Title
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Journal
SOCIAL RESEARCH, 73(4)

ISSN
0037-783X

Author
Biagioli, Mario

Publication Date
2006

Peer reviewed

Mario Biagioli

Patent Republic: Representing Inventions, Constructing Rights and Authors

COMPARED TO CASTING A VOTE, APPLYING FOR A PATENT IS SLOW, costly, and tedious. Still, both practices play out in different ways what it means to operate in a regime of political representation. In colonial America (as well as in early modern France, England, Spain, Italy, Germany, and Russia), patents were gifts the sovereigns could either grant or withhold from their subjects. Today, instead, we have the right to claim intellectual property in our inventions, and to have it recognized upon fulfilling certain requirements about the invention's subject matter, novelty, utility, nonobviousness, and adequate disclosure. The transition from patents as privileges to patents as intellectual property rights parallels the demise of political absolutism, the development of liberal economies, and the emergence of the modern political subject. In France, patents were declared one of the *droits de l'homme* less than two years after the revolution, and the US Constitution was the first, in 1787, to include a clause about the authors and inventors "exclusive rights to their respective writings and discoveries" (*Loi Relative*, 1791).[1]

Today's discussions about the pros and cons of intellectual property are essentially political in nature, hinging on different views on the right balance between what should be or remain public and what should be allowed to become private (and for how long) so as to provide

incentives to innovation. My goal here is to look at the same balance at a more microscopic level—to move it from the level of broad political and cultural debates to the mundane details of patent applications. Far from depoliticizing the debate over intellectual property by shifting it into the grey, technical realm of patent bureaucracy, I want to show that one can sketch out an "archaeology of democracy" from a very mundane but key step in the patent application: the disclosure of the invention. Required by modern patent law in the United States and virtually every country in the world, this is the section of the application where the inventor describes (in words and images) the invention in sufficient detail to enable a third party to repeat it.

It is the specification requirement that makes the patent system defensible in political terms. The most famous of US patent officials, Thomas Jefferson, took patents to be private monopolies—monopolies he disliked and tried to limit (Bickford et al., 2004: 1412). Even those who do not share Jefferson's views still acknowledge the tension between the image of equality and free competition democracies put so much effort in polishing and the temporary monopolies those same democracies are happy to grant to a great number of inventors.[2] Debates over the relationship between patents and monopolies have a long history. Jacobean England tried to distinguish unacceptable monopolies (many of which were banned in 1624) from acceptable ones (exemplified by patents of invention). Because the latter were limited to *new* inventions only, they were seen as taking nothing away from the public that it had before (Loosey, 1849: 117).[3] Used throughout the nineteenth century in Europe to defend the patent system from serious and occasionally fatal attacks, the argument is still alive today—often with the additional spin that without patent protection many inventors would be likely to withhold or take their discoveries to the grave with them (Dutton, 1984: 22-23; MacLeod, 1996: 137-153; Schiff, 1971). The real enemies of public knowledge, we are told, are not patents but trade secrets.

While bearing conceptual family resemblances, defenses of the patent system display a distinct shift in emphasis as we move toward the present. The 1624 English Statute of Monopolies stated that patents

of inventions were *harmless* and therefore allowable because they did not take anything away from the public, but it is now not uncommon to hear that patents are *good*—that they should be understood not as monopolies but as publications; that is, tools for the public disclosure of new and potentially useful knowledge. It is the specification of the invention mandated by modern patent law that has allowed a "harmless monopoly" to be recast into a win-win situation:

> A patent is a contract between the inventor and the public, by which the inventor, in consideration that the exclusive use of his invention is secured to him for a limited period of time, confers upon the public the knowledge of the invention during that period and an unrestricted right to use it after that period has expired . . . The specification is the instrument in which the terms of these mutual considerations and promises are declared, and on its completeness and accuracy depends the validity and the value of the contract itself (Robinson, 1890: 70).[4]

Referred to as the "patent bargain," this arrangement is typically represented as a quid pro quo in which the inventor discloses in order to receive patent protection from the state (Fessenden, 1810: 49).[5] But if we look more carefully we see that the quid is actually construed as identical—not just equivalent—to the quo. Hiring a security company to protect one's property involves a transaction between two different entities (cash and services), but what is given and taken in the contract between the inventor and the public is exactly the same thing: the invention. Furthermore, the security company may or may not provide a service that is worth what you are paying them, but the more the inventor discloses, the more protection s/he will receive, and the more disclosure the public receives, the more its government is committed to protect. Disclosure, then, is not conceptualized as a cost of doing business but as the information necessary to ensure protection. Unless you provide a good map of your property, the law will not be able to

defend you effectively against trespassers. If you conceptualize the patent bargain as the kind of synchronic snapshot-like exchange epitomized by the "patent bargain," then neither the public nor the inventor can reap unfair advantages from it.[6] Incorrect or deceptive disclosure by the inventor does not make the contract lopsided but simply voids the patent. More sophisticated than other Enlightenment constructs modeled after the balance, the contract between the inventor and the public is presented as a self-correcting scale—one that would break before going off balance.[7]

Early modern inventors often described their devices to state officials with drawings, models, and "discourses," but that is not what I mean by patent specification. Those early forms of disclosure were not public nor were they meant to be sufficiently detailed to enable the public to repeat the invention.[8] The latter kind of disclosure was not required in the early modern period, when patents were privileges. It began to be used consistently in England toward the end of the eighteenth century, was codified in US and French patent law around 1790 (when patents became rights), and is now mandatory in modern patent systems. The introduction and function of specification requirements provide a direct window on the simultaneous emergence of intellectual property and representative politics.

GALILEO TO JEFFERSON

Two examples, separated by 200 years, capture the dramatic transformation I map in this paper. The first dates from September 1594, when the Senate of the Republic of Venice granted Galileo a 20-year privilege for a water pump (Favaro, 1907: 126). Both the application and the grant were a matter of routine. Venice had been issuing patents for inventions since at least 1474—about 600 of them by the time Galileo filed for his (Berveglieri, 1995: 22). The entire description of the invention boils down to two lines in the privilege where the pump is said to "raise water and irrigate land, [and] with the work of a single horse it will keep twenty water spouts connected to it going at the same time" (Favaro, 1907: 126).

What such a pump looked like, how it functioned, or how it could be built is not disclosed. We know that applicants for Venetian privileges might be asked for drawings and models of their devices or samples of the products resulting from the invention, but the sparseness of this material in the archives indicates an inconsistent handling and use of such information (Berveglieri, 1995: 27-27).[9] If Galileo ever provided drawings or verbal descriptions of his invention, they were not included in the text of the privilege or attached to it as an appendix. And keep in mind that the privilege handed to Galileo contained all the information about the invention that might be accessible to the public, or rather to the subset of the public to whom he might have chosen to show the letter.

The Venetian patent system involved some kind of examination, but not one that primarily centered on the performance of the invention or the soundness of its principles.[10] The report of the officials charged with evaluating his invention—the *Provveditori di Commun*—states that the application was endorsed "without having seen this device of his, neither on a large nor on a small scale"—a reference to the fact that Galileo showed them neither a working prototype nor a model.[11] Technical examinations were common when inventors requested funds to develop inventions of particular public relevance, or pensions and rewards in exchange for communicating new military technologies to the state.[12] Such tests, however, were rarely performed when inventors applied for privileges without the additional request of state funds.[13] In Galileo's case, the *Provveditori* seemed to support his request based on their assessment of the *local utility* the invention would have after being put to work. Terminally swampy Venice had a soft spot for water pumps, and Galileo promised a very efficient one. The Venetians, however, were not so naïve as to grant privileges simply on the inventor's promise that s/he would reduce the invention to practice. Unlike modern US and European patent law, Venice had very strict reduction to practice requirements, ranging from a few months to a couple of years (Biagioli, 2006a: 154, n 144; Hulme, 1897, 314). The validity of the privilege might hinge not only on evidence that the invention *could* work (that it was reduced to practice), but also that it *did* work and generate business.[14]

