

What Kinds of Computer-Software-Related Advances (if Any) Are Eligible for Patents? Part I

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..... To what kinds of thing should the patent system apply is a question that has troubled the US courts since the middle of the 19th century. The grandiose dreams or delusions of Samuel Morse brought the question to the Supreme Court in 1850, when the validity of his patent on the telegraph was challenged. The Court upheld most, but not all, of Morse's patent.¹

Morse's achievement, as the Supreme Court perceived it, was overcoming the problem that, when a simple circuit transmitted a signal, that signal sank into the noise on the line after going 20 or 30 miles. Many others had failed to solve the problem. "The great difficulty in their way," the Supreme Court said, "was the fact that the galvanic current, however strong in the beginning, became gradually weaker as it advanced on the wire; and was not strong enough to produce a mechanical effect, after a certain distance had been traversed." (See Fig-

ures 1 and 2.) To send a signal from Baltimore to Washington would require thousands of volts and high currents—not feasible at a time when making a pickled frog's legs twitch was a major scientific achievement in the application of "electro-galvanic force."

Morse's great invention, the Supreme Court said, was his "plan for combining two or more electric or galvanic circuits, with independent batteries for the purpose of overcoming the diminished force of electromagnetism in long circuits." This is illustrated in Figure 3. Thus, his invention replaced the simple circuit of Figure 1 with a cascade of relays (called "repeaters"), which he spaced about every 15 or 20 miles. The intervals were sufficiently short that the signal was restored regularly to substantially its initial level before the noise could swamp it out.

In other words, Morse cascaded a series of nonlinear amplifiers, each of

which supplied power to the following amplifier in the series, so that each time the signal was rescued from the noise before signal amplitude fell to the noise level. The resulting graph of the signal would then be as if Figure 2 were replicated side by side many times toward the right, with a vertical displacement upward sufficient to keep the total amplitude from ever falling down to the noise amplitude level. See Figure 4.

Morse's patent claimed the invention in a number of different legally acceptable ways. The Supreme Court saw no problem with Morse's claim to his particular apparatus or to his claiming a process for telecommunications by means of using his apparatus. But Morse had imperial dreams: In his famous (or notorious) claim 8, he also claimed the use of the electromagnetic force (EMF) or galvanic current, however developed, for transmitting intelligible information at any distance.² The Supreme Court held this broadest of his claims invalid. The Court pointed to the fact that Morse had not described every possible way to use EMF for telecommunications, so as to enable others to engage in such uses. Yet, he would shut the door against patents for others who in fact discovered and

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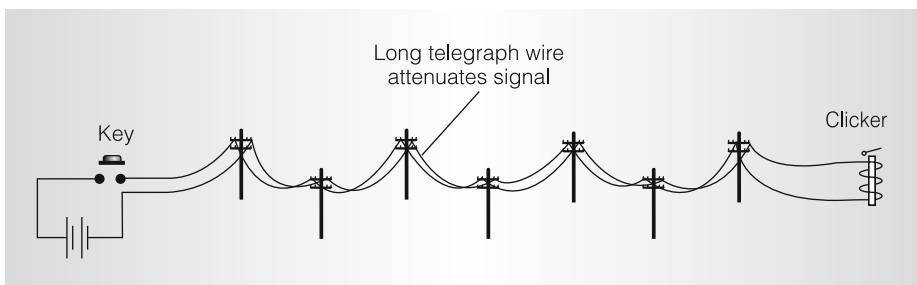


Figure 1. The telegraph problem: transmitting signals over long distance.

