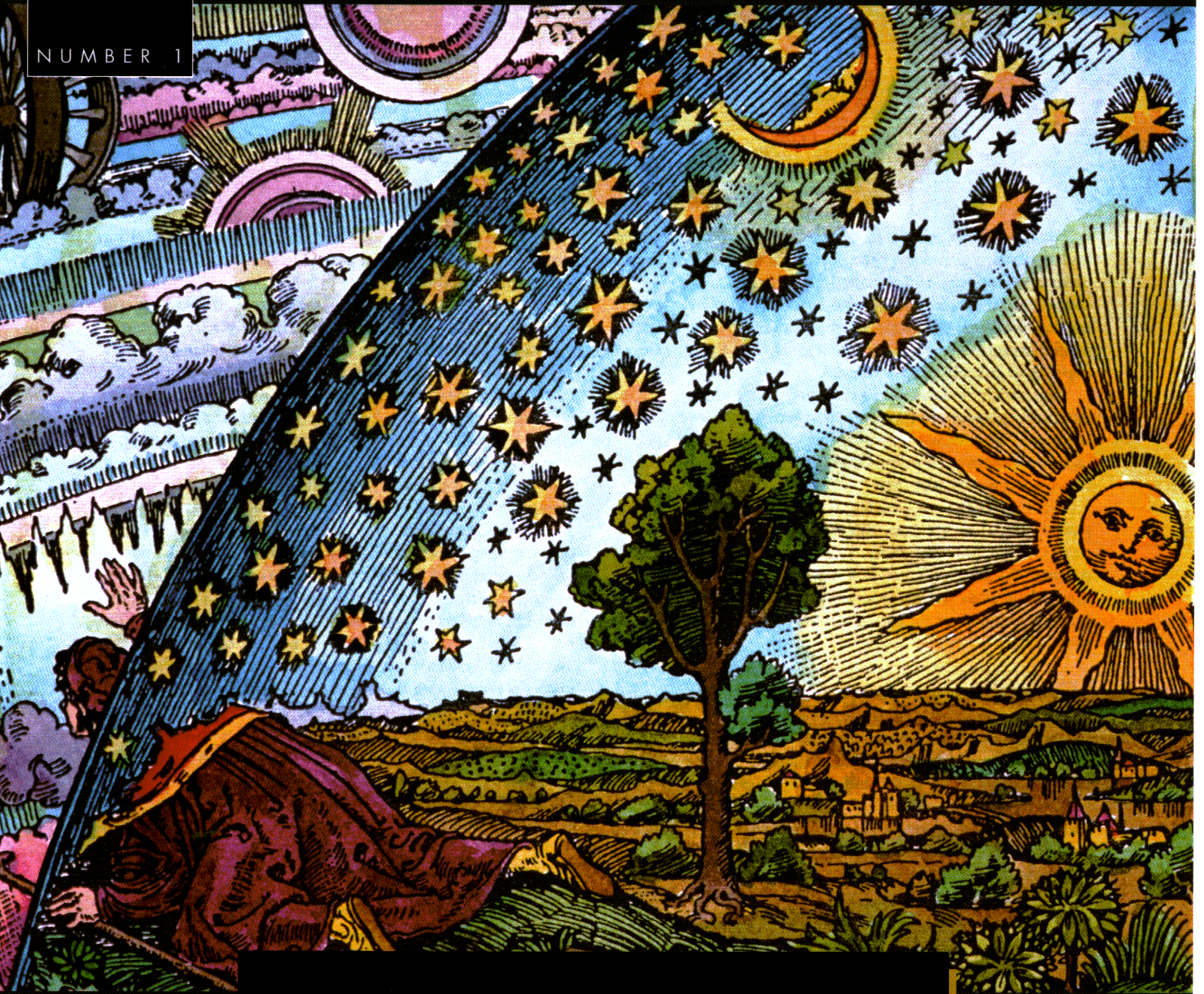


Pharmaceutical NEWS

2 0 0 0

VOLUME 7

NUMBER 1



LOOKING INTO THE NEW MILLENNIUM...

