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Patents and Their Role in an Industrial Development Strategy:
The Experience of the United States of America

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Shortly after I entered the patent field in 1957, the famous (infamous?) "Melman Report" came out and I became concerned about the future of the Patent System and a patent career. Professor Melman had reviewed the Patent System for the U.S. Congress as had Professor Machlup and both came down hard on the Patent System.

Professor Melman answered the question whether the Patent System still fulfilled the Constitutional purpose of promoting "the useful arts," in the negative and added that in the future "the main impetus for promotion of science and the useful arts will come, not from the patent system, but from forces and factors that lie outside that system." (S. Melman, "The Impact of the Patent System on Research", U.S. Senate Study No. 11, Washington, Government Printing Office (1958) p.62)

And Professor Machlup's oft-quoted conclusion:

> "If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. but since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it." (F. Machlup, "An Economic Review of the Patent System," U.S. Senate Study No. 15 Washington, Government Printing Office (1958) p.80)

But the Patent System has survived Professors Melman and Machlup and other like-minded critics and is going strong indeed. Criticism of the Patent system, certainly from economists' quarters in industrialized countries, has become much less strident and acrimonious though it has not completely subsided.

Studies of the proposals for alternatives to patents as incentives were made time and again but again the Patent System survived them as, in the final analysis, the very best and most viable time-honored alternative itself. for instance, another Congressional Study by Giligillan ("Invention and the Patent System", Joint Economic Committee, Washington, Government Printing Office, 1964) which the author ambitiously called a "first appraisal" of the Patent System, identified "15 or so rival institutions" and proposed additional ones, in particular a "new institution" which

> "would avoid almost all the shortcomings of the existing systems, and support invention much better than ever before, with unlimited funds, and guidance for social welfare, yet with direction by businessmen, through licensed, nonmonopolistic, semipublic trade associations, which would acquire universal membership through gaining control of all good patents, through being granted them on better terms than to non-cooperating inventors." (P.9)

But it is noteworthy that even this proposed "new institution" is based on patents and involves patent pools.

Mr. George Frost also scrutinized the various alternatives and finding them wanting concluded that it is " exceedingly doubtful that...intense research and new product competition would continue in the absence of a patent system" and that "patent system incentives will have an important place in stimulating business enterprise to create technology and — perhaps more important — to apply." ("Patents & Progress", Richard D. Irwin, Inc., Homewood, Illinois, 1965, p.94) Incidentally, Frost had previously authored Senate Study No. 2 on "The Patent System and the Modern Economy" (Washington, Government Printing Office, 1957) and in it he stated — which is as valid today as it was then— that

> "It ought not to be necessary endlessly to defend the patent system against the stigma of 'monopoly,' when it is in fact a source of competition. It should not be assumed that every time an excuse is found to invalidate a patent, competition somehow necessarily benefits. It ought not to be necessary to indulge in endless argument over whether the patent laws or the antitrust laws ought to prevail when both serve the same end of maintaining competition and we should be looking for ways to make both more effective." (P.77)

More recently, Professor Dr. Carlos Fernandez Novoa of Santiago de Compostela, Spain has dealt with and rejected alternative systems, notably a governmental monetary award system in his book "Hacia Un Nuevo Sistema de Patentes" (Towards a New Patent System) (Editorial Montecorvo, S.A. 1982). He concluded that "...the Patent System is the only system for promoting technological research that is compatible with a free market system." (P.32)

In addition to considerable criticism of the Patent System on the part of economists, complaints were the order of the day that the Patent System had really never been studied in depth to answer such questions as whether the economic benefits derived from the Patent System outweighed its costs. However, in more recent times empirical studies and mathematical models have been made and have provided previously-absent evidence regarding the economic value of patents. A fairly recent double issue of the Quarterly Journal of the American Patent Law Association on the "Economics and the patent System" (Vol. 10, Nos. 1 and 2, 1982) is "must reading" in this respect.

Accordingly, it can now be stated confidently that patents

1. do promote the innovation process,

2. do facilitate licensing and technology transfer,

3. do have a great impact on research by disseminating information on advances in technology,

4. do encourage high risk investments which lead to industrialization, and

5. do have a significant influence on economic progress.

What kind of patent protection will provide the greatest incentives for 1.) domestic research and development with the aim to achieve useful innovations; 2.) productive investments and 3.) international technology transfer often coupled with investment ventures? I submit that it will not be a patent system which is overly restrictive in terms of patentable subject matter and patent duration, on the one hand, and overly liberal in terms of compulsory licenses, forfeitures, and other sanctions for nonworking, on the other hand.

