RESEARCH PAPER

First aid for a badly injured patent system

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ABSTRACT

An academic lifetime of research on patents for invention led to conviction of how unfit for purpose current international arrangements have become, and to the proposal of several reforms (Kingston, 2010). What follows is the result of further reflection on how poorly the modern world system fulfils the original intention of patents. It explains how this has come about and offers two new suggestions for improvement.

KEYWORDS

patents, innovation, patent reform, pharmaceutical industry, patent history

What are patents for?

Patents were brought into being as a means of enabling ideas to be turned into practical reality; that is, for economic innovation. Ideas come from individuals, and early patents for invention were granted by the Venetian Ordinance of 1474. This offered clever people a deal: if they brought their ideas to Venice to exploit**,** they would be given a monopoly over them for a number of years.

Modern patents everywhere have their origin in clause 1.8 of the United States Constitution. This is what empowers the US Congress to make laws which give inventors protection 'for the creations of their minds'. These laws are intended to enable ideas that are potentially beneficial for society to be turned into practical reality even if the individuals with the ideas do not have the resources to do this themselves. Take, for example, James Watt's idea of the separate condenser, which transformed the efficiency of the Newcomen steam engine. As an instrument-maker, Watt could not have financed its innovation, but he did get a patent for it. Because this would keep competitors from copying the invention for a period, the owner of a button factory, Matthew Boulton, who did have the required resources, was able to take the risk of backing Watt's idea. Without the patent, it is highly doubtful whether as a rational businessman, he would have done so. Similarly, the Wright brothers had enough resources to work on innovating powered flight, but it would have been irrational to use them if their results could then be copied. However, by giving them power to prevent competition for a time, their patents held out the prospect of profits.

This is what patents are intended to do, but instead they now primarily operate to benefit large corporations*,* which have more than enough power themselves to protect ideas without them (Bonadio and Goold, 2023). A large firm is able to make and preserve profits to the extent that others cannot compete on price or quality. It will be seen below that not only can corporations now

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reinforce this power with patent protection, but this may even be for 'inventions' with little or no creativity. Firms in an industry regularly trade patents of this kind between themselves, resulting in impregnable oligopolies. Members of these oligopolies face no threat of entry of smaller or new firms to their markets to challenge them and force their prices down.

Corporations in the pharmaceutical industry are especially favoured by the modern patent system. More than two-thirds of all the worldwide profits attributable to patents are made in the chemical – mainly pharmaceutical – industries (Bessen and Meurer, 2008, p.109 and note 1, p.114). Their proportion of patents is nothing like this, and the revenues of firms attributable to patents in all other technologies combined are dwarfed by them. This reveals a quite extraordinary imbalance in the protection the system now provides. It will be shown below how far this reflects differences between simple and complex technologies.

What caused such radical change?

The worldwide patent system now operates quite differently from its original inspiration. This has come about through the interaction of four historical developments:

- the change in US law which enabled firms to own the inventions of their employees, and similar provisions in other countries;
- internationalization of patents;
- patent law change to suit the US pharmaceutical industry;
- the aggressive foreign commercial policy of the US from the 1980s.

Each of these requires its own explanation.

Firm ownership of employee inventions

Patents were responsible for so much of the early industrial development of the United States that Abraham Lincoln praised them because they 'added the fuel of interest to the fire of genius'. So much invention led to the growth of firms doing research and development, with people employed to invent. This encountered a problem in protecting the results by patents. The Constitution authorizes only laws which give patent protection to individuals, so the patent law could not be changed to enable firms to benefit from an invention which had been made by one of their employees. The property right of the patent was granted (and still is) to whoever actually made the invention. Clearly, firms could not invest in research if they were not going to own the result of it. This problem was eventually solved when the Supreme Court ruled that employee contracts could provide for any patent an employee might obtain to be assigned to his employer for a nominal payment, traditionally one dollar.[1] Without this ruling, the development of 'investment-driven' patenting by corporations would not have been possible.

Internationalization of patents – the Paris Convention

After some bilateral agreements, in 1883 15 countries agreed on mutual recognition of their patents and trademarks in the Paris Convention. The principle of this was that any member country could have whatever law it chose about these, but committed to treat citizens of other member countries in just the same way as its own. As part of this, the filing date of a patent in one member country was agreed to be the filing date for all of them. The first change in this principle came in 1925, at the first meeting of the Convention after World War 1 at The Hague. Most countries' law had made local manufacture a condition for a patent, but this was now ruled out on the initiative of the US and

[1] In the case of *US v. Burns*, 1859.