Being so close to the date of the initial grant of the privilege, the deadlines for reduction to practice or working requirements functioned as de facto technical examinations—even if slightly delayed. Having effectively farmed out the technical tests to highly motivated patentees, the officials focused on the economic and bureaucratic aspects of the privilege. They assessed the local utility and novelty of the invention, its impact on local labor, commerce, and prices, and carried out preliminary checks to see whether someone else had already received a privilege for it (Favaro, 1907: 127). Even when descriptions, drawings, and models were used to evaluate the potential technical feasibility of the invention, they were not required to teach other people how to build it. In England and elsewhere, the role now attributed to specifications was taken up by provisions about the training of workers and artisans to operate and build the invention *in loco*—a "disclosure" through bodies rather than texts (Davies, 1934: 104-105; Dutton, 1984: 39).[15]

The primary function of early descriptions was the determination of the patent's subject matter—either to avoid overlaps with preexisting patents or to archive evidence to be used to adjudicate possible future infringement disputes. Figuratively speaking, the officials used drawings and descriptions of inventions to assemble a bureaucratic cadaster of patents, not a body of publicly available knowledge from which inventions could be produced after their patents had expired. But if we fast-forward two centuries to the first US Patent Act of April 1790, we find that applicants were required to

> deliver to the Secretary of State a Specification in Writing, containing a description, accompanied with drafts or models. . .(if the nature of the invention or discovery will admit of a Model) of the thing or things by him or them invented or discovered, and described as aforesaid in the said Patents, which specifications shall be so particular, and said models so exact, as not only to distinguish the invention or discovery from other things before known and used, but also to enable a Workman or other person

> skilled in the Art or Manufacture. . .to make, construct, or use the same, to the end that the public may have the full benefit thereof after the expiration of the Patent term. . . (US Patent Act of 1790. In Walterscheid, 1998: 465).[16]

Note that the act drew a clear distinction between the kind of disclosure required to "distinguish the invention from other things before known" and the kind needed "to make, construct, or use the same." This was not an isolated case. The first French patent law of 1791 introduced comparable specification requirements (*Loi Relative*, 1791, Articles IV, XVI).

What changed radically between 1594 and 1790 were not just the *standards* of patent descriptions but what those descriptions were *for*. Questions about the accuracy or extent of Galileo's disclosure or that of countless other inventors are not as relevant as the appreciation of the striking differences between the Venetian officials' handling of his request for a privilege and the steps that had to be followed in post-1790 US patent applications. Using modern US patent terminology, we could say that the Venetians used the information provided by the inventors as a statement of the "claims" of the patent (the subject matter the applicant considers his/her invention or discovery), but did not require that evidence to provide what is now called the "Detailed Description of Invention" (the information needed to enable a person skilled in the pertinent art or science to make and use the invention) (Manual of Patent Examining Procedure, 14, Nov. 1992 version: 600-2). While claim and description constitute, together, the modern patent specification, these two elements had very different genealogies, reflected radically different interests, and are still quite different in practice. Today it is up to the patent office or the courts to judge whether the claim and the description are appropriately balanced at the time the application is filed. Inventors are inclined to cast their claims as generally as possible to maximize the extent of the protection while giving away as little as possible about how to repeat it. It is in the public interest, instead, to minimize the inventors' claims (so as to limit the extent of their monopolies) while receiving

as much information as possible about the invention so as to facilitate its transition into the public domain at the expiration of the patent.[17]

The new purpose of patent descriptions changed the verbal and pictorial genres used to construct them. Already in March 1811, the first director of the US Patent Office—William Thornton—gave inventors a printed template for applications, a stern request to drop old style "panegyrics on the excellence of his invention," and a set of instructions on how to compose specifications and drawings (Thornton, 1923: 102). What mattered in the new regime was not the alleged "excellence" of the invention but the application's formal compliance with newly introduced statutory requirements about patentability.[18] Anyone who looks at a modern patent is likely to be struck by its remarkably contrived language and stylized drawings—genres that are now codified in the *Manual of Patent Examining Procedure* (MPEP)—the multivolume reference text issued by the US Patent and Trademark Office and followed by both patent examiners and attorneys. Just the rules for patent drawings—down to the kind of ink to be used—fill several pages (MPEP, 2006; Rankin, forthcoming).

The sheer size of the MPEP is testimony to the extraordinary amount of work required to articulate and maintain the patents as rights regime, but it would be a mistake to take this evidence to mean that patent specifications have just become more extensive or more accurate since 1790. The change has been more radical than that.

Toward the end of the eighteenth century, patents did not simply become more descriptive but rather entered a brand new regime. This was a new regime for inventions, but also for their makers and users. They all became represented, differently but simultaneously: inventions gained specifications and people gained political representation. The transformation of the subjects of political absolutism into a politically sovereign "public" set the conditions of possibility of the patent bargain—the contract between inventors and citizens. At the same time, it was the introduction of patent specifications that made that contract politically defensible by distancing it from the "odious monopolies" of the ancien régime.

Two ways in which representation was *not* part of the picture prior to 1790 are important here. Detailed patent descriptions were not required in Venice, Florence, Germany, France, England, the Netherlands, and colonial America. Furthermore, whatever information early modern inventors included in their privilege supplications was very rarely made available to the public—at least not in a lawful, transparent manner.[19] As in Galileo's case, the official charters—the *litterae patentes*—through which the privileges and their terms were made selectively public included only brief descriptions of the inventions. In time, and especially in England, the descriptions included in the body of the patent grew in size, but never approached the length and detail of a modern specification. Even when separate specifications were occasionally filed, they were not appended to the patent but filed away in the Lord Chancellor offices (Davies, 1934: 269-271). Models were also not accessible to the public. They were either returned to the applicants for safekeeping or kept in locked storage.[20] Models of inventions became public (and usually displayed in museum-like settings) only in the patents as rights regime.[21]

The Patent Act of 1790 marked a radical departure from such practices. It stated that the newly required specifications could be accessed and studied by any interested citizen even while the patent was valid, not just after its expiration:

> Upon the application of any person to the Secretary of State for a Copy of any such specifications, and for permission to have similar model or models made, it shall be the duty of the Secretary to give such Copy and to permit the person so applying for a similar model or models to take, or make or cause the same to be taken or made at the expense of the Applicant (US Patent Act of 1790. In Walterscheid, 1998: 466).[22]

The invention itself could not be copied while protected by the patent, but the knowledge now required to be included in the specifica-

tion became public at the time the patent was issued—a change found in the 1791 French patent law as well. Since 1836, the text of US patents have included the specifications themselves, and modern European patent law goes so far as placing patent applications—not just the patents—in the public domain (US Patent Act of 1836. In Walterscheid, 1998: 499).[23]

More stark differences emerge when we compare privileges and modern patents. Like most privileges, Galileo's was to expire within a year unless the invention was put to work (Favaro, 1907: 128). So strict reduction to practice requirements fit the logic of the privilege well. Privilege-granting authorities wanted to maximize local utility, not to disclose knowledge about the invention. (In the absence of international patent treatises, public disclosure of an invention could facilitate undesirable transfer to nearby countries) (Dutton, 1884: 41-42). Furthermore, if inventors could show that they had put their devices to work or could provide working models, why would the king or the state care about how they worked? There was a direct correlation, therefore, between strict reduction to practice requirements and lax disclosure requirements.

The 1790 act turned this upside down. It specified no reduction to practice requirements but stated that a patent would be voided if the specifications "did not contain the whole of the truth concerning his invention or discovery; or that it contains more than is necessary to produce the effect described" (US Patent Act of 1970, Sec. 6. In Walterscheid, 1998: 468)[24]. Reduction to practice as such was not mentioned in the 1836 Patent Act either. This absence does not mean that reduction to practice had disappeared but that it was being reconceptualized in relation to the newly introduced specification requirements. Already in *Hildreth* v. *Heath* (1841), the court stated that "if a machine be invented and *described* in such a manner that it may be made and used. . .the invention may be said to be *reduced to practice*" (cited in Dood, 1983: 245; emphasis added).