Rather, it will be a patent system that provides patent protection for the wide scope of subject matter categories especially in new and exploding fields of technology including software and in the field of chemistry, not only manufacturing processes but also uses and applications, compositions and formulations, living organisms and, most importantly, chemical substances or compounds per se. Patent protection for processes of manufacturing chemicals i inadequate even with the legal safeguard of the reversal of the burden of proof because it is so easily circumvented and because it places emphasis on the development of new processes to make known products rather than synthesis of new substances.

It will also be a patent law that does not envisage sanctions for nonworking in any form or only under very special circumstances. Provisions for compulsory exclusive licenses and for premature forfeiture or revocation as

remedies for nonworking as per recent proposals for revision of the Paris Convention are especially abhorrent and repugnant and counterproductive. Such a patent law will also provide for efficient prosecution procedures and countenance effective and prompt enforcement of patent rights against infringement including also contributory infringement.

Furthermore, a patent system that provides adequate incentives for research and development, investments and technology transfer, is one that is not niggardly when it comes to the duration or life of a patent, that is to say, one that will provide more, or ideally much more, than fifteen years, rather than less.

The CAFC, a Special Institution

The CAFC is a very special institution in the Patent World. It went into operation on October 1, 1982 and ushered in a new era. A golden age for patents and the patent system where patents are ever so much more valuable and enforceable. The CAFC is a combination of the former Court of Customs and patent Appeals (CCPA) and Court of Claims and was formed to assume sole jurisdiction over appeals in patent cases from all federal district courts as well as to retain jurisdiction for appeals in patent and trademark cases from the Patent and Trademark Office. It was intended by this action to harmonize the varying bodies of law developed in the different Circuit courts and to eliminate forum shopping.

Due to the existence of the CAFC the patent system has been revitalized. Patents are more valuable and the courts “read the riot act” to infringers. This, if course, good news to large patent holders and R&D-minded companies like ours. And this is proclaimed by such general business periodicals as “Fortune”, “Dunn's Business Month” and “Chemical Week” which had articles in recent issues with such titles as “The Surprising New Power of Patents”, “Patents: Potent Weapon for High Tech Companies”, and “Washington's Pro Patent Court”. The “Fortune” article about the s“surprising new poer of patents” carried the following interesting byline.

> "Thanks mostly to a new appeals court, patent holders are winning many more suits against infringers. Damage awards have driven some defendants close to bankruptcy. Companies with patents are going on the offensive; infringers had better rethink."

These articles point out in a "then and now" comparison that before 1982 trial courts held patents invalid more often than not, normally assessed only "reasonable-royalty" damages and rarely granted injunctions or double or treble damages so that it literally paid off to infringe.

Now the situation is drastically changed, mostly due to the CAFC but also due to more patent legislation and less antitrust enforcement. Many more patents are upheld and penalties for infringement have become severe. Nowadays, "patents create a formidable defense which may crush patent infringers with actual and even treble damages, post-infringement interest, attorney's fees, legal costs and a permanent injunction." (Trade Secret Reporter, p.33, June 1986)

Consequently, there is a "growing respect for the power of patents and...the need to manage differently as a result."

The issue of patents for new discoveries has given a spring to invention beyond my conception.

Thomas Jefferson

The Patent System added the fuel of interest to the fire of genius.

Abraham Lincoln

On April 10, 1790, President George Washington signed the bill which laid the foundations of the modern American patent system. Three years earlier, at Philadelphia, the Constitutional Convention had given Congress the power “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.”

For 200 years the patent system has encouraged the genius of hundreds of thousands of inventors.

It has protected the inventor by giving him an opportunity to profit from his labors, and it has benefited society by systematically recording new inventions and releasing them to the public after the inventors' limited rights have expired.

The patent and Trademark Office has recorded and protected the telegraph of Morse, the reaper of McCormick, the telephone of Bell, and the incandescent lamp of Edison.

It has fostered the genius of Goodyear and Westinghouse, of Whitney and the Wright Brothers, of Mergenthaler and Ives, of Baekeland and Hall.

Under the patent system, American industry has flourished. New products have been invented, new uses for old ones discovered, and employment given to millions.

Under the patent system a small, struggling nation has grown into the greatest industrial power on earth.

