Evanescent Intellectual Property? On Brad Sherman’s *Intangible Intangibles*

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Abstract

This note introduces and discusses Brad Sherman's book *Intangible Intangibles: Patent Law's Engagement with Dematerialised Subject Matter* (Cambridge, Cambridge University Press, 2024). It reviews the three moments in the dematerialization of intellectual property, and discusses the role of science in this process, as well as the notion of dematerialization. This discussion leads to a reflection on the future of intellectual property.

Keywords

Intellectual Property, Intangible, Science, Dematerialization, History

Introduction

Dematerialization is one of the most apparent features of the current economy. Concerning intellectual property, it raises a question, which is clearly formulated by Sherman in his book *Intangible Intangibles:* “how patent law designed for inventions of the “Industrial Age” is going to accommodate and deal with inventions from the 'Information Age'”? (Sherman, 2024, p. 4)[1]. Sherman provides a subtle and even dialectical set of answers based on the conviction that the dematerialization of subject matter in IP Law is not solely a 21st century problem (p. 5). One of the pillars of his approach is to focus on the role of science. Science may indeed make subject matter repeatable, identifiable and traceable beyond the reach of the inventor although such a subject is fundamentally uncertain, open-ended, fluid, and heterogeneous.

This is the reason he adopts an historical approach and insists on the role of science in providing the tools for the description and identification of subject matters. But Sherman is also convinced that it is necessary to put at distance the paradigm of mechanical inventions, on which patent law is based. Such a paradigm has two main characteristics : 1) mechanical inventions result from a two-stage inventive process, which first is based on the determination of a concept, then on its application in practice ; 2) thanks to the description and the scientific knowledge, the scientific explanation of the invention makes it possible to know how the invention must work but also why.

1 Three ways of dematerialization

Such a paradigm cannot by itself explain how patent law deals with subject matter and this is the reason Sherman analyzes three kinds of dematerialization processes with 1) chemical, 2) computer related, 3) biological, inventions.

Chemical inventions

Sherman is perfectly aware of the fact that chemical inventions were protected very soon. As an example, Nicolas Leblanc patented his invention on soda in 1791, the very same year as the French patent law came into force. But this precisely makes his question relevant: how a subject matter, which did not fit with the mechanical invention model, did succeed to be patentable which raised, a more general question : how patent law can work for several kinds of invention, which are based on different models of inventive activity?

Concerning the chemical inventions, an answer was not obvious for various reasons. First, it was not evident to consider the chemist an inventor since he was not able to explain why he obtained the compounds he developed. The inability of chemistry as a science to give an account on what the chemistry as an industry created made it difficult to defend such a subject matter.

What could not be justified by scientific arguments was however supported by the practice of depositing material samples attached to the patent application. “Specimens ensured that the accuracy of the written description could be tested during the application process if needed.” (p.74). As experts, scientists played an important role in the identification of compounds, which were at the core of litigations, which raised the question of their interests in the patent system.

Scientists also played a role by improving chemical nomenclatures and by standardizing the

1 This paper was presented at the 2024 ISHTIP Conference at the Boston University School of Law on 26 June 2024.

chemical names (see the Geneva Congress in 1892). The upshot of this was that “the written description was treated as if it encapsulated the invention” (p.76). Such a movement was possible thanks to the adoption of the structural formula and of the systematic naming of chemical compounds. These new ways of representation were the result of theoretical improvements in the domain of chemical science and facilitated the test of novelty for the patent procedures. Thanks to these improvements in the chemical language, the use of samples became less and less necessary in the granting of patents. This dematerialization of the chemical subject matter enabled also the extension of generic claims in the early 20th century (Dallas decision, 1903 ; Markush decision, 1924). In return, “patent law helped to shape the way chemical information was organized and classified” (p. 135).

We can wonder whether this co-evolution of dematerialization, but also this extension of chemical patentability was not a key reason why debates raised on the nature of invention in chemistry. For instance, the campaign against chemical product patents which occurred in the late 1930s, early 1940s thanks to Charles E. Ruby took place after fierce controversies about the development of the US chemical industry, its dependency to the German one, and the impact of such a relationship on the use of the patent law. This brings to another more general question: what is the place of socioeconomic aspects in the study of the science / patent law relationship?