The modern patent bargain connects specification and reduction to practice by requiring the inventor to give the public an enabling disclosure—a disclosure sufficient to allow a person skilled in the art to

repeat and operate the invention. But to repeat and operate means to reduce to practice. The 1793 Patent Act had already moved in that direction by tightening specifications requirements to include "the several modes in which [the inventor] has contemplated the application of that principle or character" (US Patent Act of 1793, Sec. 3. In Walterscheid, 1998: 480).[26] If we fast forward to the present we see that patent law has further narrowed down the "several modes" by requiring the specification to "set forth the *best mode* contemplated by the inventor of carrying out his invention" (Halpern, Nard, and Port, 1999: 188). It appears, then, that specification requirements entail reduction to practice requirements in the sense that the applicant is asked either to show evidence of an actual embodiment of the invention (actual reduction to practice), or to describe in detail what s/he takes to be the best way to construct his/her invention (constructive reduction to practice) (Halpern, Nard, and Port, 1999: 205-207). In the patents-as-privileges regime, reduction to practice or working requirements performed the role we now give to specifications. But in the patents-as-rights regime we see that reduction to practice requirements have been logically subsumed under specification requirements to the point that they may be fulfilled not by showing an actual device but a detailed *textual and pictorial description* of a *possible* device. Reduction to practice has gone virtual.

It is interesting that the specification requirements found in the first patent act started to emerge a few years before—between the Declaration of Independence and the ratification of the Constitution—in patents issued by individual states. Pennsylvania granted a patent to Henry Guest on March 17, 1780, for "manufacturing oil and blubber from the materials he has discovered," but required him

> to put up in his said manufactory or manufactories a printed account in English and German of the said materials by him discovered or invented and used in the making oil and blubber, subject to the inspection of all persons, in order that no person may unknowingly offend [that is, infringe] and that all after the expiration of the term of five

years may be enabled to prosecute the said manufactures to their own advantage (Bugbee, 1967: 86-87).

Although this grant required the disclosure—even a bilingual one—of the *ingredients*, it did not go so far as to link the validity of the patent to making available a description of the *process* used by the inventor—a step that was to become standard requirement with the act of 1790. Two other postrevolutionary patents issued by the South Carolina assembly in 1788 to Samuel Knight (for a rice-pounder) and to Isaac Briggs and William Longstreet (for a steam engine) added precisely that requirement (Bugbee, 1967: 93-94).

That specifications were absent in the colonial period, but began to emerge after the Declaration of Independence to become eventually codified in the first US Patent Act supports a correlation between political representation and patent representations. The hypothesis gains further strength when we notice that while the 1790 act marked a sharp departure from both earlier European and colonial American patent practice, its provisions were closely matched by the first French postrevolutionary law of intellectual property. Passed in January 1791, that law stated that the applicant had to provide a complete, enabling disclosure of the invention; the disclosure was to be accessible to the public; and the patent will be voided if the specification was found wanting (*Loi Relative*, 1791, Articles IV, XI, XV, XVI). Comparable specification requirements were eventually adopted throughout Europe (Loosey, 1849: 58, 332, 341-2, 357, 392-5, 415, 430-3, 443).

INTRODUCING ORIGINALITY, REINVENTING NOVELTY

Together with the shift to specification from reduction to practice came an equally drastic reframing of what it meant for an invention to be new. While related in practice, originality and novelty are logically distinct: the former concerns the authorship of the invention, while the latter refers to the differences between an invention and others that preceded it. You may be the original inventor of a device (in the sense that you invented it by yourself), but that does not mean that

the device is new because, unknown to you, someone else might have already invented an equivalent device.

In 1790, US patent law started to link patentability to originality, saying that a patent would be void if it was proved that the patentee was not the "first and true inventor or discoverer" of the invention (US Patent Act of 1790, Sec. 5. In Walterscheid, 1998: 467). It added a novelty requirement: an "Art, Manufacture, Engine, Machine, or Device, or any improvement therein" could be patented only if "not known or used before." Although the act did not specify where the invention was supposed to be unknown and unused prior to its patenting, legislative history indicates that the lawmakers meant "anywhere in the world"—an interpretation that was shared by the courts (Walterscheid, 1998: 373).[27] Two important consequences followed from these requirements. First, no US patent could be issued for an invention previously patented somewhere else (by the same inventor or a different person).[28] Second, an invention could be rendered unpatentable in the United States not only by operating it prior to the application, but also by making it publicly known. Though not always applied, the originality and novelty requirements of the 1790 Patent Act represented a sharp break from previous doctrine—one that continues to puzzle legal scholars as it seems to run counter to the economic interests of the United States at that time (Walterscheid, 2002: 309-335). A technology-poor country would want to facilitate technology transfer, but originality and novelty requirements (and the early restriction of patenting to US citizens only) worked against such transfer by making foreign inventions not patentable in the states.[29]

Originality requirements have not changed since 1790, while those concerning novelty have been somewhat diluted over the years, at least in the United States. The way the first Patent Act changed previous patent doctrine, however, dwarfs anything that has happened since.[30] Until 1790, the granting of privileges (in England, continental Europe, and colonial America) was utterly independent from the determination of whose mind had first produced the idea of the invention. Privileges went to the first person who put to work a certain invention

in a certain country. It was quite reasonable to focus on novelty relative to a place (rather than on originality or absolute novelty) because privileges were initially aimed at obtaining useful manufactures that were previously unavailable in that specific country (Biagioli, 2006a: 147-152). It is ironic that modern patent treatises are about controlling industrial espionage, while early modern privileges were openly aimed at promoting it. Still, consistent with the logic of the privilege, it was utterly immaterial whether the inventor had extracted the invention for his/her mind or from the country next door—"whether it is learned by travel, or by study it is the same thing" (Fessenden, 1810: 48).

Seen against this background, the shift inscribed in the first Patent Act was literally categorical. It was also double, or perhaps triple. It substituted a geographical construct (local novelty) with a mental one (originality), but it also turned novelty (a notion that had been previously local and relative) into an absolute one—novelty anywhere. Furthermore, it changed the very referent of novelty, not only its geographical scope. While the patents-as-privileges regime was primarily concerned with the novelty of an *invention in a certain place*, early US patent law started to conceive of novelty in terms of the difference between *a patent and another that preceded it*. It looked at the relationship between patent and prior art, not at whether a material invention had or had not been brought to a certain place. The shift was so radical that the notion of geographical novelty central to the patents-as-privileges regime has become oxymoronic in modern patent law—a legal regime that construes novelty as temporal. What has changed is the very meaning of novelty, not just its geographical scope.[31]

THINGS IN PLACE TO AUTHORS IN SPACE

The shift inscribed in the 1790 US Patent Act or in the first French patent law of 1791 reconceptualized the role of the inventor from two different directions, both pushing it toward the figure of the author and, occasionally, that of the genius. First, by severing the traditional link between inventor and importer, originality requirements cleansed the notion of inventorship of some of its blatantly less than authorial

connotations. Second, the introduction of specification requirements recast the inventor from engineer to author by redefining the very category of invention in textual terms.[32]

Specification requirements mandated that the inventor write down the invention in order to describe it in a way that could be understood and made replicable by the public as represented by the "person of ordinary skill in the art." This created the conditions of possibility for treating the actual material invention (the entity that used to be protected by early modern privileges) as separate from its "idea" (the entity that would become protected by patent law). It was a paper item—the specification—that eventually put the "intellectual" into "intellectual property."[33] Allowing for the emergence of the idea as a distinct entity, specifications made possible for that idea to become the immaterial "essence" of the invention. This in turn recast the material invention (which had previously been the sole instantiation of the invention) as just one of the possible (and therefore inessential) embodiments of such an idea. This was not a process of abstraction from particular to general, but rather one of separation between form and matter.