The patent system is one of the strongest bulwarks of democratic government today. It offers the same protection, the same opportunity, the same hope of reward to every individual. For 200 years it has recognized, as it will continue to recognize, the inherent right of an inventor to his government's protection. The American patent system plays no favorites.

It is as democratic as the Constitution which begot it.

The U.S. depends on high technology products in its trade relations. These products are the result of intensive research and development and are protected by the patent system.

Patents are both an incentive for, and a result of, research and development. Correlation of patent data with research and development expenditures for some major industries--electronics, machinery, instruments and drugs--confirms that patenting is significantly and directly related to R&D expenditures in those industries. As research and development expenditures increase, so do the number of patents.

Patents Provide Technological and Market Information

Patent documents provide unique technical information that can be invaluable to both industrial researchers and industrial policymakers. Eight-four percent of all U.S. patents contain technology that is not disclosed or only partially disclosed in the nonpatent literature. This absence of other disclosure makes patents a vital resource of technological information. Such state-of-the-art information is essential to U.S. industrial researchers working to advance the technological frontier or to find alternative solutions to technical problems. Industry policymakers also rely on information about current technological developments. Patents reveal which nations and corporations are developing new technologies and allow U.S. companies to assess international competition and to make better business decisions domestically and abroad.

As the President stated in March of this year, in his message to Congress on technology in this country: We know, for instance, that a strong and reliable patent system is important to technology progress and industrial strength. The process of applying technology to achieve our national goals calls for a tremendous investment of money, energy and talent by our private enterprise system. If we expect industry to support this investment, we must make the most effective use of the incentives which are provided by our patent system. (Science and Technology Message of the President, March 16, 1972)

A strong industrial base obviously is absolutely necessary for a strong country. Industrial innovation, equally obviously, is vital to such an industrial base and a patent system which operates properly is of pivotal importance to industrial innovation. The nurturing of industrial innovation in any country is critical to its future.

In 1965 President Johnson appointed a commission (consisting of 14 leading businessmen, scientists, engineers, inventors and lawyers) to review the U.S. patent system, which had remained basically unchanged since a revision of the original system by Congress in 1836. Reporting in December 1966, the commission said it had agreed unanimously that "a patent system today is capable of continuing to provide an incentive to research, development and innovation." The commissioners added that they had "discovered no practical substitute for the unique service" rendered by the system.

A patent cannot lessen competition but always increases competition (hence it is inaccurate to consider a patent a “monopoly”). A fundamental requirement for patentability is novelty. If the subject matter is new, it is a truism that it did not previously exist. The discovery and patenting of new subject matter provides the marketplace with a new alternative, and what was previously available is not affected by the patent. The protection a patent affords in many cases is the only means a small entrepreneur may have to enter competitively a market controlled by the industrial giants...

When the colonization of what was to become the United States of America took place, the colonial governments enacted legislation providing incentives to establish or stimulate industries by awarding exclusive grants and various other types of benefits such as subsidies, loans, etc. Unlike the English patents of invention, which were royal grants and favors, the American versions were enactments by colonial legislatures of specific grants to individual inventors.

Massachusetts began issuing patents for inventions in the middle of the 17th century and in 1641 adopted what many consider to be the first general patent statute in America.

Most of the other colonial governments issued no patents for invention, exceptions being Maryland and South Carolina. The latter came close to establishing (by legislative enactment) a formal system of granting patents, even to providing for a special procedure for examining applications for patents. In the 1740's efforts were made in South Carolina to introduce a general statute to protect inventors as an encouragement to their development and disclosure of their novel ideas, but the efforts failed.

It was in the period of the Confederation of the States, commencing in the 1780's, that patents of invention began to be issued with great regularity, apparently due to a strong need to stimulate domestic industry. To Pennsylvania goes the credit for granting what many persons consider to be the first patent in America which contained a written description of the patented invention.

By 1777, when the Articles of Confederation were drafted, Connecticut, Delaware, New Hampshire, and New Jersey joined in granting patents for varying terms and under various conditions.

On August 18, 1787, when the Constitutional Convention met in Philadelphia, it was presented almost simultaneously with separate and independent proposals concerning intellectual property, one by James

Madison of Virginia, and the other by Charles Pinckney of South Carolina. Madison's proposals called for a national legislature “to encourage by premiums and provisions the advancement of useful knowledge and discoveries.” Pinckney's proposals included the authority “to grant patents for useful inventions.” Both proposals were accepted unanimously by the convention, and referred to a committee charged with incorporating them into a draft of the Constitution. Madison credits Pinckney with the proposal that there be a national patent institution.

