Left, Alexander Graham Bell's 1876 patent for the telephone. In later years he experimented with flight; below, he watches (far right) as assistants test a kite in 1908.
THE POWER OF PATENTS

For two hundred years the United States patent system has defined what is an invention and protected, enriched, and befuddled inventors. As a tool of corporate growth in a global economy, it is now more important than ever.

by Oliver E. Allen

In a decision of far-reaching significance, a federal circuit court in 1985 ruled that the Eastman Kodak Company had infringed the instant-camera patents held by Polaroid. The court ordered Kodak to cease making and selling its own instant camera, a product on which Kodak had sunk many millions of dollars in an effort to beat out Polaroid and bolster its position as a camera and film manufacturer. The ruling, which capped a nine-year legal battle between the two concerns, stunned the financial world and came as a severe blow to Kodak, while allowing Polaroid to breathe a vast sigh of relief. Five years later, in 1990, the case finally ended when Kodak was assessed a $900-million penalty.

The dispute was only the most recent proof that the U.S. patent system continues to play a major role in the world's economic affairs; two hundred years after its inception in 1790, its rulings reach into everyone's lives. The system also accomplishes what it was set up to do: By providing an incentive for creativity, it promotes the advance of commerce and industry in the United States.

The Kodak ruling possessed one unusual feature: The two industrial behemoths that clashed in the suit both had been founded by inventors, George Eastman and Edwin H. Land respectively. In Eastman's day such continuing control was not unusual. Energetic and resourceful inventors could still start their own companies without too much difficulty, although it was never easy. One of the most notable was Alexander Graham Bell, whose efforts culminated in the mammoth American Telephone and Telegraph Company. By Land's time it was difficult and becoming more so; only a person with the drive and keen business sense of a Land was likely to make it.

In the storied old days a person invented something in the attic or basement, got a patent on it, began building it and selling it, and made a pile of money, all pretty much alone. Today's
inventor, with some isolated exceptions, is likely to be a salaried lab hand working in almost complete anonymity for a large corporation. If he or she gets any reward for building a better mousetrap, it may only be a smile and a pat on the back from the supervisor. Those few individual inventors who do make it big today—like Land, or Steve Wozniak of Apple Computer, or William Hewlett and David Packard of the company that bears their name—are all the more exceptional for being successful entrepreneurs and industrialists as well as inventors.

This is certainly not what the men who designed the patent system in 1790 had in mind. The change is an outgrowth of the Industrial Revolution during the nineteenth century and the accompanying proliferation of complex technologies plus the growth of powerful corporations that moved in to control the new technologies. As it happened, the major turning point came just when George Eastman was introducing the first Kodak camera—about the turn of the twentieth century. What the founders set up in the early days of the Republic was a system, in the words of Article I, Section 8, of the Constitution, to "promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." Our forefathers had just triumphed over an overbearing monarchy and were not only committed to defending individual liberties but dead set against monopolies. They did think, however, that deserving writers and inventors should be encouraged by being given temporary monopolies on the fruits of their labors, so that they could keep on working creatively and, in the case of inventors, could start successful innovative businesses, thus benefiting the fledgling nation.

As industries expanded, the care and feeding of patents became a key element in corporate strategy.

TEN PATENTS THAT CHANGED THE WORLD

The system started on a small scale after the first patent act became law in April 1790. The first patents (No. 1 was issued on July 31 of that year) had merely to be okayed by two of the three officers of the patent board: the Secretary of State, the Secretary of War, and the Attorney General, who were expected to perform their patent work in addition to executing all their other duties. By 1802 a more formal arrangement was needed, and a separate Patent Office was set up under the jurisdiction of the Secretary of State. So great was the flood of applications that the office allowed inventors to omit any claim that their devices or processes were novel; all they had to do was register them. The flood naturally increased. Finally, in 1836, a formal examining procedure was set up, and the rules were once again tightened; applications were scrutinized far more rigorously than at any previous time. In 1849 the Patent Office was taken from State and put under the jurisdiction of the Department of the Interior; in this century it was transferred again, to Commerce, where it now resides.

Not only has the office moved, but the definition of what constitutes an invention has also undergone change. In the early years of the nineteenth century, it was decreed that an invention must be useful as well as new. It must also be generally beneficial to society, not "mischievous or immoral," as one judge put it. In 1880 a new standard was added: The invention must be not only new and useful but the result of a "flash of genius" that made it a new departure, a scientific breakthrough. Although difficult to define, the "flash" concept remained in force until the middle of this century, when it was finally abandoned as too diffuse. A new patent law in 1952 established a kind of negative but workable standard that holds today. It requires an invention to be "nonobvious"; it must be a departure that would not have occurred to the average person who had ordinary skills in the art or technique. Inventions are special.