As in 1790, modern patent law still does not allow for the patenting of ideas or principles in and of themselves. Like the case of copyright where the author is granted intellectual property rights in his/her "personal expression" conceived not as an abstract entity but as something fixed in a medium, modern patents protect "inventive ideas" only when they are embodied in something material. This view was implicit in the specification requirements introduced in 1790, but became explicit in the 1793 Patent Act: "in the case of any machine, he [the inventor] shall fully explain the *principle and the several modes* in which he has contemplated the application of that principle or character" (US Patent Act of 1793, Sec. 3. In Walterscheid, 1998: 480; emphasis added). The invention becomes neither the abstract idea of the philosopher nor the immanent material device of the early modern engineer but rather a principle with various possible embodiments. Its two halves, however, began to lead separate lives. Inscribed on a piece of paper, the

"inventive idea" moved into the halls of soon-to-be-established patent offices to become the primary focus of patent practice, while its material embodiments stayed outside, in the world of manufacture and commerce.

The same split enabled the transformation of the inventor from producer of material devices to thinker and author—the creator of the idea and the author of the specification. In some important ways (but not in others), this separation is comparable to the one that enabled the transition from printing privileges to copyright (Woodmansee, 1984; Rose, 1993; Jaszi, 1991). Writers were recast from producers of material texts to authors of the "personal expression" embodied in their work. It was to this immaterial personal expression (not to the physical book) that copyright was attached. The author's personal expression could not be legally protected unless it were inscribed in something—that is, unless it secured a material host.

But if inventive ideas and personal expressions can be protected only when embodied (in the case of invention) or fixed in a medium (in the case of copyright), there is a key difference in the role such inscriptions and embodiments played in the construction of copyrights and patents as author's rights. Manuscript and printed texts had been written, sold, and circulated for centuries before they were reinterpreted as carrying the immaterial personal expressions of their authors. The law simply recast the author function of certain kinds of texts that already existed. Instead, privileges for inventions became patents only when the law started to require that the invention be specified in writing. In this case the law did not reinterpret a text as being authorial but rather mandated the production of a new kind of text and, by doing so, constructed the inventor as an author.

Not only did the introduction of specifications change both the notion of invention and of inventor, but it also made possible the geographical expansion of the patents' protection. Without patent specifications, it would have been impossible to develop the international patent treatises that, starting in 1883, have led to the globalization of intellectual property that we see today (Plasseraud, 1983).

How could different countries compare, exchange, and cross-register patents without a specification, without a piece of paper one could put on a desk and check against other specifications of inventions from other countries? (Latour, 1988) If it was the recasting of "invention" from thing to text that allowed its transformation from privilege to right, it was its newly acquired status as right that in turn allowed its legal protection to travel in space through international treatises about patent rights.

In this context, the idea of the invention did not emerge through a process of abstraction but through one of inscription—not by thinking it up but by writing it down. In time, the law came to focus less on how the actual invention looked, how it was built, and what it did here and now, and more on how it was described on the surface of the application.[34] The instructions that the Patent Office now gives to potential applicants often use the term "invention" to refer to the inventive idea as described in the application—a slippage that would have surprised (if not shocked) early modern inventors.[35] While the relationship between invention and privilege had been one between a machine and a document that regulated its use, modern patent law has come to construe the patented invention itself as a text.

The changing use of models may epitomize this shift. The early modern privilege regime treated models as the most valuable description of the invention because of their proximity to its materiality, but since 1870 patent law has allowed them only in special cases. Even then, they are studied by the patent examiners but do not become part of the patent—as drawings and written specifications do instead (Dood, 1983).[36] Modern patent disputes rarely engage the materiality of the invention because they have become, in effect, contests of textual interpretation over competing patents (Sherman and Bently, 1999: 185-186).[37] Similarly, issues of patent priority are settled by going back to dates and signatures in laboratory notebooks and written affidavits, but only rarely to things.

I am not saying that people did not have ideas about their inventions prior to 1790, but rather that whatever went on in the inventors'

minds (or in the books they might have written about their inventions) was perfectly irrelevant to the working of the privilege system. Privileges rewarded working machines in specific places, period. They were technology transfer tools, not instruments of intellectual property. I mean this not only in the historical and empirical sense that privileges were introduced to facilitate the immigration of machines, manufactures, and skilled labor into the confines of the privilege-granting nation, but also in the logical sense that, as a regime, the privilege had no need for the idea of the invention (as a category), nor did it have a conceptual or legal space to represent it even if such an idea were to be found in the inventor's mind. In this sense, there was just nothing intellectual about the privilege. It was all about locality, materiality, and utility. The way the meaning of "prior art" changed in the transition from privileges to patents exemplifies the point.

"Prior art" is a term of patent law that refers to the state of a given field of technology prior to the introduction of the invention. (What were the common technologies of personal transportation prior to the introduction of the automobile?) Prior art is the baseline against which the inventor is required to demonstrate the novelty and nonobviousness of his/her patent—the "other" against which the "identity" of the invention is to be constructed. But prior art can quickly turn into a patent's death knell if a patent examiner or a competitor can show that the patents' claims are found in prior art. That means that the invention (or part of it) is already in the public domain and is, therefore, unpatentable. What counts as prior art in modern patent law, however, is remarkably different from what counted as prior art in the earlier privilege regime.

In the early modern period, the kind of prior art that counted against a privilege was limited to the prior operation of the invention within the jurisdiction of the privilege-granting authority. Privileges protected working technologies in a certain place, and the prior operation of that technology in the same place invalidated the privilege. The like invalidated the like. For the same reason, publicly available knowledge of that invention did not count as prior art because knowledge

was not what the privilege protected or was concerned with. One could publish books on a given machine without diminishing the chances that someone else could reduce that invention to practice and get a privilege from the same authorities that had granted publication privileges to the books in which that invention was described (this is not a hypothetical example) (Biagioli, 2006a: 157-158). All this changed with the introduction of specification requirements. Thereafter, a patent could be denied not only if the invention was shown to have already been in operation in that country, but even if it was disclosed (that is, specified) either there or anywhere else. When specification requirements turned the invention into an object of knowledge—the embodiment of a publicly disclosed idea—then knowledge started to count as prior art too.

It was the reconceptualization of the invention from actual machine to inventive idea that enabled the emergence of the notion of inventors' rights—at least in France and the United States. Such a transformation does not appear to have stemmed from an attempt to develop legal tools to match the emergence of new technological objects and activities, or from the pressure of the inventors lobbying to have their rights recognized. An overwhelmingly agrarian economy at the end of the eighteenth century, the United States had little pressing concern for patents—a fact reflected in the near absence of debate prior to the inclusion of the clause about inventors' rights in the Constitution (Walterscheid, 2002: 2). My hypothesis is that the reframing of the inventor as an author stemmed from changes that developed from inside the law in response to the introduction of a brand new political regime. It was the direct result of the introduction of two new legal requirements—disclosure and originality—that were correlated (in a formal sense) with the conceptual framework that went with the new political regime. The introduction of specification requirements was not just about increasing the amount of information inventors had to provide to the state in order to receive a privilege, but was rather an index of an entire regime change that took place around 1790 in the United States, in France, and (much less dramatically) in England.

NOVELTY INTRODUCED, AND THEN TRIMMED

So far I have presented specification, originality, and novelty as distinct categories. I now want to argue that novelty was not an independent new requirement, but that it followed logically from the introduction of specifications. I do not mean this in the trivial sense that it would be impossible to evaluate the novelty of an invention in the absence of disclosure, but rather that it was because of the introduction of disclosure requirements that novelty and, through a different path, originality, became categories of patent law and assumed the contours they largely still have today.

The meaning of "publication" changes dramatically as we move from privileges to patents. More information is disclosed about the invention but, more important, the introduction of specification requirements widens the definition of what kind of information that can put an invention in the public domain and thus prevent its patenting. Today, for instance, even an orally delivered conference paper may count as a disclosure of the invention described in the paper. Paper abstracts, published conference proceedings, articles, and books are taken, a fortiori, to put an invention in the public domain.[38] The ease with which different ways of making an invention public could end its chances to a patent was quickly understood by both inventors and competitors alike. Around 1829 English inventors were already complaining that competitors who had got word of a pending application could try to block the patent by rushing to print a description of a similar invention to destroy its novelty (Dutton, 1984: 44).