Less than three weeks after these proposals were presented (on September 5, 1787) David Brearley of New Jersey offered to the Convention an amendment to the emerging draft of the Constitution which involved the creation of a new federal power, one which had not even been suggested in the Articles of Confederation drafted in 1777. The new power, which was to protect the works of authors and inventors, was unanimously adopted without any recorded debate. It became the eighth clause of Article I, section 8 of the United States Constitution as ultimately adopted.

After the Constitution was ratified in 1788, the First Congress of the new nation convened on March 4, 1789 and almost immediately thereafter it began receiving proposals for statutes implementing the intellectual property clause in the Constitution. President Washington was soon presented with a bill which he signed--the first American patent law--on April 10, 1790.

This patent law was a milestone, not only for America but for all the world. For the first time in history the intrinsic right of an inventor to profit from his invention was recognized by law.

Several industries have been built on the strength of patented inventions. The world's first nylon plant was built in Seaford, Delaware at a cost of $8 million. DuPont Chairman Irving shapiro recently noted, “Now, 40 years later, nylon is made all over the world....More than three million people have jobs in the production of nylon textile and plastic products, and all of this traces back to a handful of key patents behind the invention and development of this one product.” Edwin H. Land, an inventor in over 500 U.S. patents, has said, “I must emphasize that the kind of company I believe in cannot come into being and cannot continue its existence except with the full support of the patent system”. On another occasion Dr. Land told Polaroid stockholders, “The only thing that keeps us alive is our brilliance. The only way to protect our brilliance is our patents.”

In 1900, a Japanese Government official visited the United States and upon his return to Japan he reported, “We have looked about us to see what nations are the greatest, so that we can be like them. We said, What is it that makes the United States such a great nation? And we investigated and found that it was patents, and we will have patents.”

When the First Federal Congress created a system of patent and copyright laws 200 years ago, a wave of invention and intellectual creativity was unleashed that catapulted the United States onto the world stage as an economic power.

Thomas Jefferson said that “the issue of patents for new discoveries has given a spring to invention beyond my conception.” Jefferson, an inventor himself, was head of the first Patent Board.

To commemorate the Bicentennial of patent and copyright laws, a nonprofit group called the Foundation For A Creative America was formed to organize commemorative programs.

The foundation held a series of events May 6-11, 1990, to focus attention on the contribution of patent and copyright laws to the growth of America.

Beginning May 8, 1990, the Foundation honored writers and inventors during a four-day international conference to bring together government and legal professionals in the fields of patents, copyrights, trademarks, and intellectual property.

President Bush honored the Bicentennial anniversary of the first U.S. patent and Copyright laws with a proclamation calling on all americans “to foster recognition of the importance of our patent and copyright systems through appropriate educational and cultural programs and activities during 1990, the bicentennial year of our nation's first patent and copyright laws.”

When we say that the patent system lies at the very heart of the economic progress in our country, what do we offer as evidence?

For one thing, it is the protection offered by patents and trademarks that encourages private enterprise to invest in new research and product development, and it is on this investment foundation that whole industries are built. Charles F. Kettering, one of the country's leading industrialists and a distinguished inventor, illustrated this point when he said: “Industry has been very largely built up on inventions. Almost all industries, whether they are manufacturing a patentable article or not, have probably got their start by the use of either a patentable article or process for producing an article, or an improvement upon a patented process.”

When Chester Carlson, inventor of the Xerography process of electrostatic copying, received the Inventor of the Year Award for 1964 from the George Washington University's Patent, Trademark, and Copyright Research Institute, he commented on the role of research: “I am both grateful and humble in accepting this extraordinary honor. I am grateful because it signifies that the independent inventor is still recognized as an active force in American industrial life; and humble when I consider the large part, perhaps a major part, that organized research played in bringing my invention to perfection.”

He continued: “I would be remiss if I did not mention the large role played by others in the early development of Xerography — by many people at Battelle Memorial Institute and by many more at Xerox Corporation in doing the ingenious and painstaking work that brought eventual commercial success.

“The time scale of invention is a long one. Results do not come quickly. Inventive developments have to be measured in decades rather than years. It takes patience to stay with an idea through such a long period. In my case I am sure I would not have done so if it were not for the hope for eventual reward through the incentives offered by the patent system.”

