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journals.sagepub.com/home/hos**Mario Biagioli**

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Abstract

Historians of science and technology and STS practitioners have always taken intellectual property very seriously but, with some notable exceptions, they have typically refrained from looking “into” it. There is mounting evidence, however, that they can open up the black box of IP as effectively as they have done for the technosciences, enriching their discipline while making significant contributions to legal studies. One approach is to look at the technologies through which patent law construes its object – the invention – in specific settings and periods by examining procedures, classifications, archives, models, repositories, patent specifications (in both their linguistic and pictorial dimensions), and the highly specialized language of patent claims. More ambitiously, we could treat intellectual property as a technology itself. Patent law does not evolve either by merely articulating its doctrine in response to technological developments. The line between what does and does not count as invention may be redrawn with the emergence of new objects and technologies, but is not determined by them. It is this constructive feature of the law that we are trying to capture with the notion of law as technology. We hope that thinking about the technologies of the law and the law as technology will bring into question what we mean by both “technology” and “law”.

Keywords

Patents, intellectual property, technology, innovation, methodology

Intellectual property (IP) (patents, copyright, and trademarks) has come to frame our daily lives – from what we read, watch, and listen to, the technologies we use to do that (and pretty much everything else we do during the day), all the way to the brands we

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buy.¹ And as IP is now part of the everyday experience of people around the world, it is also playing an increasingly central role in the development of science and technology at all levels.² In the past, engineers and their employers sometimes sought patents for some of their inventions, but patenting has now become a key element of corporate innovation strategies, framing invention even before it happens, guiding investments and efforts toward areas and objects that may be patentable, or adding a strategic advantage to one's patent portfolio relative to that of the competitors.³ Similar trends can be seen at the edge of academic science.⁴ While alternatives certainly exist – prizes and awards can provide incentives⁵ and social norms can regulate credit and priority⁶ – IP has now become an unavoidable, perhaps dominant, feature of any knowledge-based “business ecology.”

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1. This special issue was developed in the framework of the conference “Ownership of Knowledge,” *Max Planck Institute for the History of Science, Department III: Artifacts, Action, and Knowledge*, November 9–11, 2016. We would like to thank all the participants for their helpful comments, and in particular Dagmar Schäfer for her continuous and generous support.
 2. General studies on the long-term history of IP include Lionel Bently and Brad Sherman, *The Making of Modern Intellectual Property Law: The British Experience* (Cambridge: Cambridge University Press, 1999); Mario Biagioli, Peter Jaszi, and Martha Woodmansee (eds.), *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: University of Chicago Press, 2011); Oren Bracha, *Owning Ideas: The Intellectual Origins of American Intellectual Property, 1790–1909* (New York: Cambridge University Press, 2016); Bruce Willis Bugbee, *Genesis of American Patent and Copyright Law* (Washington, DC: Public Affairs Press, 1967); Peter Drahos, *A Philosophy of Intellectual Property* (Aldershot: Dartmouth, 1996); Christopher May and Susan K. Sell, *Intellectual Property Rights: A Critical History* (Boulder: Lynne Rienner, 2005). The following anthology is also useful as an introduction to the field: Steven Wilf (ed.), *Intellectual Property Law and History* (Farnham: Ashgate, 2012). Also relevant is the literature on the economics of science. A good overview of the field can be found in Philip Mirowski and Esther-Mirjam Sent (eds.), *Science Bought and Sold: Essays in the Economics of Science* (Chicago: University of Chicago Press, 2002).
 3. On the long-term development of patenting practices, see for instance: Allan Gomme, *Patents of Invention: Origin and Growth of the Patent System in Britain* (London: Longmans, Green & Co, 1946); Martin Otto (ed.), *Geschichte des deutschen Patentrechts* (Tübingen: Mohr Siebeck, 2015); Alain Pottage and Brad Sherman, *Figures of Invention: A History of Modern Patent Law* (New York: Oxford University Press, 2010); M. Silberstein, *Erfindungsschutz und merkantilistische Gewerbeprivilegien* (Winterhur: Keller, 1961). In addition, the following special issues have been instrumental in shaping the field: *Technology and Culture*, 32 (4), Special Issue: “Patents and Invention”, ed. by Carolyn C. Cooper (1991), pp.837–1168; *Studies in History and Philosophy of Science Part A*, 44, Special Issue: “Owning and Disowning Invention: Intellectual Property and Identity in the Technosciences in Britain, 1870–1930,” ed. by Christine MacLeod and Gregory Radick; *History of Technology*, 31, Special Issue: “Patent Agency in History: Intellectual Property and Technological Change,” ed. by Ian Inkster. London: Bloomsbury, 2012.
 4. Myles W. Jackson, *The Genealogy of a Gene: Patents, Hiv/Aids, and Race* (Cambridge: MIT Press, 2015); Nicolas Rasmussen, *Gene Jockeys: Life Science and the Rise of Biotech Enterprise* (Baltimore: Johns Hopkins University Press, 2014).
 5. On prizes and innovation awards, see M. Diane Burton and Tom Nicholas, “Prizes, Patents and the Search for Longitude,” *Explorations in Economic History* 64 (2017): 21–36; Art Jonkers, “Rewards and Prizes,” in John Hattendorf (ed.) *The Oxford Encyclopedia of Maritime*