As the meaning of publication and prior art expanded under the patent regime, so did the mobility and visibility of information about inventions. Large machines travel poorly or not at all, but printed matter is remarkably easier to move. As publications—not just working machines—joined prior art, an inventor's claims to novelty could be challenged and refuted by a remarkably larger body of faster-moving evidence. No doubt, the political culture that emerged in the United States and France after their respective revolutions was very much opposed to monopolies and therefore supportive of strict novelty

requirements. Still, the turning of novelty into an increasingly global category and the introduction of originality requirements (that never existed under the privilege regime) were not the result of direct political demands but, I argue, of the mundane effects of patent specifications. The introduction of patent specifications followed from the logic of the new political regimes but, once required, specifications and their circulation (not as ideas but as material inscriptions) triggered a range of unforeseen effects, some of which impacted the law itself.

The 1790 Act defined prior art as knowledge or use of an invention previous to the application (US Patent Act of 1790, Sec. 1. In Walterscheid, 1998: 481). The 1793 Act expanded the definition of prior art by adding publications to it, while the 1800 Patent Act made its scope explicitly global (US Patent Act of 1973, Sec. 6. In Walterscheid, 1998: 489). It extended patent rights to resident aliens, but it also stated that "every person petitioning for a patent for any invention" was required to make an oath or affirmation that such invention "hath not. . .been known or used in this or *any foreign* country" (489). A decade later, the head of the US Patent Office warned potential patent applicants not to waste their time and money unless they were positive that their inventions met novelty requirements. They could do so, he advised, by examining "well the dictionaries of Arts and Sciences, the Repertory of Arts, and other publications that treat of the mechanical arts, to endeavor to ascertain if the invention is new" (Thornton, 1923: 98). Neither the *Dictionary of Arts and Sciences* nor the *Repertory of Arts* were original US publications. The former was an English technology compendium, the latter a London-based periodical that published not only specifications of English patents, but also extracts of various European scientific journals.[39]

The same pattern is found in France, where a variety of publications (domestic and foreign, legal and illegal) started to count as prior art as soon as disclosure requirements were introduced. "If the inventor himself or another person had made [the invention] known, even if the knowledge has been obtained by fraud or corruption," the invention would end in the public domain (Perpigna, 1834: 23). The

venue or (il)legality of the publication did not make a difference. What mattered was the detail. To void a patent or to block an application, the description of the invention available in the public domain had to be equivalent to a patent specification—that is, it had to be sufficiently detailed and complete to enable a person skilled in the art to replicate it (Perpigna, 1834: 23). The like blocks the like. The same level of specification that would have enabled a patent (when introduced in an application) would have voided it if made public prior to that application (in any shape and place).

A certain Monsieur Raymond applied for a patent in 1819 for a new system of paddle wheels, applicable to steam vessels, and fixed in the stern (Perpigna, 1834: 19). In July of the same year he was informed by the minister of commerce that "this method of navigation is engraved and described in many printed works" and that, most likely, his patent was going to be challenged and voided. Raymond demanded his patent anyway. (Probably as a counter-reaction to the highly discretionary practices of early modern privileges, early French and US patent law allowed the government to inform inventors of perceived prior art or infringement issues, but not to deny them patents if the applications were complete) (Perpigna, 1834: 5).[40] Raymond's patent was granted in August, for 15 years, but was challenged and annulled in 1824 "on the ground that the description of the process had appeared in print, previous to the demand for the patent." Raymond's defense that the book containing the description had been written in a foreign language and printed in a foreign country was dismissed. Raymond fought on. The appellate court agreed with him, finding that "according to the spirit of the law on patents, the invention must have been published in France before the demand was enrolled, for the patent to be declared forfeited" (Perpigna, 1834: 19). The Supreme Court, however, did not see that spirit in the law and, sticking to its letter, reversed the decision of the appellate court, finding that it had wrongly applied "the law on patents of 1791, where no distinction is made as to the language and the country in which the work containing the description may have appeared."[41]

A prior foreign publication could void a French patent, but the US Patent Act of 1800 counted foreign knowledge and use—not just foreign publications—as prior art. Had Raymond been a US inventor rather than a French one, he could have lost his patent if someone could show that an invention equivalent to his was known or used in any country (without being patented or published there). The possibility of such scenarios probably contributed to the decision to weaken novelty requirements in the US Patent Act of 1836. Originality was left untouched, but novelty was recast as a two-tier category—one that applied to US prior art and the other to foreign prior art. An invention could not be patented if known, used, patented, or published in the United States, or if published or patented in any other foreign country. Because foreign prior art was limited to publications and patents while US prior art included use and knowledge too, a US patent could be issued for an invention that, while unknown in the United States, was known and used (but not published or patented) abroad. An invention no longer needed to be absolutely new to be patentable.[42]

If the initial push toward a global, absolute notion of novelty resulted from the introduction of specifications and the subsequent expansion of the category of prior art and its circulation, its slight slackening in 1836 was still an effect of specifications. As we have seen in Galileo's case, early modern "patent examinations" required little time and effort thanks to the limited amount of prior art the examiner had to check. But the introduction of detailed enabling specifications and the strict notion of novelty that went with them complicated and expanded the examiner's job by an order of magnitude or more. It is therefore not surprising that, within three years of the 1790 Patent Act (which required examination), the examiners' backlog had expanded so much that patent examination was dropped altogether, effectively farming out the determination of novelty and originality to the courts. The irony is that, with the removal of the gatekeepers, extremely high standards of novelty and originality—indeed absolute ones—went hand in hand with a flood of non-novel, court-clogging patents. Even more ironic, many of these copycat patents were the direct result of the

publicly available information about patented inventions demanded by the new patents as rights regime—the very information behind the development of absolute novelty standards. According to an 1836 Senate committee report on patents, it was "not uncommon for persons to copy patented machines in the model-room [of the Patent Office]; and, having made some slight immaterial alterations, they apply in the next room for patents. There being no power to refuse them, patents are issued of course" ("1836 *Senate Committee Report*," 1936: 857).

The revision of novelty requirements in the 1836 Act signaled a conceptual change, but one that stemmed from institutional, material considerations. The act's main provisions, in fact, concerned the founding of the Patent Office as part of the Department of State. It established its staff and salaries—from commissioner to clerk, draughtsman, machinist, and examiners—and a "library of scientific works, both foreign and American, calculated to facilitate the discharge of the duties hereby required of the chief officers therein" (US Patent Act of 1836, Sec. 19. In Walterscheid, 1998: 508). There was, I think, a striking correlation between the newly introduced examination, the contents of the library to be used by the examiners, and the newly curbed novelty requirements. Basically, novelty was redefined according to the range of prior art one could expect the examiners to check. They could access foreign publications (which included foreign patents as well), but they could hardly travel all over the world to see if the invention was known or used anywhere. Novelty, I argue, was redefined to conform to the less expansive notion of prior art that had to be introduced to make the examiners' job reasonable and to create politically defensible expectations about what the Patent Office could and could not do. Such an institutional decision, however, resulted from the consequences of the introduction of specification requirements. What examiners could and could not do was what the specifications (as material inscriptions) allowed them to do. They could check a text against another text they could find in their library, but could not travel the world looking for machines. The weakening of novelty requirements in 1836, therefore, was as much a result of the introduction of specifications as it was the

development of absolute (and unmanageable) novelty standards in 1790.

GIVING SPACE TO TIME

The shift toward specifications reframed both the spatial and temporal dimensions of the patent, not only definitions of novelty and originality. The invention was at first conceived of as a material and locally operating manufacture, but subsequently became an idea that, while inscribed in a patent application, did not need to hinge on one specific material embodiment—at least not in the United States. (Perhaps even the trend toward the increasingly broad definition of patentable subject matters we see today may result from the textualization of the invention—a move that enables the conceptualization of all sorts of materially different things as inventions by, so to speak, leaving their materiality behind). Be that as it may, if specification requirements turned the invention into an idea, the concomitant reframing of reduction to practice requirements meant that the material embodiment of the invention was becoming unimportant to justifying patent protection. But without an essential connection to one "body," the invention was no longer attached to a specific place, either. The notion of place that had been so central to the privilege regime lost its role as soon as the invention ceased to be one specific material device situated in a specific place. Once specification requirements turned the invention into an increasingly complex and lengthy text, it also began to circulate in space—generic spaces that were unrelated to the site where the invention would be put to work.