It is obvious that the industries which our inventors and their patents bring about are responsible for the creation of jobs. Tens of millions of american workers can trace their jobs directly to inventions; almost no jobs can be found that are not due, in some measure, to patented inventions put to use in industry.

The incomes resulting from these many jobs combine to form mass markets. Mass markets make possible mass production. Mass production results in lower prices, and these lower prices, in turn, invite mass consumption, with a continually rising standard of living.

Such then is the evidence that the patent system lies at the heart of our Nation's economic progress. In speaking at a dinner marking the 175th anniversary of the United States Patent System, Secretary of Commerce John T. Connor gave specific examples to illustrate this point. He said: “Virtually our entire industrial machine has been built under the stimulus that the United States patent system gives to the creation of intellectual property.”

“The 1906 Wright Brothers' patent on their 'flying machine' formed the basis for today's aircraft industry employing half a million persons and having sales of $8 billion a year.”

“The patented inventions of Samuel Morse and Alexander Graham Bell gave birth to the electronic communications industry employing almost a million persons and having sales of over $15 billion a year.”

“Today whole new industries spring up with spectacular suddenness on the basis of patents,” Secretary Connor noted. “The discoveries of Chester Carlson have formed the basis for Xerox's fantastic growth. Dr. Edwin H. Land's invention of synthetic polarizers and the polaroid camera have formed the basis for a whole new field of photography.”

"From personal experience I know that the patent system is responsible for the development of numerous drugs vital to our health and which have contributed materially to our increased life span. Nine out of ten prescriptions today call for drugs that did not exist in 1950."

"In sum, almost the entire history of our scientific and technological society can be written from the files of the U.S. Patent Office."

Fortunately, the recent appearance of empirical studies and mathematical models which enable evaluation of the patent system in economic terms appears to provide the previously-absent evidence. There is concordance among American economists and statisticians that patent numbers serve a useful purpose not only in gross terms as barometric indicators of trends, but also in more sophisticated settings to forecast commercial opportunities, evaluate R&D investment and assess the economic value of inventions and innovations. These results also support the economic value of patents in certain industries such as pharmaceuticals, where front end costs are high, the time lag between innovation and marketing is extraordinarily long, the Federal regulatory burden is heavy and entry by competitors cannot otherwise be impeded.

Thus, developing techniques as well as increasing interest on the part of economists and statisticians who are skilled in researching and interpreting patent data are providing the wherewithal to demonstrate, on an industrial as well as a legislative basis, that the patent system is alive and well.

Economists have long recognized that patents have an economic effect via their effects on imitation costs. Also, it has long been recognized that the costs of imitating new products have an important effect on the incentives for innovation in a market economy.

Thus, these data indicate that innovators routinely introduce new products despite the fact that other firms can imitate these products at about two-thirds (often less) of the cost and time expended by the innovator. In some cases, this is because, although other firms could imitate these products in this way, there are other barriers to entry (for example, lack of a well-known brand name) that discourage potential imitators. But to a greater extent (at least in this sample), it seems to be due to a feeling on the part of the innovators that, even if imitators do begin to appear in a relatively few years, the innovation still will be profitable.

In particular, it is important to distinguish among the various sectors of the American economy. In pharmaceuticals and agricultural chemicals, there may very well have been a decrease in the rate of innovation, due in considerable part to increases in regulatory requirements. but in other parts of the economy, such as microelectronics, the rate of innovation seems to be hale and hearty.

Does more R&D lead to more patents? If so, is the relationship a “tight” one, or is it quite erratic? Do some industries, or firms within industries, obtain substantially more patents per million dollars of R&D than others? And if so, why? These are the questions addressed in this paper, which is drawn from a larger study using patent data to help track the relationship between R&D and productivity growth.

The research summarized here, exploiting extraordinarily rich datas, reveals that industrial patenting is strongly associated with research and development. The probability that a business unit will receive any patents in a ten-month period is higher, the more R&D that unit does. The number of patents received varies nearly linearly with the amount of company-financed R&D performed. There are, to be sure, differences between industries and companies in the “propensity to patent” — that is, in the number of patents received per million dollars of R&D expenditures. These differences are mostly industry-specific.

During a speech before the New York Partnership group on January 14, 1982 President REagan remarked: “Only when the human spirit is allowed to invent and create, only when individuals are given a personal stake in deciding their destiny, in benefiting from their own risks, only then can society remain alive, prosperous, progressive and free.”