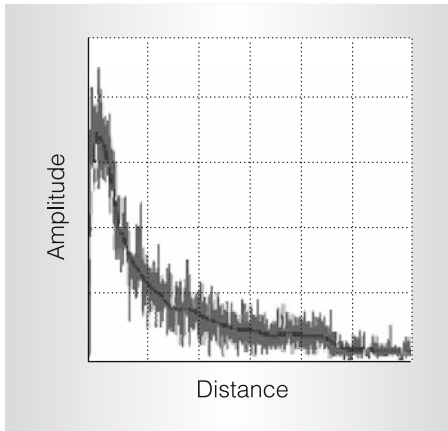


Figure 2. As distance increases, sum of noise and signal decreases until signal level approximates or is less than noise level.

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taught such further telecommunications expedients. That would be unjust to them and the public. It would also tend to discourage, rather than promote, further inventive progress in the field, for it would withdraw the incentives of the patent system from the entire field of electronic telecommunication. The Court allowed that Morse deserved praise for his invention of the repeater system of telecommunication, which he disclosed in his patent. "But he has not discovered that the electro-magnetic current, used as motive power, in any other method, and with any other combination, will do as well."

In claim 8, Morse claimed the invention at such a high level of abstraction and generality that he effectively claimed an idea without teaching others, with the same breadth as his claim, how

to exploit the idea. He thus claimed more than he invented and contributed to technological knowledge. He claimed the idea itself—that is, using EMF for telecommunication purposes—rather than a concrete implementation of the idea, such as performing telecommunication in a manner that keeps an electromagnetic signal from becoming lost in the ambient noise by periodically boosting signal level with a repeater circuit. The particular device used for performing the invention was critical to providing definiteness and reasonable limits to the claim. Yet, Morse omitted that from the claim.

The Supreme Court's decision in the *Morse* case became the principal legal authority on patent eligibility.³ When the patentability of software-related inventions first came before the Supreme Court, in the 1970s, the Court turned to the *Morse* case for guidance. In the *Benson* case, and succeeding cases, the courts found that a principal clue to the eligibility of a process for patenting is whether the underlying idea or principle is claimed in terms of using a new, nontrivial implementing device, in which case the claim is patent-eligible—or instead the idea is claimed either with no limitation to any particular device or else its implementation with a device is trivial on its face once one has the idea, in which case the claim is ineligible.⁴ Without proper device-implementation limitations, the scope of the claim is virtually unlimited. It is so broad that it covers and thus preempts the idea itself. The *Morse* decision, among others, suggests that patents on ideas are more likely to hinder than promote the pro-

gress of technology. As Justice Breyer explained in 2006:

Sometimes their presence can discourage research by impeding the free exchange of information, for example by forcing researchers to avoid the use of potentially patented ideas, by leading them to conduct costly and time-consuming searches of existing or pending patents, by requiring complex licensing arrangements, and by raising the costs of using the patented information, sometimes prohibitively so.

...Thus, the Court has recognized that phenomena of nature, though just discovered, mental processes, and abstract intellectual concepts are the basic tools of scientific and technological work. It has treated fundamental scientific principles as part of the storehouse of knowledge and manifestations of laws of nature as free to all men and reserved exclusively to none. And its doing so reflects a basic judgment that protection in such cases, despite its potentially positive incentive effects, would too often severely interfere with, or discourage, development and the further spread of useful knowledge itself.⁵

The Supreme Court has also recognized that some processes are patent-eligible even though the claim to them is not limited to a particular implementing device. If a process transforms one substance into another substance, the process is patent-eligible regardless of the apparatus used.⁶ (This "transformation" exception, however, is usually not relevant to software-related inventions.)

Federal Circuit revolution

Starting in 1995, the Federal Circuit began to change the interpretation of the law on patent-eligibility. In that year, the court heard en banc (a hearing before all 12 judges of the court sitting together, rather than the usual panel of three) *In re Alappat*, a case on a system for eliminating "jaggies" in screen displays by what might have been a software procedure or a use of hardware.⁷ The case had so many issues, and the court was so fragmented on them, that it was difficult to tell what the court actually held. But it later turned out

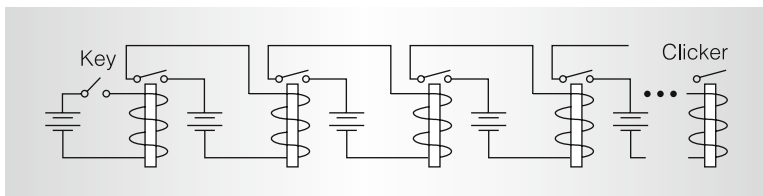


Figure 3. Samuel Morse replaced the simple circuit with a cascade of repeaters spaced every 15 or 20 miles.