This shift reframed the temporal dimension of the invention. The role of time was barely visible in the privilege system, where transactions around inventions were either instantaneous or marginally extended in time. Inventors offered working or soon-to-work manufactures to kings, republics, and cities—manufactures deemed to be useful there and then—and received privileges and rewards there and then. But the patent system and the switch to specification turned the invention into a forward-looking entity, something that existed in the pres-

ent in a potential state that may be actualized in an unspecified future. The inventor's author function changed too. It moved from artisan and importer to author, but a quite peculiar kind of author. While artists and writers can point to their work as something existing in the present, the invention exists between the present and the future, between potentiality and actuality. In this sense, the inventor is an author who, while having already rights in his/her invention here and now, is also an author waiting to happen. (It is also possible that, by the time an invention gains actual material existence, the inventor will not have any more rights in it due to the patent's expiration).

A comparable fate awaited utility. It started out as a straightforward notion connected to the benefits an invention could provide to the public or the state in a specific place at a specific time. But with the introduction of specification, utility requirements turned more indeterminate. The 1790 Patent Act stated that patent officials had to consider the patent's general utility, but did not specify any threshold for it (US Patent Act of 1790, Sec. 1. in Walterscheid, 1998: 463). Utility requirements were left unmentioned in the 1793 Act perhaps because, with the concomitant abolition of any patent examination, early enforcement of such requirements would have been impossible. The mention, in a 1792 patent bill, that inventions should "not be injurious to the public" to be patentable also suggests that, unable to either maintain early modern notion of utility or to develop a new stable and enforceable one, Congress was defensively rewriting utility as mere harmlessness (Walterscheid, 1998, Appendix VII: 473-474). That trend was confirmed by Justice Story in an influential 1817 case:

> All that the law requires is that the invention should not be frivolous or injurious to the well-being, good policy, or sound morals of society. The word "useful," therefore, is incorporated into the act in contradistinction to mischievous or immoral. For instance, a new invention to poison people, or to promote debauchery, or to facilitate private assassination, is not a patentable invention. But if

> the invention steers wide of these objections, whether it be more or less useful is a circumstance very material to the interests of the patentee, but of no importance to the public (*Lowell v. Lewis*, 1817).

Utility requirements reappeared in the 1836 Patent Act together with the reintroduction of patent examination, but were applied rarely and inconsistently.[43] Utility has since become even more notional, deferred to an indefinite future and often related to beneficiaries that do not quite exist yet.[44]

The increasing indetermination of utility was neither accidental nor induced by sociopolitical factors such as, for example, corporate interests in ever-broader patent protection. Like the disappearing role of reduction to practice, the turning of utility into a vestigial notion is, I believe, a direct consequence of specification requirements. Utility and reduction to practice rose and fell together. In the privilege system, they constituted the two sides of the same concern: the local operation of the invention. The demise of locality and materiality under the patent regime took utility and reduction to practice down with them. Everything about the modern notion of the invention is about opportunity and potentiality rather than locality, materiality, and stability. The invention is now construed as emergent. It is attached to rights from the very moment of its "origin," but the value of those rights will accrue in the future, if at all.

To say that privileges provided local protection while patent protection is increasingly global misses much of what is interesting about the transition between the two regimes. Privileges were local because their coverage did not extend beyond the political jurisdiction of the privilege-granting authorities, but more importantly in the sense that their granting hinged on the invention's perceived utility—that is, its contribution to the local economy and the revenue of the prince or state that issued the privilege. Within the regime of the privilege, utility had specific temporal and geographical features: it was local and short-term. As protection expanded in space under the patent regime,

utility became unhinged from the local. But rather than being relocated elsewhere in space, utility ended up displaced into the future.

This transition hinges on the transformation of the invention from object to idea. Early modern inventors could maximize the value of their invention only by expanding the geographical coverage of the privilege, typically by applying for privileges in other countries. This expanded protection, however, remained quite "physical." All it did was to grant exclusive use of a certain machine (not the idea of such a machine) within a certain area, albeit an expanded one. Modern inventors, instead, expand the coverage of their patents by expanding the scope of their inventive ideas, and by turning it into the broadest set of claims the patent office would accept or that a court would later be likely to uphold. In the modern patent regime, therefore, value is produced by the scope of the inventive idea, not just the geographical coverage of the grant. Of course, one would not be able to get much protection without international patent agreements, but those agreements were made possible precisely by the shift from the material logic of the privilege to the idea-base regime of patent law. It is the definition of the invention in terms of its idea—a definition made possible by the introduction of specifications—to allow for the geographical expansion of the patent system. And it is the maximization of the scope of the inventive idea that maximizes the invention's value within such a system.

PRESENTATION TO REPRESENTATION

Perhaps one way to encapsulate several of the shifts discussed above is to say that both people and inventions moved from a regime of presentation into one of representation. This can be seen by the way the various categories of the patents as privilege regime dovetailed with each other, but clashed with the categories of the patents-as-rights regime. The table included on the next page shows how the two regimes were coherent within themselves but nearly opposed to each other.

Space constraints force me to comment on only a few of these examples. Starting from the bottom of this table of comparisons, I argue that inventions were not represented but literally presented by

Early Privileges (ca. 1450-1790)	**Modern Patents (ca. 1790 to present)**
Privileges were gifts to subjects	Patents are rights of citizens
Privileges were direct arrangements between the inventor and the prince through an elected government	Patents are contracts between inventor and the public
Privileges were technology-transfer tools	Patents are intellectual property
Privileges provided local protection only	Patent protection has been growing globally
Novelty was construed as a geographical category	Novelty is defined in terms of chronological priority
Local novelty requirements	Global novelty requirements
Originality requirements	No originality requirements
Local and present utility	Temporally deferred and geographically unspecified utility
Reduction to practice	Specification requirements
Actual reduction to practice	Constructive reduction to practice
Training of local users	Textual and pictorial disclo sure to anybody, anywhere
Marginal disclosure requirements	Virtual reduction to practice requirements
Invention as material object	Invention as embodied inventive idea
Invention as practice	Invention as knowledge
Inventor as artisan and importer	Inventor as author
Prior art as prior operation in situ	Prior art as earlier use, operation, or public knowledge anywhere
Presentation	Representation

the inventor directly to the prince or his/her officials. The latter assessed the local merits of the invention by themselves, without introducing the "person skilled in the art" that the patent-as-rights regime instead needs as a fictional persona to represent the state of the knowledge in the invention's field. Furthermore, their deliberations concerned an actual material invention, not representations of its inventive idea. While it is true that drawings and sketches might be used when the invention could not be produced with the application, they did not function as actual representations. They were not (and could not be) copies of a pre-existing object simply because such an object did not exist yet. Their referent could not be re-presented because it was deferred into the future.

Tridimensional models did not function as representations either, for at least two reasons. First, a model was not a copy of an invention. The distinction between model and machine was not one of copy to original, but just one of scale. Models do not have originals. We cannot say whether the "original" was the machine or the model—whether the model was scaled down or the machine scaled up. (Remember, for instance, that the Venetian *Provveditori* did not contrast Galileo's actual invention with the model, but simply referred to its "large" and "small" forms.) (Favaro, 1907: 127) When a model was entered as evidence of the claim to be covered by the privilege, it functioned as the invention itself—it *presented* the invention. Furthermore, models were used not as static boundary marks of the invention's claim, but also as a way to demonstrate the functioning of the invention—a kind of scaled-down reduction to practice. Again, representation had nothing to do with that.

Nor do we need to invoke representation to make sense of the processes through which early modern inventions were replicated. Early inventors were not required to provide specifications but to train local workers and artisans to operate and produce them. The invention was "worked," not represented. Training involved the transmission of skilled bodily practices, but not of knowledge as representation of the invention. Finally, patents were not represented to the public but

rather archived away, typically to be retrieved only in case of infringement disputes.