Britain. As the strongest manufacturing countries at that time, they could now export to other member countries and still have their patents there. This is the first time that the influence of corporations on the international patent system is clearly evident.

The Paris Convention after World War 2

No more than 25 countries had joined the Paris Convention by the outbreak of World War 2. After that war, however, its International Bureau in Geneva came under the control of a remarkably energetic individual, Arpad Bogsch. He transformed it into the World Intellectual Property Organization (WIPO) with himself as its first Director, in 1967. By the end of his regime, he had multiplied the membership almost fourfold.

The theme for this missionary effort was 'harmonization'. The early post-war period was one in which worldwide organizations, such as the United Nations, were being established, and it was also a time when American technological superiority was unchallenged. As will be discussed below, the United States made a radical change in its patent law in 1952. Making this a model law for other countries to follow fitted in well with this worldview. It is easy to understand, therefore, how Bogsch could present harmonization of patent laws as a positive value, and that copying US practice was the way to achieve it.

Almost none of the countries which joined WIPO during the Bogsch regime had any significant inventive capacity, but each of them had a vote, which WIPO's patronage could easily direct towards the policy it wanted. This, of course, was the extension of the American system to the world. Only one country stood out against this general movement. When it became independent in 1947, India refused to join the Paris Convention because it wanted to develop an indigenous pharmaceutical industry. This would be impossible if foreign companies could have the date of patent filing in their home country apply in India also, as the Convention allowed. Freedom from this enabled India io build up a remarkably large and effective generic pharmaceutical industry with worldwide exports.

Law change to suit the US pharmaceutical industry

Once corporations came to own their employees' research output, they naturally wanted to patent as much of this as possible. The US courts, however, were bound by the Constitutional limitation in patent law to protect only 'the creations of the minds' of inventors. When a patent was challenged, judges consequently looked for evidence of individual creativity, eventually expressed as 'a spark of genius' in what was claimed to be an invention, before they would declare its patent to be valid.

Over time, as applications for patent protection were increasingly the result of purposive research and development by teams in corporations, it became more difficult to associate results with specific individuals. Identifying a spark of genius in them became correspondingly hard. The inevitable result was that more and more patents which were contested in the courts were ruled to be invalid. By the 1940s, this applied to two-thirds of Circuit Court decisions in the United States (Witherspoon, 1978). This trend was especially damaging for the US pharmaceutical industry, for three reasons. First, the industry depends more on patent protection for its profits than any other, since a chemical invention is nothing more than a formula. Once the formula becomes known, it can easily be copied, as the Indian generic drug industry showed. Secondly, drug manufacture is a simple technology in that its product is self-sufficient. It does not normally need to be linked to any complementary technology in order to be sold. Thirdly, whereas early pharmaceutical discoveries had been made by chance, often as by-products of dyestuffs research, later ones were the result of mass screening of large numbers of possibilities. Their results could produce no evidence of the spark of genius that would validate a patent.

Antibiotics revolution

This trend came to a head for the pharmaceutical industry with the beginning of the antibiotics era and the enormous potential markets this opened up. Although the first antibiotic – penicillin – discovered by Alexander Fleming in London, would certainly have met the spark of genius criterion, it was never patented. The second one, however, streptomycin, was discovered by painstaking testing of a large collection of bacteria. It did obtain a patent, but this was never tested in the courts. Had it been, it could have offered no spark of genius for its validity.

Since such mass screening was the model for future antibiotics research, it was clear that valid patents would be almost impossible to obtain as the law stood. Once the US pharmaceutical industry grasped this, it moved very quickly to have the spark of genius criterion for validity replaced. In 1948, the New York Patent Bar Association drafted a bill and it was introduced in Congress. This, supplemented by other bills and pressures, brought about the results the industry wanted. The criterion for validity was no longer to be evidence of individual creativity, but was changed to 'not obvious to one skilled in the Art' in the Patents Act of 1952. At least as significant was the provision in the Act that 'Patentability shall not be negatived by the manner in which the invention was made'. Between them, these two conditions put the result of the kind of labour that AI is starting to replace on an equal footing with that of creative vision as far as patent protection was concerned. This legislation was given its form solely by those who would benefit by it. As a judge who, as a patent attorney, had been its main drafter wrote later:

> The [1952] Patent Act was written basically by patent lawyers … A good 95% of the members [of Congress] never knew that the legislation was under consideration, or that it had passed. (Judge Rich quoted in Federico (1977) reference 5, sections 1:10, 11)

Unconstitutional?