“Intangible machines”

The dematerialization on computer related inventions is not similar to the process concerning the chemical ones. The questioning of software patentability was structured by the polarization of the computer industry between computer manufacturers and software developers. The latter, together with their bankers and lawyers, demanded software patentability for a variety of reasons. For the bankers, the software patent was a guarantee for investments For the lawyers, it was essential to remedy the vulnerability of unprotected software, even though counterfeiting was not really a problem in this field until the late 1960s.

In Sherman’s opinion, one of the major obstacles to a clear evolution of the issue was what Gerardo con Diaz called the “contested ontologies of software” (Con Díaz 2019). For computer manufacturers, software was a set of instructions that could be copyrighted, but not patented, since they had no real industrial effect. For software patent advocates, on the other hand, software had a technical impact that justified patenting. In the absence of a stabilized understanding of this ontology, which was itself due to the extreme technical intricacy of hardware and software, confusion has never really ceased to exist.

This confusion is reinforced by inconsistencies between the evolution of positive law and legislation, on the one hand, and the decision of the courts, on the other. In the late 1960s (Prater I and II, 1968 and 1969), the Court of Custom and Patent Appeals did indeed consider that a process could be patented even if it did not operate specifically on substances. But, at the same time, legislative reforms (Patent Law, 1967) or international agreements (Patent Cooperation Treaty, 1970; European Patent Convention, 1973) rejected the possibility of patenting software.

In fact, Sherman shows that, over the years, courts have been led to a form of tinkering which nonetheless ends up admitting the patentability of abstract ideas, provided they lead to "a new and useful end" (p. 165). This is a remarkable resurgence of the patent in principle (*brevet de principe*) that may have been thought of in the very early nineteenth century (see below). But, even the recourse to this criterion, which leads to the use of a physicality test, revealed itself transitory.

Indeed, patent agents were quick to grasp the physicality test in the first instance, drafting their applications in such a way as to highlight the program's physical results. However, the fact that the ontological confusion had never been resolved, and no doubt the rise of the Internet, led the courts to prefer the criterion of specificity to that of physicality: the tangible nature of the result of the invention ceased to be indispensable. The invention can be intangible — such as the method of creating a web page — because what matters now is that it be limited to a specific effect, the protection of which must avoid an overly broad pre-emptive effect. Such an evolution thus leads to a reconceptualization of the invention, now conceived through its informational rather than physical effects.

At this point, we might ask whether the impossibility of settling the ontological question is due solely to technical reasons, or whether it is due to the division of the computer science community, which is sharply divided on the issue of software control. We might also ask what effect the emergence and development of open source has had on this dematerialization process.

Biological Inventions

The biological inventions are the last kind of inventions, whose dematerialization is analyzed. Sherman studies it by starting from plants, which constitute, in his opinion, “the first type of biological subject matter that intellectual property law encountered” (p.191), and by finishing with the postgenomics paradigm.

I am not sure that the plants possessed such a precedence. After all, one of the claim’s of the US Louis Pasteur’s patent, which was granted in July 1873 for the “Improvement in the Manufacture of Beer and Yeast”, dealt specifically with “yeast, free from organic germs of disease, as an article of manufacture” (Cassier 2009). Such a claim, which was not included in the original application, was not rejected by the examiner and it is interesting to notice that in 2001, the USPTO referred explicitly to this patent in order to justify that “patenting compositions or compounds isolated from nature follows well- established principles, and is not a new practice”[2].

Concerning this question, Sherman focuses however his attention first on plant-based subject matter. This latter was fluid, malleable, unstable but, first of all, secretive since the breeders did not know why they obtained a specific plant. Moreover, breeders “could not describe plant inventions with specificity and detail demanded by intellectual property law” (p.191). The adoption of the 1930 Plant Patent Act resulted then from a campaign for protection, which mobilized moral and economic arguments but also from an effort to standardize plant names (1923). As for chemical compounds, plant-based subject matter raised questions about the status of breeders as inventors. However, some institutions such as the House and Senate Patent Committees considered that the control of natural processes by breeders justified to consider them inventors. Moreover, the adoption of a specific registration procedure, which required the deposit of samples, enabled the accommodation of plant-based subject matter.