G+B MAGAZINES



Protecting Research Software

By **Mark Pohl**

Manufacturers and the software firms that service them invest substantial money, time and effort to create new software applications. Unfortunately, this investment may be vulnerable to piracy—piracy that is often completely legal if appropriate legal precautions are not taken. A recent, high-profile example of such a scenario is Microsoft's alleged copying of priceline.com's online auction software.

This article reviews the availability, under current law, of patents to protect pharmaceutical research and development software. We review the availability of patents both specifically for research and development software, and generally for other types of software.

We first review a key legal requirement for getting a patent. Then, to see how this key requirement is put into practice, we survey some examples of actual granted patents. To that end, we first survey some actual patents granted on pharmaceutical research software, and then we survey examples of patents granted for other types of software.

General Requirements for a Patent

Patentable inventions must meet a key legal requirement. For a discovery to be patentable, it must be in the right kind of field, or be of the right kind of subject matter.

The scope of patentable subject matter is based in part on the fundamental purpose of patents. The Patent Office is part of the Commerce Department. The Commerce Department promotes economic development. The Patent Office shares this mission. The Patent Office does not promote science *per se*. Rather, its mission is to promote economic development. Thus, economic development is a central theme in defining what types of discoveries are patentable. A summary of this area of the law, in a nutshell, is that in order to be patentable, the invention must be of a class of invention that is potentially economically valuable. (Note, however, that the law does not perform economic valuations here, nor require that the invention actually have

a minimum economic value. It is sufficient that the invention may have some value—i.e., that it be of a class that includes potentially valuable members.)

For example, laws of nature, mathematical formulae, and the like, do not promote economic development, in and of themselves. Laws of nature do not produce revenues, unless applied in some concrete way (*e.g.*, to the operation of a machine or chemical reaction) to promote economic growth. For example, Albert Einstein posited that $E = mc^2$. Discovering this merits Mr. Einstein a place in history. It does not merit Mr. Einstein a patent. His discovery, in itself, does nothing to promote economic development. It does not change the speed of light or the quantum of energy obtainable from a given mass. It does not change Con Edison's cost of generating power. This relationship has economic impact only when applied in some concrete, economic embodiment: a nuclear power plant design, for example. The economic embodiment—the power plant design—is patentable. The purely theoretical relationship is not. Thus, while mathematical formulae are not patentable, an economically useful process created with the aid of a scientific principle may be. “Diamond v. Diehr,” reprinted in *The United States Reporter v. 450*, p.175 et seq. (1981) (process patent); “Mackay Radio & Tel. Co. v. Radio Corp. of Am.,” reprinted in *The United States Reporter v. 306*, at p. 94 (1939) (article of manufacture patent).

This general policy of economic development is codified in the patent statute. The patent statute enumerates the types of discoveries accorded patent protection. To promote the policy underlying the patent system, Congress employed broad language in enumerating which types of inventions are patentable. The classes of patentable inventions thus include both any machine and any process (or “method”) that uses a machine. To promote the underlying policy of furthering economic development, the statute has been, and should be, given a broad scope, even when assessing new technologies. Thus, the Supreme Court resolved that patentable subject matter includes “anything under the sun that is made by man.”

As a result, a system for marking negotiable instruments, for example, was found patentable. The system entailed marking checks with magnetic ink to denote account classifications, reading the ink classifications with a machine, and storing and processing the information in a data processor. Initially, the Patent Office found the claimed invention went solely to the personal relations between a bank and its customers. The Patent Office thus held the invention was not patentable subject matter. The Patent Office was reversed on appeal, in "Application of Johnston", *The Federal Reporter* (2nd series) v. 502, pg. 765 et seq. (C.C.P.A. 1974), rev'd on other grounds sub nom., "Dann v. Johnston," *The United States Reporter*, v. 425, p. 219 et seq. (1976). The Federal appeals court found that the invention was a machine system. Machines, and the processes for operating them, are patentable. The appeals court thus reversed the Patent Office.

This case shows that patentable machine systems may enable or improve a method of business, such as banking; the use of an otherwise patentable machine system in business does not bar patenting it. Given this breadth of the law, it is not surprising that the Patent Office has recently deemed patentable many innovations in research software, and in software generally. To see how this law is put into actual practice, we now survey some software patents. We first look at patents for pharmaceutical research software, and then for other types of software, including some e-business software patents which have been in the news.

