11

Conclusion

In his 1917 article on the patentability of mental methods, John Waite speculated about the possibility of patent protection being granted over immaterial subject matter: what I have called intangible intangibles. As he said, an 'idea of means' (which we would probably today call an inventive idea or concept), 'which is not capable of embodiment as an objective means has never … been the subject of an adjudicated patent. It is therefore an undecided question whether an invention which does not require tangible instrumentalities to effectuate the result desired is patentable.'[1] While a 'large number of patent law experts had expressed the belief that such an idea could not be the subject of a patent,' Waite said it 'is difficult, though not impossible, to conceive of an idea of means which does not involve the use of tangible instrumentalities.'[2] While it may have taken some time for this to come to fruition, patent law did eventually embrace non-physical inventions that used intangible instrumentalities. That is, patent law eventually did recognise intangible property rights in intangible subject matter or intangible intangibles.[3] As we saw earlier,

[1] John Waite, 'The Patentability of a Mental Process' (1917) 15(2) *Michigan Law Review* 660, 662.

[2] Ibid., 663.

[3] In thinking about the role of materiality in patent law, it is important to keep in mind the difference between patentable subject matter and the intangible legal rights that exist in relation to that subject matter. There is another important dimension, which has largely been lost in contemporary patent jurisprudence, which relates to force or principle employed in the invention. As Lee explained, the thing to be patented is not a 'mere elementary principle or intellectual discovery but a principle put in practice and applied to some art, machine, manufacture, or composition of matter.' Benjamin F. Lee, 'What constitutes patentable subject matter: An Address delivered before the Congress of Patents and Trade-Marks of the World's Columbian Exposition of 1893' (Congress of Patents and Trade Marks: Chicago, IL., 1893). 10. Or as Robinson said: a 'machine is an instrument composed of one or more of the mechanical powers, and capable, when set in motion, of producing, by its own operation, certain predetermined physical effects. It is an artificial organism, governed by artificial rule of action, receiving crude mechanical force from the motive power, and multiplying, or transforming, or transmitting it, according the mode established by that rule.' … 'The rule of action, imposed by the inventor on the material substances of which the machine consists, is what the courts have called the "principle of the machine"; a phrase synonymous with "*modus operandi*" and "structural law." It is, however, neither more nor less than the idea of means, which is embodied in the machine itself.' William C. Robinson, *The Law of Patents for Useful Inventions: Vol 1* (Boston: Little Brown, 1890), 257–58.

the recent shift to a more information-based subject matter has created a sense of unease, a concern that the law is out of its depth, and that it is dealing with a novel and unique type of subject matter that it is not equipped to deal with.

Having looked at how as a result of changes in chemistry, information technology, and biology patent law dealt with dematerialised subject matter, I am now in a position to return to the question I posed at the outset: namely, what does it mean to grant patent protection over a subject matter that is itself intangible or dematerialised? In order to get a sense of what might be lost or is at stake when engaging with a dematerialised subject matter, it is necessary to understand the role that materiality plays in patent law. While as Waite said 'patent law has invariably acted on the assumption that patented property is intangible,'[4] one of the things that the history of patent law shows is that the intangible is 'more indebted to materiality than one might suspect.'[5] Whether it is the vials of chemical compounds or packets of seeds deposited as part of the application process, the physical change that indicates the eligibility of a computer-related invention, or the ways in which plant intangible property was crafted to replicate the external form of the physical subject matter, it is clear that materiality has played and continues to play an important role in patent law.

Given the longstanding role that materiality has played in patent law, it might be reasonable to assume that there might be something at stake in the shift to an information-based subject matter. How then should we respond? Instead of rushing to look for policy solutions to deal with the perceived problems created by a dematerialised subject matter or bemoaning how the law is being outpaced by science, it might be more helpful to pause and consider the role materiality plays in patent law and what its absence might mean. In doing this it is important that we look at subject matter on its own terms. It is particularly important that we resist the temptation to see all subject matter through the lens of a mechanical or machine-based jurisprudence or to presume that the conceptual form of the invention is the machine. That is, we should not assume that it is Watt's steam engine rather than Hofmann's formaldehyde or Burbank's Santa Rosa plum that is the quintessential patentable subject matter (or even that there is such a thing). In line with this we should not presume that the process of invention is always one in which a priori inventive ideas are transposed into a material form or to use more doctrinal language that the inventive concept is reduced to practice. That is, we should not presume as Charles Ruby did that invention is 'a specifically human affair' that evolves out of the inner consciousness of its creator who then embodies it in a tangible substance, nor that the immaterial (conception) is created by the human inventor and then given shape in a material tangible form.[6] The problem here is not so much that these accounts

[4] John Waite, 'The Patentability of a Mental Process' (1917) 15(2) *Michigan Law Review* 660, 663.