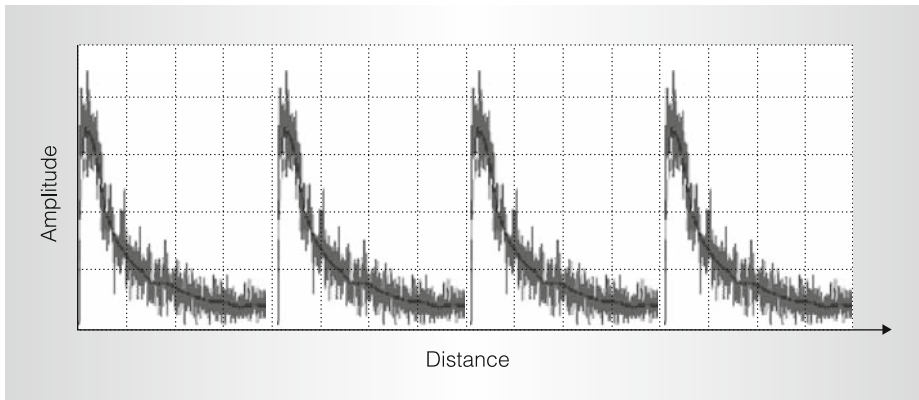


Figure 4. Morse's cascade arrangement ensured that the signal was restored regularly before the noise could swamp it out.

that this decision, the last en banc decision of the Federal Circuit to date on patent-eligibility, marked a significant change of direction for the court.

The court took a wrong turn in its panel decisions after *Alappat* by abandoning the Supreme Court's device-implementation test. *Alappat*, although ambiguous, did not expressly and clearly reject those teachings: its text lent itself to a possible reading that *Alappat* continued existing precedent in effect—but it lent itself also to an alternate interpretation. This interpretation, later adopted in the *State Street* case, the next important Federal Circuit decision on patent-eligibility, was a radical rejection of earlier precedent. Moreover, the intent of the *Alappat* opinion was uncertain because it distinguished, rather than overruled, case law inconsistent with its result: it characterized the earlier judicial rulings as holding only that business methods (not involved in *Alappat*) were patent-ineligible because they were not in the enumerated categories of § 101 of the patent code, rather than as holdings that defined what were patent-ineligible abstract software ideas.⁸ Accordingly, *Alappat* seemed on its face at least possibly to be no departure from prior decisional law on the patent-ineligibility of abstract software ideas.

That left patent-eligibility law ambiguous until the Federal Circuit's 1998 *State Street* and then *Excel* panel decisions held squarely that business methods

were patent-eligible, even though they lacked both nontrivial device limitations and substance transformation.⁹ Those decisions respectively upheld the patent-eligibility of a tax-avoidance scheme and an expedient for attracting telephone customers by giving discounts when both the callers and their called parties used the same telephone company. In these cases, the Federal Circuit interpreted the *Alappat* decision to support a "useful, concrete, and tangible" standard for patent-eligibility: under this legal test a process or product is patent-eligible if it is useful, concrete, and tangible. By so ruling, these decisions misread the decisions of the Supreme Court and effectively read any patent-eligibility test out of the patent law. The reason is that virtually any advance qualifies for patenthood under this test. Thus, in the *LabCorp* case, one Supreme Court Justice pointed out how the Federal Circuit's current test makes things patent-eligible that the Supreme Court has expressly held patent-ineligible.¹⁰ Perhaps even Morse's imperial claim to the use of EMF for telecommunications would satisfy the "useful, concrete, and tangible" test.