Moving from the realm of invention to that of politics, we see that the privilege was not a contract involving people acting as political representatives. Patent officials may have "represented" the prince or sovereign power that hired them, but those political powers did not represent the people. As a result, the privilege was not a contract between the inventor and the public (through an elected government), but rather a material gift from one person (the prince or a *persona ficta* like a city) to another person (the inventor). The very notion of the modern patent bargain would have been unthinkable outside of a political regime based on representation. Today's contract between the inventor and the public is predicated on the fact that the public—through its elected officials—is committed to enforcing that contract. But the privilege could not be construed as such a bargain because the entity in charge of enforcing it was not the public or a government elected by the public. It is not, therefore, that the patent bargain is simply a "justification" cobbled up by democracies to make temporary monopolies of invention more palatable. The very conditions of possibility of such a bargain are rooted in a regime of political representation.

FROM PRIVILEGES TO PATENTS TO. . .

I have approached the relation between politics and technoscience at the level of discourse formation by analyzing how certain kind of politics made the modern patent system thinkable. My approach has necessarily been more archeological than historical. I have not looked at how specific political and economic interests may have translated into different patent policies, but have rather focused on reconstructing the internal logic of the patents as privileges and patents as rights regimes. Politics has entered the picture at a different level, when connecting the transition from one regime to the other to changes in modes of political sovereignty. (It is also quite possible that the regime changes discussed here may relate to other radical discursive shifts connected

to the demise of political absolutism at the end of the eighteenth century).[45]

The essay, however, has departed from a purely archeological approach by privileging the introduction of specification requirements around 1790 as a key factor behind the transformation of one regime into the other. Specifications, I believe, accompanied the shift from political absolutism to representative regimes that created the need to justify the patent system by inscribing it in a system of checks and balances epitomized by the patent bargain. Such a legal-administrative step transformed the old privilege system into one more accountable to the public, but also ended up revolutionizing its very logic, substituting its old conceptual building blocks with radically different (and differently interlocking) ones. Specifications did much more than describe inventions. They created the conditions of possibility for the development of an entire legal, administrative, and political discourse and related institutional practices about patents and inventions. Patent specification, in fact, was not just as a concept related to others (as in an episteme, a paradigm, or a conceptual scheme), but a concept inseparable from a specific practice—a kind of inscription that both fostered and needed to be managed by a bureaucracy like that of the patent office. The introduction of specifications was behind the emergence of key concepts of the patent system like novelty, originality, utility, and reduction to practice, but did not act merely through its logical implications or the shape of its conceptual boundaries. It produced those effects by being embodied in an inscription that could be circulated, stored, accessed, and compared. The very existence of patent law as a separate branch of legal doctrine was made possible by the textualization of invention—by the coming to be of an inscription about which a discourse could be developed, debated, copied, and transmitted.

I have also tried to show that the arrow of agency does not always point from politics to patents. Specifications were remaking the logic of the patent system while also contributing to the articulation of the political. It is not just that inventors became authors by writing specifications that construed inventions as being about ideas—ideas on which

rights could be hinged. The practice of disclosure—turning patents into knowledge and then making that knowledge public so that it could eventually flow into the public domain—was part of the process that made inventors into citizens: that is, individuals with rights. Intellectual property rights and right-bearing citizens were constructed at the same time, through the same process. This also means that the unacceptably stifling contexts for intellectual, scientific, and artistic work that are emerging today with the increasingly widespread and fine-grained articulations and applications of intellectual property law represent the other end of the same political and discursive trajectory. Because the problems of today's intellectual property regime share the same political genealogy with cherished notions of individual rights and property, it is difficult to believe that they will be controllable through clever, ad hoc policy adjustments. The possibility for a better solution may come, instead, from understanding the radical shift that occurred around 1790, and how that made possible what we now call intellectual property. Knowing that we once moved from privileges to rights should make us realize that we can move again, this time beyond the notion of intellectual property rights.

NOTES

1. This work was made possible by a fellowship at the Institute for Advanced Study, Princeton. I would like to thank the participants in Jonathan Israel's seminar for their thoughtful criticism on an early draft of this essay, and Mark Rose and Kriss Ravetto-Biagioli for commenting on later versions. I am particularly indebted to patent aficionados Rochelle Dreyfuss, Alain Pottage, and Brad Sherman for providing food for thought, correcting mistakes, and pushing me along—and doing all this on a very short notice.
2. For instance, a great supporter of the patent system, Thomas Fessenden, wrote in 1810 that "patents for new inventions are a species of monopoly held to be illegal at common law, and, both in Great Britain and America, are founded on statute" (Fessenden, 1810: 186).

3. On the context of the Statute of Monopoly, see MacLeod (1988: 14-19). The ongoing requirement that an invention must be novel and nonobvious to deserve a patent is rooted in the same need to differentiate patents from monopolies. See Burchfiel (1989: 162).
4. The earliest appearance of the image of the patent bargain in the United States is probably in Barnes (1792): "The property or right in a discovery being exclusively the inventor's, having had its origin, and existing but in his mind; it follows, that a system for securing property in the products of genius, is a *mutual* contract between the *inventor* and the *public*, in which the *inventor* agrees, on *proviso* that the public will secure to him his property in, and the exclusive use of his discovery for a limited time, he will, at the expiration of such time, *cede* his right in the same to the public: thenceforth the discovery is common right, being the compensation required by the public, stipulated in the contract, for having thus secured the same" (Barnes, 1792: 25). Other early references to the patent bargain in US courts are in Burchfiel (1989: 180, n 152). See Dutton (1984: 22) for invocations of the patent bargain in English early nineteenth-century debates.
5. "The specification is the price which the patentee is to pay for his monopoly" (Fessenden, 1810: 49).
6. The public would break the contract by not living up to the commitment to protect what the inventor has disclosed, while the inventor would break it by giving a deceiving disclosure. (In principle, an incomplete disclosure would not set the patent bargain off balance but would simply put the inventor at risk of not receiving the full protection the law would have granted him/her). Early nineteenth-century English patent law, however, voided patents with either incomplete or deceptive specifications, without the possibility of appeal. French and US law allowed for amendments of the patent application only when it could be proven that the incompleteness was not meant to be deceptive.
7. It is also self-regulating in the sense that even though the patentee may want to make the claims as wide as possible, s/he would increase the risk of the patent being declared invalid from claiming novelty for some-

thing that was not. But like other elegant balance-based Enlightenment constructions, the "patent bargain" fails to account for the changes brought about by time and by the emergent nature of the invention. For instance, if the invention is found to have other applications after the patent has issued—applications that were not disclosed in the application—the claim is effectively expanded, but not the specifications. The imbalance thus introduced between claim and specification violates the patent bargain, and yet it does not void the patent.

8. The literature on early patent specification is sparse and limited to English law. See Davies (1934: 86-109, 260-274); Adams and Averley (1986: 156-77); Hulme (1897: 313-8; 1902: 280-8); Gomme (1946: 25-39). While in France and the United States we find an abrupt shift in specification requirements around 1790, Davies, Hulme, and Adams and Averley present a much less drastic pattern for England. While showing the same long *durée* transition from virtual absence of specifications around 1600 to "modern" enabling specifications around 1780, the English trajectory is more complicated, perhaps because the country did not experience the same kind of revolutionary political change that affected France and the United States. There is, however, consensus that even in England, "throughout the [eighteenth] century, specifications were enrolled which could in no way have enabled those skilled in the art to carry out the invention, and which would have been valueless in an infringement action. . ." (Adams and Averley, 1986: 160). Similarly, MacLeod argues that: "Since official and judicial guidance was lacking for most of the eighteenth century, it is doubtful whether patentees had any clear idea what the function of specifications was or how full and accurate it ought to be. Like most other things about the system, it was left to the patentee's discretion" (MacLeod, 1988: 50).
9. A review of the uses of models and drawings in early modern privileges is in Biagioli (2006a: 152-7).
10. The fact that seven patents were issued in Venice for perpetual motion machines between 1474 and 1650 indicates a certain laxity in the examination standards. See Berveglieri (1995: 38).