The development of molecular biology in the 1960s changed the vision of life and the understanding of genes. “The molecular gene […] came to be treated as the common denominator

2 *Federal Register*, vol. 66, 5 january 2001, p. 1093.

that united all biological subject matter." (p.230) and this new vision impacted patent law. Genes were treated as chemical compounds. The upshot of this was to reverse the relationship between inventor and nature. The 1980 Supreme Court decision of Diamond v. Chakrabarty compared the role of the biological inventor "to the structural chemist or the mechanical engineer" (p.235).

The development of molecular genetics also changed the practice of registration. Progressively, scientists were able to describe biological subject matter thanks to a written form that made possible the identification and the replication of the invention. Although there was no obligation to do so, using the sequence data to represent molecular subject matter became usual and the Patent Office itself helped to the standardization of such a practice.

The courts went further however in the dematerialization of genes. In Sherman's opinion, the 2013 Supreme Court decision in the Myriad case was a new fundamental step. It is well known that the Supreme Court decided to consider that genes occurring in nature were non-patentable, even though they had been isolated. The justification of this decision was that genes could not be assimilated to chemical compounds since they carry information. If we can agree on the fact that the 2013 Myriad decision represents a new ontological conception of genes, we can wonder however what is the correct connection of such an ontology with patent law: after all, this genes-as-information understanding was the key argument to maintain even-isolated-but-"natural"-genes outside patentability.

It is interesting to note that the European Patent Office canceled some Myriad's patents in 2004 and 2005 because the first sequences mentioned in the application were wrong. Moreover, we know that Myriad's strategy after the 2013 Supreme Court's decision was to focus its IP on its own database with the genetic mutations of the 2 million people who had been tested.

Anyway, the divorce between genes and the chemical compounds conception continued especially in the postgenomics era, when it appears that epigenetic factors have an impact on genetic effects. This has brought to a new situation, where gene becomes again a fuzzy concept, which changes the patent law practices. For instance, depositing material samples becomes again necessary to complete the definition requirement. As said by Sherman, "when it comes to intangible intangibles, to a dematerialized subject matter, […] the tangible is never far from the (sub)surface." (p.277).

2 Discussing ontologies

The initial question of the book was to know "how a patent law designed for inventions of "Industrial Ages" is going to accommodate and deal with inventions from the "Information Age "?". I think Sherman provides a very clear answer: by changing ontologies, especially thanks to the tools provided by science, which are, in my opinion, intrinsically linguistic. These ontologies deal with subject matter but also with other aspects such as the inventive agency. They are plural and very often fuzzy. This is the reason there is no definitive understanding of what is patentable or of what is an inventor. Of course, there is a strong inertia and ontologies are not continuously disrupted – but they are always under pressure: there may be significant changes, especially when a specific ontology finds a new common consent (see table 1).

In my understanding of Sherman's work, ontologies are backed by composite languages, which include various components: sometimes material deposits, always immaterial texts, which are also material , when we think of the amount of records from patent offices or the problem of informatic servers. The presence of the material dimension of the description depends on the ability of the textual description to provide a convincing “effet de réel”. One of the best ways is to provide scientific explanations of the subsurface of the invention. This is the reason science plays an important role in the dematerialization of invention. Moreover, this is why I would like to provide some reflections on science and on dematerialization.

Science, a too convenient partner

First of all, I fully agree with Sherman that the question of the dematerialization of invention is a long-standing intellectual property issue. When Watt took out a patent in 1769 to improve steam engines, one of the claims was for a condenser separate from the main cylinder. It is indeed an abstract principle — that of separation — but linked to a specific industrial effect—the reduction of fuel consumption—that lies at the root of the invention.

It should be noted that in the early 19th century, scientists were not opposed to patenting principles and to *brevets de principe*. When the French patent law was reformed in 1844, Arago called for them in very specific terms:

> “I don't claim that an idea for which no industrial application has been indicated should be patented. If someone were to discover the square of the hypotenuse today, I wouldn't want him to be patented, I wouldn't want him to have the right to demand a salary from the astronomers who would use this proposition to measure the height of the mountains of the Moon. I want there to be industrial applications indicated by the creator of the idea.”[3]

Patenting principles was called into question from the middle of the 19th century, at the very moment when a new relationship between science and industry was being established (Galvez-Behar 2020). We need only briefly mention the trial that shook the French chemical industry in the early 1860s over a synthetic dye, fuchsin. One of the issues at stake was whether the publication of the compound by a scientist could invalidate the patent that had been granted afterward. The answer was negative, especially given that a scientific discovery and an industrial invention did not operate on the same scale. The whole point of invention was precisely to make the discovery industrial, to turn an element into a product. For this reason, science had to be willing to be used and even exploited by industry.