During the nineteenth century a tremendous number of important patents were granted to such now-famous inventors as Cyrus McCormick, Samuel F. B. Morse, Charles Goodyear, and of
course, the giant of them all, Thomas A. Edison, who holds the record for the number of patents granted a single inventor, a total of 1,093 (Edwin Land is a distant second, with 533). It was a time of tremendous technological advance, with patents being awarded to the likes of Henry Bessemer (steel process, 1856), George Westinghouse, Jr. (air brake, 1869), and also such pioneers as Walter Hunt, who invented the safety pin, Alvin Fellows, who introduced the tape measure, and John McTammany, Jr., who gave us the player piano.

Not many of these pioneers were good businessmen, and some were downright sloppy. Charles Goodyear, for example, who in 1839 discovered the process for vulcanizing rubber, carelessly permitted his invention to be used in products for which it was not suited, lent his meager funds to irresponsible friends, and foolishly agreed to pay Daniel Webster the outrageous sum of fifteen thousand dollars to represent him in court; more than once he languished in debtors' prison. Goodyear's court cases were a clue to what was happening to the inventor's world: safeguarding a patent could be difficult and generate severe legal costs, and not many inventors were good at handling such matters. Noninventors could often do it better.

Indeed, the economic scene was shifting. Most notably, the manufacturing world was getting more and more complex—and expensive. Furthermore, a company set up to produce a new invention had to keep finding new products and improvements in order to flourish. But the new breed of businessman, the industrialist, was finding that the discovery of new products could not really be left to chance. If businessmen simply waited for inventors to offer new discoveries, they would surely lose out; inventions would have to be generated. In addition, new devices required a huge amount of money to develop and market, which no one wanted to waste, and their success had further to be protected so investors' hard-earned money would not be jeopardized by some damn fool's new invention suddenly appearing out of left field. The care and feeding of patents became a key element in corporate strategy.

Another thing being discovered was that a great new invention was of little use all by itself. It almost always required a host of ancillary inventions before it could be practical. Bell's telephone, for example, necessitated the invention of all manner of switching devices, amplifiers, transformers, and transmission mechanisms. Inventing a workable gasoline engine did not result in the motorcar until gears, brakes, steering, and other items were made workable. Often the original inventor was unable to solve these problems or was otherwise not in the picture. Someone else had to attend to it.

Finally, the new industrialists were quite taken with the idea of monopoly inherent in the patent laws. If a corporation controlled the key patents in its industry, it could command the market. As one observer has noted, "A patent of wide and controlling scope gives the inventor, or more often the corporation which buys up his patent, an instrument for dominating the interlocking provinces of technology, industry and commerce." Mark Hanna, the great turn-of-the-century Ohio capitalist and Republican boss, put it more succinctly. "The only real monopoly," he said, "is a United States patent."

So a whole new system of corporate patent development and control was devised by the leaders of such mighty concerns as AT&T and General Electric, aided and abetted by a number of astute patent lawyers working for them. First of all, in-house invention mills were set up. These were labs dedicated to introducing new wrinkles on the original invention so that its patent could be extended, to creating adaptations that enlarged the market for it, or even to making discoveries that enabled the corporation to grow in whole new directions. (One of the first such units was AT&T's Bell Laboratories, whose employees have produced a formidable array of inventions, including the transistor, devised in 1947.) At the same time, a great many bright people who might otherwise have toiled in solitary penury were quite willing to trade a heroic independence for the certainty of a big company's regular sal-
ary. Hired inventors, at the very least, no longer had to fear lawsuits; the corporation's lawyers would shield them from the unnerving onslaughts that had bedeviled Goodyear and had even caused innumerable headaches for the incomparable Edison.

More significantly, the big companies devised all sorts of schemes to protect the patents they already owned, by getting together with other corporations to pool their respective patents, by cross-licensing, by buying up patents from those people still in their own basements so as to keep them from upsetting the market, and even by suppressing (or at least delaying) newly patented items indefinitely. The first patent pool had been set up in the mid-nineteenth century after Elias Howe, the sewing-machine inventor, attempted to collect steep royalties from rival manufacturers using his device; the rivals objected and sued him, whereupon an agreement was arrived at between Howe and his three major competitors to share their patents and to license outsiders, who would be driven from the industry if they did not pay up. Later manufacturers in many different industries were to improve on the game.