This change to the meaning of patents as they were authorised by the Constitution was so fundamental that it might well have been ruled unconstitutional by the Supreme Court had an appeal been made. The new criterion of novelty, 'not obvious to one skilled in the Art', was adopted specifically to allow patenting of the results of research which did not involve any creativity whatsoever. It enables large numbers of patents to be issued today because their content is 'not obvious' although it is equally 'not inventive'. Because of the provision that 'patentability shall not be negatived by the way in which the invention was achieved', valid patents could be produced by mechanical screening, and now by artificial intelligence.

If the reason for the change in the law was because lower courts were unable to find sparks of genius to comply with Article 1.8 of the Constitution, what would the Supreme Court have made of a law which eliminated the need for these in patents completely? No such appeal has ever been made, not only because this new criterion had been drafted by lawyers for the pharmaceutical firms, the biggest user of patents, but also because it suited corporations in other technologies. Individual inventors did not have the resources and were not organized, and university patenting was not significant in the US before 1982, when universities were allowed to own patents on the ones results of publicly funded research for the first time.

There was a clear failure here on the part of the United States civil service. Firms and industries will invariably lobby politicians in their own interests and the civil service plays a vital role as a countervailing force. In nineteenth-century Germany, Wernher von Siemens actually went into politics to get protection for inventions in the new electrical industries. However, civil servants included chemical processes in the 1877 Patents Act which resulted from this lobbying. Combined with clever use of the Paris Convention from 1883, this gave German firms world dominance in pharmaceutical products until the outbreak of World War 1. There was no similar intervention in

the United States to ensure that change in the law to benefit pharmaceutical discoveries did not harm patent protection in other technologies, and especially complex ones.

Alternative pharmaceutical discovery protection

This was all the more regrettable because, if proper consideration had been given to the problems facing the pharmaceutical industry in getting protection for its research, a better solution might have been obtained without injuring the patent system. In 1983, the United States introduced Orphan Drug Protection, to provide incentives for research into remedies for diseases which afflict relatively few patients. In any case where a successful product was developed or adapted, the Food and Drug Administration undertook not to license a competitor for seven years. This delivers an unchallengeable monopoly since no drug can be sold legally without a licence, and it has been spectacularly successful, being copied in several other countries (see Grabowski, 2005). There seems to be no reason why this approach should not be applied to the results of all pharmaceutical research (indeed, to the research results for any product which needs a public licence to be sold) with a longer term.

This would have been a far better solution to the genuine problems of the pharmaceutical industry than distorting the patent system. This distortion came about because the law was changed, not through mature consideration by experts, but by the lobbying of politicians for a particular industry. The new criteria for the granting of patents then became accepted throughout the entire world, both because Paris Convention members were sold the idea of the value of 'harmonization', and because the United States changed its international trade policies.

US foreign commercial policy

The generosity of the US to the countries it had defeated in World War 2, reflected in the Marshall Plan, was enlightened self-interest, based upon the conviction of American industrial superiority. Beneficiary countries would be markets for the products of US firms. The quite unexpected and extremely rapid growth in Japanese ability to invade US markets was a severe shock to this conviction, and generosity in US foreign commercial policy was replaced with aggression. This took the form of imposing a new World Trade Organization with its Trade-Related Intellectual Property Annex (TRIPS) on the world.[2] TRIPS is quite different from the Paris Convention, which allowed any member to decide its own terms, as long as it applied them equally to foreigner and native. TRIPS required that each member country operated what was essentially the American system. India could not afford to stay out of the World Trade Organization and so had to accept TRIPS and join the Paris Convention.

Consequences

Patents, as the American Founding Fathers recognized, are a wonderful legal invention, but the interaction of these factors has given the world a grotesque version of them, which has three main characteristics. First, instead of being the basis for disruptive economic innovation, patents primarily provide reinforcement of the already great market power of corporations. The idea that patents should empower smaller or newer firms to disrupt established markets by turning ideas into reality has very largely been lost. Secondly, it has become a system whose main function is the protection of drug discoveries, as the profits research shows. And, thirdly, the patent system correspondingly fails to protect inventions in complex technologies. This last point requires some explanation.

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[2] Of the accounts of how the US controlled the revision of the 1947 General Agreement on Trade and Tariffs (GATT), those by Drahos (2002) and Sell (2003) are outstanding.

Differences between simple and complex technologies

As already noted, a simple technology is one where a single element on its own is what is paid for by the customer, an obvious example being a drug. The machinery for making it will likely be complex, but the product itself is a single entity, prescribed and sold by itself. In contrast, a complex technology comprises a product made up of several components which work in cooperation. It would be surprising if a patent system in which the definition of what can be protected was made to fit the pharmaceutical industry did not work particularly well for protecting drug discoveries. However, it was not foreseen that this definition would be correspondingly unsuitable for other technologies, as the figures for comparative profits show.