The various roles that patents have come to assume since the Industrial Revolution offers rich research material for historians of technology.⁷ Perhaps more important to scholars of constructivist sensibilities is the fact that, as patenting becomes increasingly pervasive and integral to innovation strategies, the law keeps articulating and revising what kind of things can and cannot be patented. From the patenting of biotechnology,⁸

History (Oxford: Oxford University Press, 2010), pp.433–36; B. Zorina Khan, “Going for Gold. Industrial Fairs and Innovation in the Nineteenth-Century United States,” *Revue Économique* 64, (2013): 89–113; B. Zorina Khan, “Inventing Prizes: A Historical Perspective on Innovation Awards and Technology Policy,” *Business History Review* 89 (2015): 631–60; Petra Moser, “Innovation without Patents: Evidence from World’s Fairs,” *The Journal of Law & Economics* 55, (2012): 43–74.

6. Scientific authorship itself is an example of a norm-based (rather than law-based) system, see Mario Biagioli and Peter Galison (eds.), *Scientific Authorship: Credit and Intellectual Property in Science* (London: Routledge, 2014); Corynne McSherry, *Who Owns Academic Work? Battling for Control of Intellectual Property* (Cambridge: Harvard University Press, 2009). On norm-based IP systems, see also Rochelle Cooper Dreyfuss, “Does IP Need IP – Accommodating Intellectual Production Outside the Intellectual Property Paradigm,” *Cardozo Law Review* 31 (2010): 1437–73; Emmanuelle Fauchart and Eric von Hippel, “Norms-Based Intellectual Property Systems: The Case of French Chefs,” *Organization Science* 19 (2008): 187–201; Jacob Loshin, “Secrets Revealed: Protecting Magicians’ Intellectual Property without Law,” in Christine Corcos (ed.) *Law and Magic: A Collection of Essays* (Durham: Carolina Academic Press, 2010), pp.123–42; Cathay Y. N. Smith, “Street Art: An Analysis under U.S. Intellectual Property Law and Intellectual Property’s Negative Space Theory,” *DePaul Journal of Art, Technology & IP Law* 24 (2013): 259–93; Chris Sprigman and Dotan Oliar, “Intellectual Property Norms in Stand-Up Comedy,” in Mario Biagioli, Peter Jaszi, and Martha Woodmansee (eds.) *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: University of Chicago Press, 2010), pp.385–98.
7. Among the many works, see Anneli Aer, *Patents in Imperial Russia: A History of the Russian Institution of Invention Privileges Under the Old Regime* (Helsinki: Suomalainen Tiedeakatemia, 1995); Stathis Arapostathis and Graeme Gooday, *Patently Contestable: Electrical Technologies and Inventor Identities on Trial in Britain* (Cambridge: MIT Press, 2013); Bracha, *Owning Ideas* (note 2); Gabriel Galvez-Behar, *La République des inventeurs. Propriété et organisation de l’innovation en France* (Rennes: PU Rennes, 2008); Graeme J. N. Gooday and Morris F. Low, “Technology Transfer and Cultural Exchange: Western Scientists and Engineers Encounter Late Tokugawa and Meiji Japan,” *Osiris* 13 (1998): 99–128; Liliane Hilaire-Pérez, *Inventions et inventeurs en France et en Angleterre au XVIIIè siècle* (Lille: ANRT, 1994); Axel C. Hüntelmann, “Priority, Property, and Trust. Patent Law and Pharmaceuticals in the German Empire,” *InterDisciplines. Journal of History and Sociology* 3 (2012); Paul Lucier, “Court and Controversy: Patenting Science in the Nineteenth Century,” *The British Journal for the History of Science* 29, (1996): 139–54; Sam Ricketson, *The Paris Convention for the Protection of Industrial Property: A Commentary* (Oxford: Oxford University Press, 2015); Eric Robinson, “James Watt and the Law of Patents,” *Technology and Culture* 13 (1972): 115–39; Steven W. Usselman, “Patents Purloined: Railroads, Inventors, and the Diffusion of Innovation in 19th-Century America,” *Technology and Culture* 32 (1991): 1047–75. See also note 15.
8. The literature on the historical development of biotechnological patents and more broadly of notions of ownership in the life sciences is vast, but good starting points are Keith Aoki, *Seed Wars: Controversies and Cases on Plant Genetic Resources and Intellectual Property*