The Clausewitzs of this movement was a thoughtful and highly successful patent attorney named Edwin J. Prindle, who in a number of writings and other formulations around 1906 advised industrialists how to go about rigging the system to their advantage. "Patents," he explained, "are the best and most effective means of controlling competition," and he had high praise for concerns like the United Shoe Machinery Company, which at that time effectively controlled the shoemaking industry by means of its several thousand closely held patents. Corporate executives should be aware, Prindle said, that if their product itself could not be patented, they might patent the machine on which it was made or the process by which it was fashioned. They should not overlook the fact that a new feature on an old machine could be patented if it resulted in a better product. And a patent on the humblest machine could bring unexpected dividends. A rather simple but securely patented machine for setting buttons on shoes, he recalled, was leased on condition that it be used only with button fasteners (not patented) made by the lessor; the revenue from the machine was minor, but sales of fasteners brought a handsome return.

Trade combinations—Prindle's euphemism for patent pools—should be sought to enable a patentee to hold sway over an entire industry. "Under such combinations there can be effective agreements as to prices to be maintained, with penalties for violation of the agreement." Such combines, he observed, "are the only valid and enforceable trade combinations that can be made in the United States."

Prindle reserved his sternest advice for corporate managers who employed staff inventors. Such hirelings were hardly to be trusted, he said, since they were all too likely to try producing inventions of their own on company time and acquiring patents for their own private gain. So they must be persuaded to sign rigid contracts assigning to their employer all rights to whatever they came up with during their period of employment as well as immediately thereafter, lest they slip off to a rival and hand over the company's best-laid designs. If they balked at signing, they could be brought around by being assured that all top officers of the company initialed such agreements. (Never mind that the executives might not be inventors.)

Such advice was highly valued, and Prindle enjoyed a very lucrative career. Patent lawyers, in fact, were becoming almost as important as inventors themselves in the business world, and sometimes more so. When the two skills were combined in one person, as a matter of fact, the effect could be lethal. This was demonstrated by the saga of the Selden auto patent, wherein one diabolically clever man was able to tie up a whole industry.

George B. Selden, the son of an appeals court judge in Rochester, New York, was a bright young man who dutifully studied law at his father's behest and in 1871 was admitted to the bar as a patent lawyer. He was also a tinkerer and was fascinated by the prospect of building a self-propelled road vehicle, something no one had achieved up to that time. By the late 1870s he had adapted an existing two-cycle gasoline engine and had fashioned a rudimentary "road-locomotive," as he called it, combining his engine with a carriage body, clutch, and running gear to approximate what was later to become the motorcar. It was far from a workable vehicle. But on May 8, 1879, he applied for a patent on it.

Being well informed about the
status of patents under consideration in Washington, Selden knew that no one else had made such an application. He was first in line. What an advantage! Surprisingly, however, he made no further improvements on his design and did little to get his vehicle manufactured. Instead, taking advantage of quirks in the patenting procedure, he succeeded in delaying for a monstrous sixteen years the actual issuance of a patent to him—all the way to November 5, 1895. ("The prince of procrastinators," someone once dubbed him.) But while delaying it, he was also able to amend and enlarge his claim—a privilege possible in those days—until in 1895 he was the possessor of a patent covering far more than what he had built in 1879. No matter that in the intervening years a different kind of engine had been universally judged superior to the kind he used, or that Germany's Gottlieb Daimler was by now widely acclaimed as the true inventor of the automobile, or that many other inventors had produced cars that worked well. He had the jump on everybody. And his patent would run seventeen years, until 1912.

To police it by suing existing car makers for infringement would be expensive, of course, and Selden did not have that kind of money. He bided his time, and in 1899 his patience paid off. He was approached by a group of industrialists headed by the New York financier William C. Whitney, who asked him for a license. The industrialists had banded together to manufacture electric automobiles—which for a while had seemed promising—but sales were slow and they needed a source of quick cash. Selden's patent offered the chance to exact tribute from the entire auto industry. Selden, happy to oblige, agreed, and the deal was done. Whitney's cohorts proceeded to demand royalties from virtually all U.S. car makers, and Selden, who would receive a percentage of each fee paid, sat back and waited for the royalty checks to arrive.

The outcry was immediate and painful. The largest automaker, Winton, refused to pay up, the Whitney forces sued, and Winton settled out of court. But the suit was expensive, and Whitney's people decided to take another tack; they would form a trade association that would control Selden's patent, persuade the country's principal car makers to join it for a modest fee, and levy a big fee on all outsiders. The new group, called the Association of Licensed Auto Manufacturers (ALAM), quickly attracted most of the major companies.

One key automaker refused to go along. Henry Ford, who had been developing his own car for a decade and knew he owed nothing to Selden's outdated concepts, and who thought patents only exploited the consumer anyway, was outraged. He realized that the ALAM could force him out of business. It must be defeated. When the ALAM sued him in 1903, he fought back.