While the President's remarks were not made in the context of the role that the patent system plays in today's economy, his expressed philosophy is a welcome reaffirmation of the philosophy underlying Article i, Section 8 of the U.S. Constitution, viz., that a successful patentee risk-taker should be rewarded with a limited period of exclusivity. Assuming that the President's comments reflect the policy of the present administration, a unique opportunity is presently at hand to restore respect and meaning to the patent grant, and vigor to the country's economy.

Today's patent system is part and parcel of our constitutionally sanctioned capitalistic economy, which recognizes the existence of property and the right to own and alienate such property, and wherein the generation of profits is the major motivating force in the use and manipulation of assets and resources. Under our free enterprise system, the governmental policy has been to foster competition, so that products are made available to the consumer in the marketplace at the lowest possible price.

The statutory intendment was that society would benefit from new and improved products flowing from inventive activities, and from the early publication of inventions, while the inventor would be rewarded with the right to exclude others from the practice of his invention for a limited term. The potential profit to be derived from the period of such exclusivity was intended as an incentive that would be sufficient to insure investment of capital into research and new product development and the continuity of economic growth, that would results from such activities.

Most writers interested in the patent system focus on the grant of exclusivity as the characterizing economic feature. "Economists have traditionally believed that the patent system works by making it costly, and sometimes impossible, to imitate a product legally — to 'invent around' a patent." The anti-patent bias so often encountered comes from a deep and traditional suspicion of monopoly. Pro-patent economists say that the temporary exclusivity granted inventors is not a bad monopoly but in fact has positive effects on innovation.

An extreme anti-patent view sometimes expressed is that “innovation continues even without patents so why grant monopolies when it isn't necessary?”

It will not come as a surprise to anyone that patent decisions in the petroleum industry (as well as all other industries) are made largely on the basis of what will best enhance the future economic health of the enterprise. The object is to improve one's competitive position within the proper bounds of legal and ethical behavior.

A third reason for filing a patent application on a new apparatus design is that a patent facilitates licensing. Apart from its potential for obtaining royalty income, which will be discussed later, licensing is sometimes the only way a company can conveniently arrange for its own use of an invention.

Some who have an anti-patent bias argue that patents are obtained only on inventions which cannot be kept secret, so the patent system doesn't cause the disclosure of any information which wouldn't be available anyway. The argument is specious. In the first place, the early publication in patents and frequently even earlier publication in scientific literature made possible by patent filing is much more useful to other researchers than the gradual seepage of information into general industry awareness. Moreover, patents are in fact obtained on inventions which could be kept secret. The defensive reason for filing to protect against discovery by others, as discussed extensively earlier, is a compelling one regardless of whether one can keep the invention secret.

There is still another reason that a patent application is likely to be filed even if the invention could be kept secret. Trade secret law requires that a company which seeks to enforce its rights against others who have improperly acquired and used a trade secret must show that the trade secret was treated as a secret within the company. That makes it advisable in at least some cases that only those with a demonstrable need to know be allowed access to the information. When patent protection is relied on, instead, there can be the free flow of communication among all coworkers in the technical field, and that stimulates creativity. There's nothing quite so effective in promoting inspiration as a good discussion among intelligent, curious and well informed people.

The patent system thereby acts to spur innovation in the petroleum industry by encouraging more and earlier publication of research results, by brining new technology more widely into commercial use through licensing, and even by encouraging the development of alternative, often improved, technology.

Well, now, we've got the patent laws and your question is: do they promote the progress of the useful arts? I think they certainly do. And I think that I might mention the way the incentives of the patent system actually operate. There are four of them. The first one is the incentive to invent, and I think that's the least important because people are going to invent anyway. The second one is that it is an inducement to disclose the invention to the public which is done when you file a patent application and get the patent issued, without which the invention might not be disclosed and be kept as a trade secret. And the third one, which I think is of the most important, is the inducement to invest risk capital to develop and promote the sale or use of the invention. There's a fourth one, which is a sort of backhanded thing, which is known usually as the negative inducement to “invent around” the potential invention. The issuance of a patent causes competitors of the patentee to devise still further ways of doing the same thing and that produces more inventions — more progress in the useful arts.

So, in those four ways, I've been convinced all my life as a patent lawyer that the Patent system surely does promote the progress of the useful arts.

Team Work

But it not always a single inventor, working along that bring about invention. We can think at once of Orville and Wilbur Wright who, on May 22, 1906, received a patent for certain “New and Useful Improvements in Flying Machines.”