11. "[N]on habbiamo veduto questo suo edeficio ne` in forma grande ne` piccola; ma reuscendo come lui dispone nella sua supplicazione, et essendo inventione nova, non piu' d'altri ariccordata, ne` ad altri statoli concesso il privilegio, giudicamo che per anni vinti lui esser degno della gratia" (Favaro, 1907: 127).
12. Galileo's demonstration of his telescope to the Venetian Senate in 1609 is an example of this practice; Biagioli (2006b: 119-27). Other examples are in Berveglieri (1995: 112-113, 122-123).
13. It is also difficult to tease out tests aimed at probing the technical feasibility of an invention from tests aimed at comparing the inventions involved in interfering applications, or tests that were simply aimed at proving the reduction to practice of a certain device for which an invention had been granted.
14. Furthermore, privileges did not distinguish the various kinds of reduction to practice found in modern patent law and often conflated them with what we call "working requirements"—privileging the latter over the former.
15. Liardet v. Johnson (1778) is considered the watershed case that affirmed the substitution of training requirements with enabling specifications.
16. An equivalent requirement is found in the very first Copyright and Patents Bill (June 23, 1789), which failed to pass (reproduced in Walterscheid, Appendix I: 436).
17. I might be using "public domain" a bit anachronistically, but harmlessly so. Some of the genealogy of the concept is traced in Lange (1981) and Litman (1990).
18. On requirements about patent drawings in France around 1820 see Perpigna (1834: 26-7).
19. It was not uncommon for early modern patent officials to leak out information about patent applications or to take up the role of what we now call "patent agents." Some of these practices persisted in the early US Patent Office under the directorship of William Thornton (Dobyns, 1997: 47-52). It was only in the 1836 US Patent Act that one could find a provision preventing patent office employees from

assuming interests in any patent during the period of their employment. See Walterscheid (1998: 498).

20. "The models of all the artfully contrived devices and other works which in this city are found in the arsenal, city hall, or anywhere else, shall be placed in a separate room, locked, under the responsibility of the masters of the Arsenal" (Pohlmann, 1961: 126).
21. On the role of the Conservatoire as a public repository and museum of patent models, see Mercier (1989: 15). Alain Perpigna, however, stated that "such models and samples are committed to the care of the Royal Conservatory of Arts and Manufactures, and cannot be publicly exposed until the expiration of the privilege" (Perpigna, 1834: 27). The US Patent Office acted as a public museum of patent models since its inception, and such role was officialized in the 1836 Patent Act, Sec. 20.
22. The first director of the Patent Office, William Thornton, read this provision quite narrowly to mean that specifications were to be made public only as evidence in patent disputes or upon authorization by the patentee, but was rebuffed by the secretary of state. See Dobyns (1997: 76-8). The public nature of specifications was restated in the 1836 Patent Act.
23. Patent applications are now made public in the United States too, but those who apply only for US patents can opt out of this practice.
24. It continues: "and if the concealment of part, or the addition of more than is necessary, shall appear to have been intended to mislead, or shall actually mislead the public, so as the effect described cannot be produced by the means specified" (US Patent Act of 1790, Sec. 6. In Walterscheid, 1998: 468). The only reference to something like a working requirement clause is found in a draft of the 1790 Act that was, however, dropped: "And be further enacted that whenever the Grantee of such Patent shall neglect to offer for sale within the United States. . ." (De Pauw et al., 1972: 272).
25. See also Law (1870: 424).
26. Equivalent wording was introduced in the Patent Bill of March 1, 1792 (which did not pass), but is not found in the previous Patent Act of 1790.

27. The wording of the 1790 Act is not accidental as previous drafts include more restrictive provisions—"not before known or used *within the United States*"—which were then dropped.
28. This restriction was somewhat eased by the 1836 Patent Act.
29. In practice, however, some patent of importation did squeeze through. See Walterscheid (1998: 378-9).
30. For a comparison of modern and early nineteenth-century novelty standards, see Burchfiel (1989: 191-195).
31. I take the articulation of the notion of nonobviousness in *Hotchkiss* v *Greenwood* (1851) to represent the next step in the logical evolution of the notion of novelty.
32. Oren Bracha's "Genius and Owners: The Construction of Inventors and the Emergence of American Intellectual Property" (2006) has provided much inspiration for my argument. Although Bracha does not single out the introduction of specifications as a primary cause for the transition from what he calls the image of the inventor as entrepreneur and craftsman to one as "genius-owner" and relates such a shift primarily to broad cultural and economic trends, he does suggest that there may be a link between the move from a conceptualization of inventions as things and inventions as ideas at the same time that we find a switch from privileges for devices to patents for disclosed inventions. While we deal with much of the same evidence and many of the same issues, my argument differs from his by effectively ignoring economic and cultural considerations, focusing instead on the implications of the new political framework, the demands of the patent bargain, and the key role of patent specifications in that. I try to argue that most of the phenomena we are looking at are consequences of the introduction of enabling specifications.
33. Neither the US Constitution nor the first (1790) Patent Act mention the term "intellectual property." They only refer to the granting "for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." "Property" (but not intellectual property) is mentioned in the 1793 Patent Act (Sec. 1) and in Fessenden (1810: 58).

34. Even the drawings commonly used in specifications are not treated as free-standing inscriptions, but function only in relation to the textual specification.
35. 35 U.S.C. 112 Specification: "The specification must include a written description of the invention or discovery and of the manner and process of making and using the same . . . . The specification must set forth the precise invention for which the patent is solicited . . . . It must describe completely a specific embodiment of the process . . . ."
36. Malcom Baker (2004: 19-42) provides a range of interesting insights on the use of scientific and technical models in early modern Europe, though not specifically in relation to patents.
37. Sherman and Bently's argument is about how the problems of identification of intangible property change as a result of the systematic adoption of a registration system, but it is, I believe, quite parallel to the issues I am discussing here once one replaces what I mean by "idea" with what they mean by "intangible property."
38. Unlike European countries, the United States has a one-year "grace period" in which the inventor can publish the invention prior to applying for a patent. Because most patents today are registered in other countries as well, US inventors tend to play by international rather than national rules.
39. Thornton's first reference is to George Gregory, *A Dictionary of Arts and Science* (London: Phillips, 1806-7. 2 vols). An expanded edition was issued before 1810, and a US version (based on the second London edition) was printed in Philadelphia by Isaac Pierce in 1815-6. It was reprinted both in England and the United States several times. Despite the generic title, there was only another mid-1750 book by that title, indication that Thornton must have been referring to Gregory's work. The *Repertory of Arts and Manufacturing* was a periodical published in London between 1794 and 1802 and was continued under a slightly different title (*Repertory of Arts, Manufactures, and Agriculture*) till 1862. It was also referred to as *Repertory of Patent Inventions*. On the popularity of the *Repertory*, see Dutton (1984: 151).

40. For a similar situation in the United States see "1836 Senate Committee Report" (1936: 856-7).
41. The Supreme Court reaffirmed that position shortly after, and it was codified in legal reference books by 1834 (Perpigna, 1834: 23).
42. It is interesting, however, that today most countries have adopted the absolute standard of novelty that the United States introduced in 1790 but dropped in 1836.
43. "[T]here is nothing to indicate that the [Patent] Office thereafter [1836] made any concerted effort to reject applications on the ground that the subject matter was not sufficiently useful and important to warrant a patent" (Walterscheid, 1998: 428). See also "1836 Senate Committee Report" (1936: 856).
44. It seems that, like originality, utility is a requirement that has to be kept on the books to legitimize the patent system despite the fact that, as a requirement, it is very difficult to uphold on empirical grounds. Some legal scholars have noticed this tension: "At first glance, the utility requirement in patent law appears to be somewhat superfluous. Indeed it is a rare occasion that lack of utility is raised as an invalidating defense in a patent litigation context. However, there is a purpose behind the utility requirement in that it secures a quid pro quo for society" (Halpern et al., 1999: 121). For similar trends in nineteenth-century Europe, see Plasseraud and Francois (1985: 11, 60-61); and Dutton (1984: 80).
45. I am thinking, for instance, about the pattern of shifts from the classical to the modern episteme described in Foucault, 1970.

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