This detour through the nineteenth century inspires to me a general question about the socio-economic dimension played by science in the process of dematerialization highlighted by Sherman. What is the flip side of the role played by science, which provides its power of abstraction through ever more precise and profound language? I do not want to give the impression here that Sherman’s understanding of science is simplistic. By referring to the postgenomic era, he perfectly shows how equivocal this role can be since a more comprehensive scientific understanding makes its previous contribution to patent law unstable. My question is rather to look beyond this epistemic contribution and to question the social aspects of such a connection.

Dematerialization or (commodity) fetishism?

[3] François Arago, Chambre des députés, 16 April 1843 in (Renouard, 1865, p.271). My translation.

This brings me to a second set of thoughts concerning the dematerialization processes at the heart of Sherman's analysis. If we simplify the approach, dematerialization is made possible by the increasingly important role of the informational dimension of inventions. But where does this dematerialization come in? Is it a dematerialization of the invention itself, which no longer needs to be tangible to be patented? Is it a dematerialization of the invention's description, thanks to the use of an abstract language made possible by scientific progress? What are the links between these two levels of dematerialization?

A more general question also needs to be asked, echoing the one I posed about the status of science in this process. For my part, the concept of dematerialization fails to satisfy me insofar as it tends to obscure the other side of dematerialization, be it the materiality of its energy costs, for example, or the social relations that enable it. That is why I prefer to use the concept of “immaterialization”, even if I am not sure whether it is more relevant (being a poor concept entrepreneur). In any case, we may well ask ourselves what is ultimately driving patent law to contribute to this movement. If science provides the tools for abstraction, it is the law that is willing to go back on dogmas that are... intangible. So what are the factors that make this dynamic possible?

The future of intellectual property

The advantage of Sherman's approach, which consists in looking at the question in the past, is that it forces us to ask the question of the future of intellectual property. The ontologies underpinning patent law do more than just make it operational. They also make it politically acceptable. But can patent law remain acceptable if it is forced to reconsider the fundamental ontologies that characterized it, notably its industrial dimension?

This question extends to the whole of intellectual property, as the different types of intellectual property have been built precisely on particular ontologies. Of course, there has never been a precise and universal correspondence between a given object and a given mode of protection (take the French case of design protection, for example). Nevertheless, we may well ask whether the dematerialization of intellectual property is not tending to erase the different types of property? Does not this dynamic, combined with the one I have just mentioned, carry with it the risk of implosion?

These last thoughts are perhaps far removed from the heart of Brad Sherman's work. The latter is so rich and subtle that it can only inspire deep reflection. I hope I have not betrayed its content, and to form an opinion, it is far better to read it.

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	Mechanical Inventions	Chemical Compounds (I)	Chemical Compounds (II)	Software (I)	Software (II)	Biological inventions : plants	Biological inventions : molecular genes	Biological inventions : postgenomics
Subject Matter	Tangible effects Clear identity Product	Tangible effects Problem of identification Product / process	Tangible identity Clear identity Product / Process	(In)tangible effects (Un)clear identity Program	Intangible effects Clear identity Program	Tangible effects Clear identity (the plant) "Specie"	Tangible effects Clear identity Genes as chemical compounds	Tangible effects Unclear identity Genes as information carriers / Epigenetic factors
Inventive Activity	Concept / Application	Empirical (no preliminary concept)	Scientific	Scientific	Scientific	Empirical	Scientific	Scientific
Description / Application process	Use of technological / scientific knowledge No material deposit necessary	Unstable description Material deposit	Stable description (structural formula) No material deposit necessary	Stable description Material deposit not necessary	Stable description Material deposit not necessary	Unstable description Material deposit necessary	Stable description Material deposit not necessary	Unstable description Material description useful

Table 1. The diversity of dematerialization.