(Durham: Carolina Academic Press, 2008); Christopher Beauchamp, "Patenting Nature: A Problem of History," *Stanford Technology Law Review* 16 (2013): 257–312; Jane Calvert and Pierre-Benoît Joly, "How Did the Gene Become a Chemical Compound? The Ontology of the Gene and the Patenting of DNA," *Social Science Information* 50 (2011): 157–77; Alberto Cambrosio and Peter Keating, *Exquisite Specificity: The Monoclonal Antibody Revolution* (New York: Oxford University Press, 1995); Maurice Cassier, "Patents and Public Health in France. Pharmaceutical Patent Law In-the-making at the Patent Office between the Two World Wars," *History and Technology* 24 (2008): 135–51; Maurice Cassier, "Pharmaceutical Patent Law In-the-Making: Opposition and Legal Action by States, Citizens, and Generics Laboratories in Brazil and India," in Jean-Paul Gaudillière and Volker Hess (eds.) *Ways of Regulating Drugs in the 19th and 20th Centuries* (London: Palgrave Macmillan UK, 2013), pp.287–317; Graham Dutfield, *Intellectual Property Rights and the Life Science Industries: Past, Present and Future* (Singapore: World Scientific, 2009); Cary Fowler, *Unnatural Selection: Technology, Politics, and Plant Evolution* (Yverdon: Gordon and Breach, 1994); Joseph M. Gabriel, *Medical Monopoly: Intellectual Property Rights and the Origins of the Modern Pharmaceutical Industry* (Chicago: The University of Chicago Press, 2014); Jean-Paul Gaudillière, Daniel J. Kevles, and Hans-Jörg Rheinberger (eds.), *Living Properties: Making Knowledge and Controlling Ownership in the History of Biology*, Max-Planck-Institut Für Wissenschaftsgeschichte Preprint 382 (Berlin: Max-Planck-Institut für Wissenschaftsgeschichte, 2009); Johanna Gibson (ed.), *Patenting Lives: Life Patents, Culture and Development* (Aldershot: Routledge, 2008); Cori Hayden, *When Nature Goes Public: The Making and Unmaking of Bioprospecting In Mexico* (Princeton: Princeton University Press, 2003); Daniel J. Kevles and Ari Berkowitz, "The Gene Patenting Controversy: A Convergence of Law, Economic Interests, and Ethics," *Brooklyn Law Review* 67 (2001): 233–48; Daniel J. Kevles, "Inventions, Yes; Nature, No: The Products-of-Nature Doctrine from the American Colonies to the U.S. Courts," *Perspectives on Science* 23 (2014): 13–34; Daniel J. Boorstin, "New Blood New Fruits," in Mario Biagioli, Peter Jaszi, and Martha Woodmansee (eds.) *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: University of Chicago Press, 2011), pp.253–67; Daniel J. Kevles, "Ananda Chakrabarty Wins a Patent: Biotechnology, Law, and Society, 1972–1980," *Historical Studies in the Physical and Biological Sciences* 25, (1994): 111–35; Daniel J. Kevles, "Patents, Protections, and Privileges: The Establishment of Intellectual Property in Animals and Plants," *Isis* 98 (2007): 323–31; Daniel J. Kevles, "Genes, Railroads, and Regulations: Intellectual Property and the Public Interest," in Mario Biagioli and Jessica Riskin (eds.) *Nature Engaged: Science in Practice from the Renaissance to the Present* (New York: Palgrave Macmillan, 2012), pp.147–62; Daniel J. Kevles, "A Primer of A, B, Seeds: Advertising, Branding, and Intellectual Property in an Emerging Industry," *UC Davis Law Review* 47 (2013): 657–969; David R. Koepsell, *Who Owns You? The Corporate Gold Rush to Patent Your Genes* (Malden: Wiley-Blackwell, 2009); Javier Lezaun, "Pollution and the Uses of Patents: A Reading of Monsanto V. Schmeiser," in Nico Stehr (ed.) *Biotechnology: Between Commerce and Civil Society* (Somerset: Transaction, 2004), 135–58; Michael MacKenzie, Peter Keating, and Alberto Cambrosio, "Patents and Free Scientific Information in Biotechnology: Making Monoclonal Antibodies Proprietary," *Science, Technology, & Human Values* 15 (1990): 65–83; Bronwyn Parry, *Trading the Genome: Investigating the Commodification of Bio-Information* (New York: Columbia University Press, 2004); Alain Pottage and Brad Sherman, "Organisms and Manufactures: On the History of Plant Inventions," *Melbourne University Law Review* 31 (2007): 539–68; Brad Sherman, "Before the High Court: D'Arcy v Myriad Genetics Inc: Patenting Genes in Australia," *The Sydney Law Review* 37 (2015): 135–46.