For any drug, there is exact correspondence between what is discovered, what is patented and what is put on the market. It cannot be otherwise because of public health regulations. For all other technologies, such correspondence is extremely rare, indeed almost non-existent. What makes these technologies complex is that they are made up of many pieces of information, which individually can often meet the current 'non-obviousness' criterion for patentability. Whether patented or not, almost none of the pieces of information in a complex technology is capable of being turned into saleable reality on its own: only the combination of all of them in the right way can meet a market need. For example, Chester Carlson's invention of copying on plain paper (which he called 'electron photography') was first disclosed in a 1940 patent, but its initial application was only in making lithographic printing plates, which required several manual operations. It took more than half a century before all the related components needed to deliver automatic copying in the way we now take for granted were invented, turned into innovations and brought together in the famous Xerox 914 machine. Most of the supplementary information that the original concept needed for this to happen did not exist during the lifetime of Carlson's many patents and became available only after their protection had expired.

Can anything be done?

It should now be clear why the international patent system works so well for chemical patents and so poorly for those in the electrical and mechanical categories, where technologies are usually complex. If this imbalance is not changed, innovation in all non-chemical technologies will continue to be far lower than it could be with a properly functioning patent system.

Of course, the most useful potential reform would be a criterion of novelty which better reflects the purpose of patents, especially their creative aspect. Measurement of patent grants by money instead of by time would also be a useful improvement (see Kingston, 2010). Since these would challenge TRIPS, they are impractical unless enough countries agree to concerted action. Until then, improvement will have to be sought in ways that are outside TRIPS provisions. This would allow one or a few countries to act unilaterally. Even without the problem of TRIPS, there would be strong resistance to any change which diminished current protection for pharmaceutical discoveries and corporately owned inventions. This need not be a problem if the objective is limited to bringing the level of protection that patents provide to invention in complex technologies up to that now given to invention in simple technologies.

Changes not in conflict with TRIPS

The first such change could build on the precedent of the extension of patent term for pharmaceutical patents to take account of delays in their commercialization resulting from their need to obtain regulatory permission to be sold. The parallel with a patent in a complex technology is that similar delay is caused by the need for other components to become available, or for a change in market demand. This approach would make use of the information stored in the world's patent databases. These collections are a unique source of technical data. Moreover, much work has been done by

WIPO and some of the national patent offices to improve the ease with which they can be searched. Since all patent applications appear in these databases 18 months after filing, they contain disclosures of ideas which failed to meet the 'non-obviousness' criterion of the modern patent system, as well as those that did and became patents. Even if many of the concepts included may have been left behind by changes in technology or markets, there are some amongst them whose information is needed now or might be needed in future. This could be either because complementary technical information has become available, or because markets have evolved so to make them useful.

Unfortunately, at present all this information is primarily used negatively. It is used by examiners in patent offices to rebut novelty in an application. Investment opportunities in a complex technology arise from the combination of many pieces of information in the public domain, possibly in the form of patent disclosures that were once protected. What is now new and useful is the combination of all these pieces of information, but protection for investment in this cannot be obtained from the present patent system. The combination is likely to be held by a patent examiner to be 'obvious to one skilled in the Art', and consequently unpatentable.

But what art and who is skilled in it? With a combination of pieces of information that is completely original, there is no existing art for anybody to be skilled in. This is true in varying degrees according to the originality of the invention. Consequently, the skilled person is imaginary, and the examiner is assumed to have a hindsight which is always perfect. This leaves no room for giving protection to a vision of how many different pieces of 'old' information could fit together to make a complex product. Incidentally, such a vision could be accommodated by the spark of genius test for patent validity before the 1952 change in the US law.

Patent duration

In the early days of patents, when the technology they protected was simple by today's standards, exploitation of an invention could begin close to the start of the term of the patent grant. Today, with more complex technology, this is no longer the case. Many patent applications and grants now contain information that will be published long before its time. If and when supplementary information emerges which makes this information useful, it cannot obtain patent protection to justify investment in innovation. This protection can now be provided only by the market power of a large firm. This is an abdication of the disruptive function that patents are meant to have.

An illustration, of contemporary interest because of its relevance to climate change concerns, can be found in 1992 US patent number 4335093.This was for the use of autonomous sailboats moving water turbines for energy to split sea water for hydrogen. This has been made practicable only with the greatly increased sailing speeds of multihulls with advanced sails and automated control that has enabled IBM's unmanned craft to cross the Atlantic. The supplementary information that the original concept needed for commercialization did not exist during its period of patent protection, and became available only long after protection had expired. There are countless similar examples in these databases where the current patent system gives protection to information when it cannot be used and fails to give protection later when it is needed to justify the risk of investment in its innovation.

