TOC.htm#ref20
[48]http://www.uspto.gov/web/offices/pac/dapp/opla/2009-08-25_interim_101_instructions.pdf

- The Interim Guidance for Determining Subject Matter Eligibility for Process Claims in View of Bilski v. Kappos[49] (***the "July 2010 Interim Bilski Guidance"***)

1.8 The August 2009 Interim Instructions

Computer-related inventions have become so mainstream, that the August 2009 Interim Guidelines spend little text dealing with them. They provide that:

- A computer program per se, is not statutory subject matter.[50]
- a claim to a computer readable medium that can be a compact disc or a carrier wave covers a non-statutory embodiment and therefore should be rejected under § 101 as being directed to non-statutory subject matter.[51]
- Conversely, a printed circuit board or a computer programmed with executable instructions is typically construed as a base structure combined with functional descriptive material that could create a patentable distinction over the prior art.[52]
- With respect to the machine (of the machine or transformation test):
    - For computer implemented processes, the "machine" is often disclosed as a general purpose computer. In these cases, the general purpose computer may be sufficiently "particular" when programmed to perform the process steps. 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. To qualify as a particular machine under the test, the claim must clearly convey that the computer is programmed to perform the steps of the method because such programming, in effect, creates a special purpose computer limited to the use of the particularly claimed combination of elements (i.e., the programmed instructions) performing the particularly claimed combination of functions. If the claim is so abstract and sweeping that performing the process as claimed would cover substantially all practical applications of a judicial exception, such as a mathematical algorithm, the claim would not satisfy the test as the machine would not be sufficiently particular.
- In the examples section, it provides:
    - Product Example: Claim 3 – Computer-readable Medium
- Claim 3. A non-transitory computer-readable storage medium with an executable program stored thereon, wherein the program instructs a microprocessor to perform the following steps:
    - sorting results of a search into groups based on a first characteristic;
- ranking the results based on a second characteristic using a mathematical formula [f]; and
- comparing the ranked results to a predetermined list of desired results to evaluate the success of the search.

[49]www.uspto.gov/patents/law/exam/bilski_guidance_27jul2010.pdf
[50]Ibid, at p. 2.
[51]Ibid, at p. 2
[52]*Ibid*, at p. 4.

- Is the claim directed to a manufacture? (P1)
  - YES - it is an article (a non-transitory storage medium) produced from raw or prepared materials
- Does it recite a judicial exception? (P3)
  - YES - it recites a mathematical algorithm.
- Is it directed to a practical application? (P4)
  - YES - evidenced by the tangible embodiment of the computer readable storage medium.
- Is the claim directed to substantially all practical applications of the mathematical algorithm? (P5)
  - NO – there are other substantial uses of the algorithm than using it in evaluating search results in a program stored on the particular claimed manufacture. As there are other ways to use the algorithm, for example, with different programmed steps, not every use is covered by the claim.
  - The claim is eligible (P6).54
  - A tangible medium including a computer program should be evaluated to determine if there is a functional relationship between the computer program and the medium for purposes of distinguishing over prior art, not for subject matter eligibility.55

The Interim Instructions provide two examples of computer-related technology:

- Process example: Claim 4 - No Machine or Transformation Claimed
  - Claim 4. A method of evaluating search results, comprising:
  - sorting the results into groups based on a first characteristic;
  - ranking the results based on a second characteristic; and
  - comparing the ranked results to a predetermined list of desired results to evaluate the success of the search.
- Under the BRI, each step could be done by hand or on a programmed computer.
  - Is there a particular machine? (M2)
    - NO - there is no machine explicitly recited or inherently required
  - Is there a transformation of an article? (M5) – NO
  - Claim is not eligible (M7).56

The 2009 Interim Instructions also provides flowcharts for determining proper subject matter, which are reproduced in Appendix “A”.

1.9 The July 2010 Interim Bilski Guidelines

The July 2010 Interim Bilski Guidance provides a non-exhaustive list of factors to be considered in determining whether a process is abstract and not patentable. It includes the machine or transformation test as factors favouring patentability.

The Guideline directs:

“Each of the factors relevant to the particular patent application should be weighed to determine whether the method is claiming an abstract idea by covering a general concept, or combination of concepts, or whether the method is limited to a particular practical application of the concept. The presence or absence of a single factor

will not be determinative as the relevant factors need to be considered and weighed to make a proper determination as to whether the claim as a whole is drawn to an abstract idea such that the claim would effectively grant a monopoly over an abstract idea and be ineligible for patent protection."

The Guideline lists four factors:

1. **Machine**:

   Does the method involve or is it executed by a particular machine or apparatus? If it is, then it favours patentability. In such case, the following factors favour patentability:

   a. The method involves a particular machine and not a general one;
   b. There is integral use of the machine or apparatus to perform the method;
   c. The machine is not merely the object on which the method operates;
   d. The machine does not contribute only nominally or insignificantly to the execution of the claimed method (e.g. not just a data gathering step or a field of use limitation); and
   e. Whether and if so, how much, the machine limits execution of the method steps.

2. **Transformation of a Particular Article:**

   Does performance of the method result in or otherwise involve a transformation of a particular article? If it does, it favours patentability. In such case, the following factors favour patentability:

   a. The transformation is more particular than general. It applies to a specifically identified article rather than one generically recited;
   b. The nature of the transformation in terms of its type and extent (such as in a different function or use of the article);
   c. The nature of what is transformed: The article is transformed rather than a concept or contractual obligation;
   d. The transformation imposes meaningful limits on the execution of the claimed method steps; and
   e. The transformation is not extra solution activity or a field-of-use: It does not contribute only nominally or insignificantly to the execution of the method.

3. **Application of a Law of Nature**:

   Does the performance of the method involve an application of a law of nature, even in the absence of a particular machine or transformation? If it does, it favours patentability. In such case, the following factors favour patentability:

   a. The particularity of the application: Does the method not apply across many fields of endeavor (such as reciting an effect of a law of nature or claims every mode of accomplishing that effect)?;
   b. Does the method not involve subjective determinations such as a particular way of thinking about, or reacting to, a law of nature;
   c. The extent to which, and how, the application imposes meaningful limits on the execution of the claimed method steps. It does not contribute only nominally or insignificantly to the execution of the method.

4. **Not involving a General Concept** :

If a general concept (a principle, plan or scheme) is used in executing the method, it could be a clue that the claim is drawn to an (unpatentable) abstract idea. In such case, the following factors favour patentability:

a. The use of the concept as claimed would not preempt the use of the concept in other fields;
b. The claim is not so broad as to encompass both known and unknown uses of the concept;
c. The claim does not cover all possible solutions to a particular problem;
d. The concept is not disembodied but is instantiated by being implemented in some tangible way;
e. The mechanism by which the concept is implemented is observable and verifiable rather than subjective or imperceptible; and

The Guideline listed examples of general concepts:

- Basic economic practices or theories (e.g., hedging, insurance, financial transactions, marketing);
- Basic legal theories (e.g., contracts, dispute resolution, rules of law);
- Mathematical concepts (e.g., algorithms, spatial relationships, geometry);
- Mental activity (e.g., forming a judgment, observation, evaluation, or opinion);
- Interpersonal interactions or relationships (e.g., conversing, dating);
- Teaching concepts (e.g., memorization, repetition);
- Human behavior (e.g., exercising, wearing clothing, following rules or instructions); and
- Instructing ‘‘how business should be conducted’’.