software,⁹ diagnostic methods,¹⁰ and genetically modified organisms like the OncoMouse,¹¹ the law not only protects and proprietizes innovation but also revises, in ways that are as problematic as they are intriguing, what counts as nature, that is, where we draw the ever-contestable line between nature and technology, discovery and invention. The old view of patents as legal “tools” that the law “applied” to protect certain technologies has thus been replaced with one in which the interaction between law and technology develops both new articulations of patenting as well as new definitions of technology. This is perhaps most evident in the case of business methods, where the extension of patenting to cover ways of conducting or organizing business strongly signals that such practices amount to a technology, even though they do not involve any innovation that most people would consider to involve technology as we know it.¹² The same may be said about copyright law.¹³ Traditionally, its role in the technosciences was limited to regulating scientific publishing, but that changed dramatically when, a few decades ago, it became central to the

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9. Martin Campbell-Kelly, “Not All Bad: An Historical Perspective on Software Patents,” *Michigan Telecommunications and Technology Law Review* 11 (2005): 191–248; Gerardo Con Díaz, “Ownership and the History of American Computing,” *IEEE Annals of the History of Computing* 34 (2012): 86–88; Gerardo Con Díaz, “Embodied Software: Patents and the History of Software Development, 1946–1970,” *IEEE Annals of the History of Computing* 37 (2015): 8–19; Gerardo Con Díaz, “Contested Ontologies of Software: The Story of Gottschalk v. Benson, 1963–1972,” *IEEE Annals of the History of Computing* 38 (2016): 23–33; Gerardo Con Díaz, “The Text in the Machine: American Copyright Law and the Many Natures of Software, 1974–1978,” *Technology and Culture* 57 (2016): 753–79; Gerardo Con Díaz, “Intangible Inventions: A History of Software Patenting in the United States, 1945–1985,” *Enterprise & Society* 18 (2017): 784–94; Gerardo Con Díaz, *Software Rights: Patent Law and the American Computing Industry* (New Haven: Yale University Press, In Press); Christopher M. Kelty, *Two Bits: The Cultural Significance of Free Software* (Durham: Duke University Press, 2008); Pamela Samuelson et al., “A Manifesto Concerning the Legal Protection of Computer Programs,” *Columbia Law Review*, 1994, 2308–2431; Timothy Lenoir and Eric Giannella, “Technological Platforms and the Layers of Patent Data,” in Mario Biagioli, Peter Jaszi, and Martha Woodmansee (eds.) *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: University of Chicago Press, 2008), 359–84.
 10. Rebecca S. Eisenberg, “Prometheus Rebound: Diagnostics, Nature, and Mathematical Algorithms,” *Yale Law Journal Online* 122 (2013): 341–49; Amit Prasad, “The (Amorphous) Anatomy of an Invention: The Case of Magnetic Resonance Imaging (MRI),” *Social Studies of Science* 37 (2007): 533–60.