[5] Alain Pottage, 'Literary Materiality' in (ed) Andreas Philippopoulos-Mihalopoulos, *Routledge Handbook of Law and Theory* (London: Routledge, 2018) 409, 425.

[6] Charles E. Ruby, 'Patents for Acts of Nature' (28 April 1939) 89(2313) *Science* 387, 388.

build on a series of unhelpful binary oppositions such as tangible and intangible, form and matter, material and immaterial, so much as how they see the relationship between these extremes.

As well as leading us to overlook important aspects of patent law, this way of thinking also skews the way we think about the impact that information-based subject matter has on patent law. To view physical samples, for example, through the lens of the figure of the machine suggests that samples and specimens operate in a similar way to the originating ideas of mechanical jurisprudence and that they lay the foundation for the subsequent transposition of the invention into a material form. One of the lessons that the history of patent law shows is that this temporal logic does not apply to chemical and biological subject matter. As we saw in relation to the deposit of chemical compounds, it was the *possibility* of reviewing physical objects rather than the review itself that was important. So too with the deposit of biological samples, where there was a disjuncture between the deposited material and its impact. In both cases, the role that physical samples played did not follow the temporal logic that underpins a machine-based jurisprudence.

Rather than following the lead of Ruby when thinking about patentable subject matter, it might be better to follow the approach of the nineteenth-century treatise writer, William Robinson. While Robinson and Ruby both saw invention as the product of the agency of the human inventor, they differed in terms of how they saw agency and thus invention. In particular, while Ruby's view of agency was modelled on mechanical invention (an approach Robinson called 'crude notions of physical agencies'[7]) in contrast Robinson argued that the idea of agency and with it the invention should change to accommodate different types of subject matter. If we follow this lead and reject the temptation to see patent law through the mechanical lens of the 'crude notions of physical agencies' we are led in a different and more fruitful direction.

While patentable subject matter often coincides with the physical form of the invention, a useful starting point for thinking about the consequences of a shift to information-based subject matter is to remind ourselves that materiality does not necessarily 'connote physical attributes of substances, such as their mass, density, or spatial definition' so much as an 'agency that is afforded by, elicited from, or ascribed to them.'[8] One of the consequences of this is that when we are confronted with a dematerialised subject matter, rather than lamenting the loss of materiality, a better response is to ask: what roles does materiality play and can these roles be performed by some other means?

While materiality has performed a number of roles in patent law, two stand out. The first is that the use of physical samples allowed patent law to accommodate a

[7] William C. Robinson, *The Law of Patents for Useful Inventions: Vol 1* (Boston: Little Brown and Co, 1890), 115.

[8] Alain Pottage, 'The Materiality of What?' (2012) 39 *Journal of Law and Society* 167, 168.

mute, ungiving, and secretive subject matter. This was the case with nineteenth-century organic chemical compounds and with many biological inventions. In both cases, the inability of science to explain what went on below the surface when something happened meant that scientists were unable to reduce the invention to a paper format: they were unable to isolate, identify, and capture the inventive idea that was meant to motivate and shape the resulting invention, at least in a way that could be repeated from the patent documentation. Instead, they were forced to rely upon the results of those changes: the tangible objects that captured and embodied the inventive ideas.

A second role performed by materiality was that by individualising the subject matter, materiality helped to ground the intangible.[9] In doing so, materiality helped patent law to demarcate the boundaries of what was protected. Thus while the physicality of Morse's tangible telegraphic machines were patented, his untethered claim to electromagnetism was not. By individualising the subject matter, materiality also ensured that the subject matter could be identified, examined, and once patented, put into circulation. In this sense physicality ensured that the intangible was rendered visible to a legal, scientific, and commercial audience and that it was confined within acceptable limits.

While materiality played an important role in allowing patent law to embrace different types of subject matter, it is clear that patent law is able to accommodate a subject matter that lacks physical form. Whether it is speculative chemical inventions claimed using structural formula, post-*Myriad* gene patents, or information-based computer-related inventions, there is nothing inevitable about physicality in the way that patent law engages with its subject matter. Physicality is a tool that patent law uses to allow it to achieve certain ends that can in certain circumstances be performed without recourse to physical effect or trace.

While physicality may not be integral to the way patent law deals with patentable subject matter, this does not mean that a shift away from materiality will not have an impact on the scope, operation, and effect of the law. One of the things that the history of patent law shows is that the relative materiality or immateriality of the subject matter is not the issue. This is because it is not the act of dematerialisation that is important, so much as the way that the law responds to this lack of materiality and the changes this brings about; it is here that we see the influence of a shift to information-based subject matter most clearly.[10]

In thinking about the consequences of a shift to information-based subject matter, it is important to distinguish between the problems that arise because of the process of dematerialisation and the more fundamental, almost inescapable problems that

[9] In this sense, deposited materials operated like type specimens in so far as they ensured that patent law operated taxonomically at the level of the species.