Pharmaceutical Research Software

The complexity and document intensity inherent in the pharmaceutical industry has made it an eager client for automation using software. For example, Software House Inc. of Somerset, New Jersey, sells software to manage New Drug Applications filings, Pharmaceutical Software Laboratories Inc. of Omaha, Nebraska markets software to analyze IMS data and make it more user-friendly, and Strategic Network Designs Inc. of Clark, New Jersey, markets pharmaceutical marketing-budget tracking software. Much of this type of software is patentable.

Genomics is an area that, with its vast amount of data to be managed, has bred several software patents. For example, AlphaGene Inc. of Woburn, Massachusetts has patented its genomic database system. The system has autonomous units that seek target data to be processed and then call a computer program or subroutine to process that target data. The autonomous agents can control the assembly of gene sequences. As another example, Incyte Pharmaceuticals Inc. of Palo Alto, California, has patented their database and system for storing, comparing and displaying genomic information. The patent discloses a relational database system for storing and manipulating biomolecular sequence information. The database includes genomic libraries for a plurality of types of organisms, and the libraries contain multiple genomic sequences, which represent open reading frames located along a contiguous sequence on each of the organisms' genomes. The database can determine homologous matches between a probe open reading frame and the open

reading frames in the genetic library.

Similar to Incyte's patented software, Gregg Dietzman of Friday Harbor, Washington, has patented software that can process the contents of an external database. His natural products information system stores such data as chemical structures, geographic locations, taxonomy, genus synonyms, and textual descriptions and related natural products images such as images of the organisms. The system correlates the data products data and images stored in the system with remote databases, such as those containing existing commercially-available data, linking the remote data thus correlated for display.

More mundane areas, such as regulatory compliance, have, due to the document intensity of the operations, proven amenable to software patents. For example, Michael Sandifer of Millbrae California, has patented a computer aided maintenance and repair information system for equipment subject to regulatory compliance. This type of system could be useful in maintaining cGMP records and filling out required Standard Operating Procedure reports. The systems allows the user to maintain equipment subject to regulatory compliance, by incorporating a technical database of electronically stored publications, with a way to select required forms to be filled in, for completion and submission to the appropriate regulatory authority.

These examples show that patents avail to protect innovative pharmaceuticals research and product-development solutions. The patent law, however, is not custom-tailored to protect only the pharmaceuticals industry. Rather, the same law which protects pharmaceuticals innovations, protects innovations in other areas of business.

Other Commerce Patents

Several accounting systems have been patented. For example, the Transaction Tracking Data Processing System, U.S. Patent No. 4,994,964, monitors a client's business orders over time and, based on predetermined criteria, determines the client's vested interest in funds deposited into special client accounts. Similarly, the Data Processing System and Method, U.S. Patent No. 4,918,602, can apparently "encompass the totality of banking transactions of a traditional institution." It also may be used in diverse non banking businesses. The Financial Data Processing System Using Payment Coupons, Patent No. 4,974,878, is a check-writing system that uses machine-readable coupons to generate conventional checks.

These accounting systems are "dumb" in that they simply record decisions made external to the system, that is, by a person. However, expert systems containing a certain amount of reasoning capacity can also be patented. For example, a patented expert system, Processing System for Managing BI-Media Investments, U.S. Patent No. 4,910,676, supervises and processes trades for an investment portfolio. This system manages a portfolio consisting of both revenue generating and negotiable draft investments. This system goes further than the "dumb" accounting systems discussed earlier, because it is not a mere reactive book-keeping system. Rather, it is an expert system that manages

risk exposure and ensures that the present values of the portfolio components are continually hedged.

Another patented expert system, the Extended Coverage Monetary Regulation System, U.S. Patent No. 4,985,833, automatically allocated a customer's deposits among multiple financial institutions. The allocation ensures FDIC or FSLIC coverage for the full aggregate amount of the deposits, regardless of amount. This system incorporates and automatically responds to federal deposit-insurance regulations. Thus, it is capable of making proactive business decisions, rather than mere reactive bookkeeping activity.

Expert systems such as these do more than passively track decisions. These systems actually make decisions. In doing so, they approach the capabilities of some of the patented securities trading systems.