Current state of affairs

These developments in the Federal Circuit led to a negative reaction in Congress and among some segments of the electronics and information technology industries. Several minority opin-

ions in the Supreme Court questioned what the Federal Circuit has been doing and remarked adversely on business-method patents and similar expansionist patent developments.¹¹ The US Patent and Trademark Office (PTO), after years of submissiveness, suddenly regained its feistiness in the last several years. It began to reject extreme patent applications that perhaps passed the Federal Circuit's "useful, concrete, and tangible" test,

but flunked the tests that the Supreme Court had laid down. This has culminated in three recent Federal Circuit decisions. In the first, the *Nuitjen* case, the court held that signals are patent-ineligible because the statute does not extend to intangible, incorporeal things, especially when transitory and ephemeral.¹² Next, in the *Comiskey* case, the court revived the doctrine that a series of mental steps not requiring use of a machine was patent-ineligible.¹³ Finally, in May 2008, the Federal Circuit heard argument of *In re Bilski* before the entire panel of 12 judges; a decision is anticipated in a few months.

Bilski involves a claim to a business method—hedging against risk of upward fluctuations in the price of an input for a product by buying counteracting futures in a total dollar amount equal to the total dollar value of the input that will go into the user's requirements of that input for the period being hedged.

The result in *Bilski* is likely to be an abandonment (under much hostile fire) of the Federal Circuit's "useful, concrete, and tangible" standard of patent-eligibility and a simple restatement of the rule of the *Benson* and other 30-year-old precedents of the Supreme Court—which are to the effect that processes that do not transform substances are patent-ineligible when they are not implemented by a device in a nontrivial manner. In the remainder of this issue's Micro Law column, I will

develop in more detail what that means. In the next issue, Part II, I will turn to a more fundamental test of patent-eligibility—one dictated by the Constitution—that the claimed invention must be within the “useful Arts” as the Constitution uses that term in Article I, § 8, clause 8.¹⁴ (To foreshadow that briefly, other precedents already hold that Article I, § 8, clause 8 of the Constitution limits Congress’s authority to grant patents.¹⁵ A process that is not within the useful Arts, or at least the same kind of thing as or akin to something within the useful Arts, is not the kind of process that the Constitution, and therefore the patent statute, authorizes.¹⁶)

Device-implementation test

Claimed processes typically implement some underlying scientific principle, phenomenon of nature, or abstract idea (“underlying principle”) by using a device.¹⁷ Thus, the method of performing telecommunication by transmitting an electrical signal that is periodically amplified above the ambient noise level is implemented, according to Morse’s system, by using a series of electromagnetic relays or repeaters cascaded.¹⁸ (It could be effectuated by other devices—for example, Schmitt Triggers or optoelectronic equivalents—but those are not what Morse disclosed.)

A large body of case law addresses processes that depart materially from what was previously known only in their use of a different (often new) underlying principle. The process may require use of no device at all—as in the case of a process for communicating intelligible signs at any distance by use of EMF, however developed (Morse’s claim 8). In that case, the process will be patent-ineligible because the patent entirely preempts others’ use of the underlying principle.

Such a process may instead require only facially trivial device implementation. For example, one case involved the problem that different nitrogen-fixing plants required different bacteria, which typically inhibited or interfered with one

another. Hence, farmers needed to stock an inventory of packages of different bacterial compositions, which was inconvenient. An inventor discovered some species that did not interfere with one another and thus he was able to combine them in a single package. The patent claimed a package of nitrogen-fixing bacteria that worked for different plants where the package contained several different non-mutually-inhibitive bacterial strains, each of the strains respectively specific for one of the several plants. The Supreme Court held the patent invalid as, in effect, a patent on the natural principle that certain bacteria did not interfere with one another. Once the natural principle was known, the implementation was trivial on its face.¹⁹