Not so well known, perhaps, is the patent granted on June 23, 1868 to Christopher L. Sholes, Carlos Glidden, and Samuel W. Soule for the invention of the typewriter or the patent granted on July 12, 1870 to John W. Hyatt, Jr. and Isaih S. Hyatt for “Improvements in Treating and Molding Pyroxyline” — an invention from which sprang the great celluloid industry, supplying toilet articles, camera film, and a thousand other articles.

A team of three physicists — who were awarded the Nobel Prize for physics in 1956 — were responsible for the transistor: John Bardeen and Walter H. Brattain were granted a patent in 1950 and William Shockley was granted a patent in 1951. A still later example is the patent granted on May 17, 1955 to Enrico Fermi and Leo Szilard for their neutronic reactor, an important development in the field of atomic energy.

While an inventor works along or with someone else, there are certain requisites which are basic for putting his idea into practical use. He must have time to devote to the development of his idea. He must have equipment with which to work. He must have space in which to carry on his experiments. Time, equipment, and space — given these three requisites, he is able to work within an environment contributive to his very best efforts.

But these requisites are not always easy to come by, for their acquisition takes capital. Additionally, the cost of obtaining the patent may run into thousands of dollars. And if the inventor wishes to retain ownership of his patent, raising the funds for the manufacture of the resulting product may run into thousands or even millions of dollars.

Not that such obstacles have deterred courageous inventors, for patent history relates the stories of those who persevered courageously and received an inventor's rewards of recognition. On the other hand, patent history also relates the unfortunate stories of those who persevered courageously and lost.

Because modern industry is devoting more and more time to the research and development of new products and new processes, and because it recognizes that this research and development require not only ability to create new ideas but capital to prepare them for public use, it has become increasingly interested in providing an environment in which inventive-minded scientists and technologists can work singly or in teams to bring into existence these new and needed products and processes.

Therefore, in order to hire competent scientists and engineers and to provide them with expensive equipment, thousands of American companies plow back some of their profits into their operating funds, profits that otherwise would be paid out to the stockholders. But stockholders who have chosen to invest in the future of american business appreciate such policy and are willing to wait for later — and often — larger dividends as a result of this research and development.

This R&D industrial work holds out the promise of an exciting career for a young inventor who recognizes at the outset that the development of an invention sometimes requires expensive equipment which he himself cannot supply. further, he reasons that association with other inventive minds can stimulate his creative talents and that the whole team and eventually the public can benefit from his contribution as a team member working on a given project.

There are those, however, who prefer to work as “lone wolves” in this inventive business, a preference indicated by the fact that currently some 30 percent of all patents granted are being issued to individuals rather than to

inventors employed by others.

These “others” include not only industry, but universities and research institutions, and Federal and State governments. In the research laboratories of American industry, American universities and research institutions, and american government, some of the inventive wonders of science and technology are being readied this very day for public use in the tomorrows ahead.

The Employed Inventor

When an inventor working for a company, a university, a research institution, or the government has his invention patented, should he or his employer reap the rewards of such invention? With this question a second one is often linked: Would the invention have been patented without the employer's supplying necessary time, equipment, and space?

It is evident that both points of view must be considered. On the one hand, a man whose inventive genius finds the key which unlocks the door to a patentable invention is entitled to the fruits of the discovery. On the other hand, a company which provides the necessary time, equipment, and space for an inventor or team of inventors has earned its reward-rights. For example, a company assumes heavy risks, for it has no assurance that a marketable invention will emerge from the laboratory work of the inventor(s). Furthermore, a company may spend thousands of dollars of its stockholders' money on what appears to be a patentable invention only to discover that another company has acquired a patent for a similar invention, an invention which makes it imperative that its own inventor or team of inventors start the project all over again.

How are these reward-rights situations resolved? Each company works out its own system, and the inventor decides for himself whether or not he wishes to work under this system. If he decides to become a “salaried inventor”, he generally signs a contract which sets forth his “property rights”

as an inventor. from then on, he generally receives his monetary reward through one or more media: through a stipulated share in the company's profits stemming from “his” particular invention, through promotion in rank and salary, and through special monetary rewards of recognition. In a very real sense, he “trades” ownership and control of his invention for greater security, better equipment, stimulating associations, and improved equipment.

Inventors employed by universities and research institutions are rewarded according to the policy established by the particular school or institution, a policy which differs considerably from school to school and from institution to institution.