Novel securities and commodities trading systems may be patented. For example, the Automated Securities Trading System, U.S. Patent No. 4,674,044, actually makes trading markets in securities. It qualifies trading orders to determine whether the order comports with predetermined trading limits (this feature is reminiscent of the accounting systems responsive to FDIC regulations). Another system for derivative securities trading, the Renewable Option Accounting and Marketing System, U.S. Patent No. 4,823,265, covers an options-trading system. It includes the capacity to value options contracts and to automatically roll over maturing hedges.

Several other patents have issued on trading systems that incorporate and automate legal requirements. For example, a commodity exchange, the Automated Futures Trading Exchange, U.S. Patent No. 4,903,201, verifies compliance with Commodities Futures Trading Commission regulations, automatically executes trading orders, and stores order data. Another patented trading system, the Goods Database Employing Electronic Title or Documentary- Type Title, U.S. Patent No. 5,063,507, automatically creates title evincing the new ownership of traded goods.

Several other expert systems capable of performing higher-level business analysis have been patented. One, the Method and Apparatus for Evaluating a Potentially Insurable Risk, U.S. Patent No. 4,975,840, analyzes insurance data (e.g., health data) to determine the cost of extending insurance to a given risk. Another, a Securities Valuation System, U.S. Patent Nos. 4,334,270 and 4,566,066, uses a computer to store, retrieve, and edit securities pricing information.

E-Business Patents

Priceline.com has patented its auction method, the "Method and Apparatus for the Sale of Airline-Specified Flight Tickets," U.S. Patent No. 5,897,620 (April 27, 1999). Priceline's patent covers a way to give travelers a reduced fare in return for flight-time flexibility.

Obtaining this patent has proven fortuitous for Priceline. Priceline applied for this patent while negotiating with Microsoft over a joint venture. During the negotiations, Priceline disclosed some of its confidential software information to Microsoft. Microsoft, in turn, allegedly stole this

confidential information and used it to attempt to compete with Priceline. Getting the patent has given Priceline a way to protect against its much larger competitor.

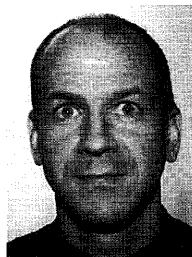
In addition to Priceline's patented auction process, there are several other patented e-commerce auction techniques. These patented techniques address auctioning goods as diverse as automobiles (the Electronic On-Line Motor Vehicle Auction and Information System, U.S. Patent No. 5,774,873), commodity metals (the Method and System for Matching Sellers and Buyers of Spot Metals, U.S. Patent No. 5,715,402), financial bonds (the Bond-Trading System, U.S. Patent No. 5,915,209) and loans (the System and Method for Conducting Loan Auction Over Computer Network, U.S. Patent No. 5,966,699). Similarly, Health Hero has patented its way of conducting an on-line, real-time auction, its Method Of Conducting an On-Line Auction With Bid Pooling, U.S. Patent No. 5,794,219.

Like Priceline, Amazon.com has patented parts of its e-commerce operation. For example, Amazon has patented a Secure Method and System for Communicating a List of Credit Card Numbers Over a Non-Secure Network," U.S. Patent No. 5,715,399. Amazon has other patents, as do most other prominent Internet businesses.

One part is the "One-Click" purchasing feature used on its web site. This feature is patented as the Method and System For Placing a Purchase Order Via A Communications Network, U.S. Patent No. 5,960,411. That patent discloses a method whereby an Internet server combines information about the purchaser, to generate a purchase order with billing and shipping information included, where the purchaser "effects the ordering of the product by selection of the order button." When priceline found Barnes & Noble copying the idea on the Barnes & Noble website, priceline sued for patent infringement. Within just two months, priceline had succeeded in getting a Federal judge to order Barnes & Noble to stop using the patented feature.

Summary

Patents are widely available to protect research software innovations. Perhaps more significantly, patents are available to protect innovative software generally, whether used in pharmaceuticals research or otherwise. As Priceline.com demonstrates, patents can be an effective tool to protect a company's investment in innovation, even against larger, wealthier competitors. Further, as Amazon.com demonstrates, patents can be an effective tool to protect a company's market-share.



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