[10] On the means of bioproduction see Hallam Stevens, 'Bioinformatics and How to Make Knowledge in a High-Throughput Genomics Laboratory' (2011) 6(2) *BioSocieties* 217.

lie at the heart of the subject matter eligibility inquiry, which arise with most types of subject matter.[11] One of the most notable and consistent changes brought about the dematerialisation of subject matter was in terms of the impact it had on the scope of what could be patented and how the subject matter was evaluated. While chemical samples and biological specimens may have been introduced to deal with one problem (namely, a lack of prevision), the deposit of physical samples served other functions. For example, although chemical and biological specimens may not have been introduced with the goal of individualising the protected inventions (as occurred in Germany with chemical compounds), this was an indirect consequence that patent law seized upon to help it deal with an otherwise unruly subject matter. In this context, the materiality of the physical samples functioned to demarcate and limit the intangible. Once it was accepted that prevision was no longer a problem and that patentees were able to rely on paper-based representations of their chemical and biological inventions, physical samples were no longer needed.

While structural formula and sequence information performed a similar role to deposited samples in helping patent law to capture the inventive concept, the shift away from the use of physical samples did have consequences. This was because in the absence of a patent tied to a physical specimen, there was no reason to limit the subject matter to individual inventions. In this sense, the shift from physical specimens to paper-based representations created the possibility for patents to be granted for classes of inventions. When tied to the decision that applicants for a class of inventions were able to disclose a select number of members rather than each individual member of a class, subject matter eligibility became a question of degree not kind. The situation was similar in the case of computer-related subject matter where the shift from physicality to specificity as the touchstone for subject matter eligibility opened up the possibility for patents for classes of specific inventions.

While physicality may not be integral to the way patent law engages with patentable subject matter, this is not the case in relation to the information that explains, defines, and characterises that subject matter. As we have seen, patent law consistently relied upon the informed nature of the subject matter in deciding eligibility.[12] The information that is generated in the experimental systems and practices that produce the subject matter is incorporated into patent law either directly via the descriptions of the inventions used in the patents or indirectly via the experimental

[11] In part this is because patent law is fundamentally concerned, to paraphrase Rheinberger, with things that we do not know yet but we wish to discover. At the same time, while lawyers, patent attorneys and the Patent Office deal with recent science, the courts, particularly appeal courts, are often deal with dated inventions. For example, the US Supreme Court decision of *Myriad* was concerned with an invention that made its way into the patent system some 27 or so years earlier. See Sean V. Tavtigian et al., 'Chromosome 13-Linked Breast Cancer Susceptibility Gene' US Patent No. 6,033,857 (7 March 2000), filed on 20 March 1998 but based on earlier abandoned applications from 1995.

[12] While for the most part patent law passively accepted the way that the subject matter was presented to the law for scrutiny, one area where the law constantly pushed back was in terms of the way that the scientific prior art or public domain was organised and accessed.

knowledge that is attributed to the person skilled in the art that informs the way that the patent is construed. As different types of information become part of Patent Office practice (which is a 'blend or mayonnaise of law with science and technology') and adopted by lawyers and judges when thinking about and interrogating patents (sometimes with the aid of experts), the information is eventually assimilated and normalised within the fabric of the law.[13]

To understand how patent law deals with techno-scientific subject matter, whether nineteenth-century organic chemical compounds, medical diagnostic inventions, or mRNA vaccines, we need to look to the information that is embodied within or attached to that subject matter. That is, to get a sense of how patent law deals with subject matter, whether dematerialised or not, we need to look to the information that allows that subject matter to be visualised, defined, and explained and in so doing ensures that it is rendered legible and manageable. It was here, perhaps more than anywhere else, that we see the influence of science and technology on patent law most clearly. In a relationship that is neither one of co-production nor one in which the law is destined to play catch-up with scientific change, science and technology not only play a role in providing new candidates for protection, they also provide the means which allow these new types of subject matter to be assimilated within the law. In this sense, patent law sees subject matter not as the thing in itself; rather it sees subject matter in the way that science allows it do so. While the problems associated with a shift to an information-based dematerialised subject matter may ultimately be resolved by mundane technical factors that are developed in the experimental systems and practices where the subject matter is generated or where that information is used, one of the unexpected outcomes of the debates about the dematerialisation of subject matter is that they might lead to a more nuanced understanding of patent law and its interaction with science and technology. And that would not be a bad thing.

[13] K. P. McElroy, 'Our Anomalous Patent Office' (May 1921) *The Journal of Industrial and Engineering Chemistry* 469.