Another such case involved pepsin, which was medicinally useful when absorbed in the small intestine, but infeasible to administer because gastric acids in the stomach inactivated the pepsin. The allegedly inventive solution was to package the pepsin in an acid-resistant capsule that did not dissolve until it got through the stomach into the intestine. Again, once the natural principle was known the solution was facially trivial.²⁰ As the Supreme Court’s *Flook* decision explains, when it must be conceded (as it was in that case) that the claim contains no substantial departure from what was already known, except for use of the underlying principle, then it must be concluded that the claim is not patent-eligible because the underlying principle must be treated as if it too were already known.²¹

These cases must be contrasted with those involving processes that are *not* limited in their departure from what is already known merely to their incorporation or use of a given new or old scientific principle, natural phenomenon, or abstract idea. They are patent-eligible when tied to a device implementation specially adapted for performing the process and not concededly old or facially trivial.²² An example of such a case was that of Bell’s telephone, the

patent to which the Supreme Court held valid and infringed. Bell claimed a voice-telecommunication process using specified apparatus—either a variable-resistance or electromagnetic (“magneto”) transducer. (Curiously, Bell’s apparatus patent claims did him no good. He thought that the magneto approach was vastly superior and the variable-resistance device of no value, so that he claimed only the magneto apparatus. By a fluke, he claimed the process, however, with both of the two different transducers. It turned out that the variable-resistance approach—preferably, a carbon button—was universally adopted because the magneto transducer was unsatisfactory, and Bell’s process patent claim was therefore all that anyone infringed.)

The Supreme Court’s precedents support the rule that the clue to the patent-eligibility of processes that do not involve the transformation of substances is whether the underlying principle is implemented in a nontrivial manner with a specific machine or other device adapted to carry out the process. The Court has declined to rule without qualification that a process can *never* be patent-eligible without meeting this test. But all of the processes that the Court has so far analyzed have been found patent-eligible if they satisfied the test and found patent-ineligible if they failed to meet the test. The rule therefore appears to amount to one of a rebuttable presumption, but it is uncertain what fact pattern would ever rebut the presumption—since none has been recognized so far that does so.

Notes

1. *O’Reilly v. Morse*, 56 US (15 How.) 62 (1853).
2. This was Morse’s own language: “Eighth. I do not propose to limit myself to the specific machinery or parts of machinery described in the foregoing specification and claims; the essence of my invention being the use of the motive power of the