Protecting innovation in complex technologies

What is proposed for complex technologies, therefore, is to end the current sterilization of the information in the world's patent databases. This could be achieved by giving protection to combinations of several pieces of information in a complex product which is not already commercially available. An initial proposal could lead to a period for development and testing of a prototype. Success with this would be followed by a period of exclusivity, enforceable by the granting body, not by the beneficiary. Like orphan drug arrangements, this would be protection of innovation, not invention, and therefore could not be affected by any external arrangements a country might have, such as TRIPS. There is nothing to prevent any country from introducing provision for this outside its patent law.

Intimidatory litigation threats

Wherever it was enacted, such legislation could be expected to result in rapid growth in innovation in the complex technologies which were ignored when the United States changed its patent law in 1952, and by the countries which copied the United States. On its own, however, this legislation would not be enough to enable smaller firms and start-ups to deliver the contribution they could make to economic development. This is because the ultimate arbiter of patent validity is a court. The threat of litigation too costly to be borne is a major deterrent to investment in innovation which depends upon patent protection. Large firms are only too ready to use this threat, as has been confirmed by detailed research for the European Commission. This found that 'every patent of value owned by a small firm in an EU country was infringed in the US' (European Commission, 2001).

National patent offices already perform numerous semi-judicial functions, but these cannot help a patentee faced with an infringer which simply challenges a patentee to pursue him through the courts with all the cost and risk this would involve. Any patent office could deal with such intimidation (again without infringing TRIPS) by adding a litigation officer to its staff. This would be akin to the ancient legal device known as *amicus curiae* (friend of the court), which is used in many jurisdictions, under both common and civil law, in cases where an interest is not represented. Patentees are most often not represented in a court simply because they cannot afford to mount a case against an infringer. Such an official would have resources to litigate on a patentee's behalf when there is a power asymmetry between patentee and infringer. This would be perfectly within the tradition of the institution of *amicus curiae* because it would be giving representation in a court that would otherwise be denied. Neither could it be claimed to be in conflict with TRIPS. The function would cost little to operate because the number of cases in which the officer would be involved in actual litigation would be few. The very existence of the funding would put an end to intimidation because firms ready to use this weapon would be aware that they would be met with resources to match their own.

In large firms, decisions to intimidate and infringe are generally made by middle managers, who can ignore calls to respect a patent without any threat to their careers. Faced with the resources behind a litigation officer, however, the prudent decision maker would see his career path in terms of coming to terms with the patentee.

Unilateral introduction

Both these changes could be freely introduced by any country, since they would leave its obligations under both the Paris Convention and the World Trade Organization untouched. The US acted on its own when it introduced Orphan Drug Protection. So did the UK when functional design protection was introduced in its 1977 Copyright, Patents and Designs Act. In fact, the UK has already made a useful contribution towards dealing with the intimidation problem in its 'Opinions' service (also introduced unilaterally). For a small fee, any patentee can have a review by a senior examiner for either patentability or infringement, and the outcome of this is a valuable pointer towards what a court might decide. The litigation officer concept is a logical development in reducing intimidation of patentees.

Conclusion

The evident potential value of protecting information that is in the public domain, once it becomes useful for innovation, is too great to be ignored. So is the need to prevent intimidation of patentees. Some enlightened government might take the initiative for the small legal changes needed in its own national economic interest. If this were to happen, it could be expected that others would quickly copy these changes, which could have remarkable economic consequences.

There are precedents. Britain had such a head start in the industrial revolution that other European countries could not match the capability of its firms. This changed with the coming of industries which depended less on this kind of advantage for their profits than on research and development. For Germany, the real industrial revolution arrived once the capacity to protect the results by patents had been added. An important component in the foundation of both the British and American pharmaceutical industries, for example, came from the seizure of German-owned patents in World War 1.

In terms of an industrial future, many countries are now in the same position relative to the most advanced, as Germany was relative to Britain before turning to R&D and patents. Few of their firms can any longer match the capability market power of those in the Far East and the US. The solution Germany found made up for its relative deficit in capability. A similar solution is open to countries currently disadvantaged. This lies in correcting the distorted patent system that has been imposed on them and could begin by providing protection for innovation in complex technologies and by ending intimidation of patentees. These first small steps might eventually lead to reform of an international patent system that is now far from fit for its original purpose.

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