Because of the need to take lengthy depositions in many parts of the country, and for other reasons, it was years before the case came to trial. At first several other companies joined in the defense, but gradually almost all dropped out, leaving Ford to wage the campaign virtually by himself. The legal fight was expensive for Ford—but also beneficial, as he reaped a harvest of favorable publicity from the fight against the monopoly interests. "Nothing so well advertised the Ford car and the Ford Motor Company," he said later, "as did this suit." Finally, in 1909, the trial was held—and the ALAM won. Ford's associates were sickened. Ford himself was undeterred and decided to appeal. In January 1911 the appeals court reversed the decision and found Ford. Although Selden's patent might be valid, the court stated, Ford and others had not infringed it as they all were using a different kind of engine. The suits were dismissed. The monopoly was broken. But by then Selden had received an estimated two hundred thousand dollars for his wiles, and there was only one year left on the patent anyway.

The Selden fight, ugly as it was, did have one beneficial result: The patent laws were tightened so that no one in the future could perpetrate such a monstrosity. But patent pooling continued in the auto industry. Anxious to avoid costly legal battles after this one, the major manufacturers drew up cross-licensing agreements that in one way
Selden's patent on the automobile offered the chance to exact tribute from an entire industry.

The automobile, 1895. George Selden didn't invent it, but he managed to get the patent on it and used the patent to tie up the industry until Henry Ford beat him in court in 1911—two years before the patent would have expired anyway.

U.S. government tended to be lenient toward such combinations; but many restrictions were imposed by New Deal legislation, and even more followed World War II. Still, in one form or another agreements based on patent control persist today. And industry's efforts to enforce such agreements have led to the use of strong-arm tactics, at least in the past. An official of the Owens-Illinois glass company was once reported to have remarked to a small manufacturer of melting and annealing equipment that it wished to control, "If you don't go in with us on this thing, we will enter suit against you and we will continue to sue you until you are out of business."

A few notable companies, it must be admitted, have avoided problems of this kind by deliberately ignoring the patent system and relying on secrecy to protect their product. Much the best known is the Coca-Cola Company, which has never patented its familiar drink. It has not had to, for no one outside the company has ever been able to learn Coca-Cola's secret formula.

Another class of companies that ignore the patent system is made up of those whose innovations are necessarily short-lived. In many rapidly evolving technical fields, for example, an invention is likely to be outmoded before a patent on it can be obtained. As the president of a company in the electronic instrumentation field noted, all his products would be superseded in five years. "Why," he asked, "should I spend money on patents?"

In any event, it has become extremely difficult for the individual inventor to fight the system. Cases abound of inventors who were ruined by the unrelenting pressure and expense of litigation. Lee de Forest, renowned for his inventions in radio, found himself pushed into bankruptcy by the cost of infringement suits. Another radio pioneer, Edwin Armstrong, who introduced frequency-modulation (FM) radio to the world, became so distraught by his bitter court battle against RCA that he killed himself. Certainly a good proportion of
such loners feel that their independence, while perilous, is essential. In the words of the inventor of the critically important three-phase motor, Nikola Tesla, “Invention is predominantly individualistic. Everything of prime moment comes from some individual unconnected with any commercial organization—from the lone worker who follows the fleeting inspiration of a moment and finally does something that has not been done before.”

Apologists for the independent innovators like to point out that established concerns tend to belittle radical thoughts—the kind that make history. The railroad baron Cornelius Vanderbilt dismissed George Westinghouse with his air brake, proclaiming that he had no time to waste on fools. General Electric and other companies rejected the idea of a machine to rinse and dry clothes; the novel machine was picked up by a company that had not been in the field at all, Bendix, which made a bundle on it. But perhaps the crowning put-down was voiced by the banker J. P. Morgan, speaking on behalf of the officials and engineers of Western Union: “Mr. Bell, after careful consideration of your invention, while it is a very interesting novelty, we have come to the conclusion that it has no commercial possibilities.”

Such critically important new inventing as does take place today outside the ranks of big industry is likely to occur in areas no one has thought to go before or no one thought was really practical, as with Land and his amazing instant camera—an idea that Eastman Kodak had at first belittled. Even so, the going can be extraordinarily difficult, and the stakes can get awfully high, as was demonstrated by the struggle of the then quite small Haloid (later Xerox) Corporation of Rochester, New York, to introduce a copying process based on the patent held by the inventor Chester Carlson.

An engineer and lawyer, Carlson had gotten the idea for a new copying process while working for a patent firm in New York in the 1930s. It differed from previous methods in that it was dry—no liquids were used. It involved charg-
Haloid had to work desperately to protect its priceless Xerox patents while developing a machine to use them.

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