- electric or galvanic current, which I call electro-magnetism, however developed for marking or printing intelligible characters, signs, or letters, at any distances, being a new application of that power of which I claim to be the first inventor or discoverer.”
3. An advance that is *patent-eligible* is eligible to be considered for being granted a patent, based on whether it is novel, unobvious, adequately disclosed, and properly claimed. Thus, the advance may be patent-eligible and still fail to qualify for a patent grant because it is not novel. An advance that is *patent-ineligible* will not even be considered for patenting on the basis of novelty and so on. Computer programs and algorithms, per se, as contrasted with machines operated in accordance with a computer program or algorithm, for example, are patent-ineligible.
 4. *Gottschalk v. Benson*, 409 US 63 (1972). See also *Parker v. Flook*, 437 US 584 (1978); *Diamond v. Diehr*, 450 US 175 (1981). Since this trilogy of cases, the Supreme Court has not rendered any decision on the limits of patent-eligibility.
 5. *Laboratory Corp. of Am. Holdings v. Metabolite Labs., Inc.*, 548 US 124, 126 S. Ct. 2921 (2006); dissenting opinion of Justice Breyer, joined by Justices Stevens and Souter.
 6. This occurs, for example, in the vulcanization of rubber by heating it in the presence of sulfur, which changes gummy, inelastic raw rubber into a hard, elastic product, by cross-linking the polymers.
 7. *In re Alappat*, 33 F.3d 1526 (1994).
 8. Section 101 of the patent code, 35 USC § 101, limits the categories of things on which patents may be granted to any new and useful “process, machine, manufacture, or composition of matter.” This language remains substantially unchanged from the first patent law in 1790.
 9. *State Street Bank & Trust Co. v. Signature Fin. Group Inc.*, 149 F.3d 1368 (Fed. Cir. 1998); *AT&T Corp. v. Excel Communications, Inc.*, 172 F.3d 1352 (Fed. Cir. 1999).
 10. *Laboratory Corp. v. Metabolite Labs., Inc.*, 126 S. Ct. 2921, 2928 (2006); Justice Breyer dissenting from dismissal of certiorari.
 11. In *eBay Inc. v. MercExchange, LLC*, 126 S. Ct. 1837 (2006), Justice Kennedy, joined by Justices Stevens, Souter, and Breyer, suggested that the public interest might be better served by not granting injunctions in cases involving “the burgeoning number of patents over business methods, which were not of much economic and legal significance in earlier times,” because of “the potential vagueness and suspect validity of some of these patents.” In *Laboratory Corp. v. Metabolite Labs., Inc.*, Justice Breyer, joined by Justices Stevens and Souter, remarked that the Federal Circuit’s *State Street* decision “does say that a process is patentable if it produces a ‘useful, concrete, and tangible result.’ But this Court has never made such a statement and, if taken literally, the statement would cover instances where this Court has held the contrary.” He then went on to question whether “the patent system, as currently administered and enforced, adequately reflects the careful balance that the federal patent laws embody.”
 12. *In re Nuijten*, 500 F.3d 1346 (Fed. Cir. 2007). The court ruled that a signal is not a process, machine, manufacture, or composition of matter. In principle, Congress could add signals to the list of patentable categories, but it has not chosen to do so. There would appear to be no constitutional obstacle to such legislation.
 13. *In re Comiskey*, 499 F.3d 1365 (Fed. Cir. 2007).
 14. That provision of the Constitution, Article I, § 8, clause 8, states:

“Congress shall have Power to promote the Progress of...the useful Arts by securing for limited Times to...Inventors the exclusive Right to their...Discoveries....”
 15. *Graham v. John Deere Co.*, 383 US 1, 5-6 (1966), (Constitution limits congressional power to enact patent laws); accord *Bonito Boats, Inc. v. Thunder Craft Boats, Inc.*, 489 US 141 (1989); see also *Feist Pubs., Inc. v. Rural Tel. Serv. Co.*, 499 US 340, 349 (1991), (same for copyright).
 16. See *Parker v. Flook*, 437 US 584, 593 (1978), (“The rule that the discovery of a law of nature cannot be patented rests, not on the notion that natural phenomena are not processes but rather on the more fundamental understanding that they are not the kind of ‘discoveries’ that the statute was enacted to protect.”).
 17. As used here, “device” means a machine, article of manufacture, or other physical material. Processes are usually performed by using a machine, but they may use other physical materials.
 18. That is my translation of what the 1850 Supreme Court meant when it said that Morse’s invention was his “plan for combining two or more electric or galvanic circuits, with independent batteries for the purpose of overcoming the diminished force of electromagnetism in long circuits.” I interpret that to be limited to electromagnetic devices (relays) and as not including other forms of nonlinear amplification with hysteresis, for elevating signal above noise, such as Schmitt Triggers. (Hysteresis is needed to prevent instability in the form of “jitter.”)
 19. *Funk Brothers Seed Co. v. Kalo Inoculant Co.*, 333 US 127 (1948).
 20. *Armour Pharm. Co. v. Richardson-Merrell, Inc.*, 396 F.2d 70, 74 (3d Cir. 1968).
 21. See *Flook*, 437 US at 592.
 22. They may, however, lack novelty or be obvious. Those are different issues.