Patents and the Public

Even though we have centered our attention on the inventor — as he works singly or as a member of an industry, university, research institution, or government team — we must always remember that the successful operation of the patent system is dependent not along on the skill and genius of the inventor but also on the capital — the money which makes possible the production and marketing of the patented product or process — and the management which has been supplied by the entrepreneurial interest which assumes the financial risks involved.

The coalition of these three basic interests — skill, money, and management — works in our competitive free enterprise system for the benefit of the general public, and because this is true, it is not by accident that the strongest patent system in the world is located in the strongest Nation in the world. And this has been true since the beginning our our country.

Our country's economy has made tremendous strides during the years which have elapsed since 1790 when “an Act to Promote the Progress of Useful Arts” vested the power to grant patents in three distinguished “Commissioners for the Promotion of Useful Arts”: Secretary of State Thomas Jefferson, Secretary of War Henry Knox, and Attorney General Edmond Randolph.

As the population moved West, inventions and patents blazed the way for progress. John Deere's steel plow helped the pioneers to cultivate new fields, and Cyrus H. McCormick's reaper enabled them to harvest the grain and send some of it East to feed the growing population. Joseph F. Glidden's barbed wire invention made possible effective enclosure of large areas where cattle could graze and be herded for shipment to market.

Transportation, aided by the Conestoga wagon and the stagecoach, was accelerated by John Ruggles' improved locomotive and by better road beds. There came a time when the trains became longer and faster, and a serious problem of stopping them arose. It was then that George Westinghouse's air brake and later Eli H. Janney's automatic car coupler solved the problems by insuring safety. Came then the automobile, the bus, the truck, the airplane to open new ears of transportation.

As with transportation, so with communication. Patents made possible swifter dominion over space and time. These included Samuel F. B. Morse's telegraph, Alexander Graham Bell's telephone, Guglielmo Marconi's wireless telegraphy, Lee de Forest's vacuum tube which made radio possible, and Vladimir K. Zworykin's cathode ray tubes which made television possible.

Further to spur the economy there were patents in the mechanical industries, such as the sewing machine and the linotype; in the metallurgical field, such as aluminum and the Bessemer steel process; in the chemical field, such as plastics and synthetic fibers. In every field of endeavor patents came into being to widen industrial horizons and to benefit the public at large.

So successful had the U.S. Patent System become before its first century had ended that it won the attention of other countries. In 1876, a Swiss shoe manufacturer visited the Philadelphia Centennial Exhibition. Upon returning home, he had this to say: “I am satisfied that no people has made, in so short a time, so many useful inventions as the American, and if today machinery apparently does all the work, it nevertheless, by no means, reduces the workman to a machine. He uses it as a machine, it is true, but he is always thinking about some improvements to introduce into it, and often his thoughts lead to fine inventions or useful improvements.” So convinced was he that American progress centered on its Patent System that he urged his countrymen to follow suit. Twelve years later, in 1888, Switzerland had adopted a patent system.

The Rewards of Performance

From a review of the operation of the U.S. Patent System, it becomes apparent that it has brought — and continues to bring — rewards both to the inventor and to the public.

In return for the 17-year protection period which his country affords him, the inventor — or his company — can afford to invest time, labor, equipment, and money in his project because he knows that during this period, no one else, without incurring a liability for infringement of the patent, is free to copy his brainchild.

True, the Patent System cannot guarantee profits for it cannot guarantee the commercial success of a patented product or process, but it does foster a fair-play environment in which to promote the use and sale of the patented idea.

In return for this protection, the inventor discloses his patent so that anyone else may study it, gain ideas of his own for improving it or for improving a kindred — or even a wholly different — project of his own.

Patents and inventions thus play a vital role in our daily life. They provide products and processes which we take for granted. Perhaps we ought to make ourselves more aware of what we owe to the inventive skill and genius of persons throughout the world who have contributed to the growth and prosperity of our nation. Certainly we can be grateful to the Founding Fathers who underwrote our Patent System.

No wise American will boast that our Patent System operates perfectly, but it has achieved much over the past 200 years. Among its many contributions, it has operated to protect the individual and small business concerns during the formative period of a new enterprise. With its encouragement of and reward to American inventiveness, it has produced new products and processes which have placed the U.S. in the forefront in scientific and technological progress. It has aided our national defense, transportation, and communications, and is now encouraging science to solve new problems such as water desalinization. It has contributed to the improvement of health and the public safety. Finally, the patent system has helped to bring about the highest standard of living the world has ever known.