 11. Fiona Murray, “The Oncomouse That Roared: Hybrid Exchange Strategies as a Source of Distinction at the Boundary of Overlapping Institutions,” *American Journal of Sociology* 116 (2010): 341–88.
 12. *State Street Bank and Trust Company v. Signature Financial Group, Inc.*, 149 F.3d 1368 (Fed. Cir. 1998).
 13. Research on the history of copyright has expanded enormously over recent years. Some of the seminal studies, compendia, and introductions include Isabella Alexander and H. Tomás Gómez-Arostegui (eds.), *Research Handbook on the History of Copyright Law* (Cheltenham: Edward Elgar, 2016); Elizabeth Armstrong, *Before Copyright: The French Book-Privilege System, 1498–1526* (Cambridge: Cambridge University Press, 1990); Benedict Atkinson and Brian Fitzgerald, *A Short History of Copyright: The Genie of Information* (Cham:

protection of software. As Brad Sherman shows in his contribution to this volume, this was far from a mere “application” of copyright to software, but it involved a complex re-articulation of the difference (and similarity) between “text” and “machine” while effectively redefining both.

It would be unfair to say that past historians of science and technology have neglected IP. Quite to the contrary, patents and patenting activities have been often discussed by historians of technology, economic historians, and business historians, going back to the Renaissance and early modern period¹⁴ and, of course, to the

Springer, 2013); Lionel Bently, Ronan Deazley, and Martin Kretschmer (eds.), *Privilege and Property: Essays on the History of Copyright* (Cambridge: Open Book, 2010); Ronan Deazley, *On the Origin of the Right to Copy: Charting the Movement of Copyright Law in Eighteenth-Century Britain* (Oxford: Hart, 2004); Ronan Deazley, *Rethinking Copyright: History, Theory, Language* (Cheltenham: Edward Elgar, 2006); Monika Dommann, *Autoren und Apparate: Die Geschichte des Copyrights im Medienwandel* (Frankfurt am Main: S. Fischer, 2014); Adrian Johns, *Piracy: The Intellectual Property Wars from Gutenberg to Gates* (Chicago: University of Chicago Press, 2010); Lyman Ray Patterson, *Copyright in Historical Perspective* (Nashville: Vanderbilt University Press, 1968); Mark Allen Rose, *Authors and Owners: The Invention of Copyright* (Cambridge: Harvard University Press, 1993); Simon Stern, “From Author’s Right to Property Right,” *The University of Toronto Law Journal* 62 (2012): 29–91; Stef van Gompel, *Formalities in Copyright Law: An Analysis of Their History, Rationales and Possible Future* (Alphen aan den Rijn: Wolters Kluwer, 2011); Christopher L.C.E. Witcombe, *Copyright in the Renaissance: Prints and the Privilegio in Sixteenth-Century Venice and Rome* (Leiden: Brill, 2004); Martha Woodmansee and Peter Jaszi, *The Construction of Authorship: Textual Appropriation in Law and Literature* (Durham: Duke University Press, 1994).

14. On patenting in the premodern period: Carlo Marco Belfanti, “Between Mercantilism and Market: Privileges for Invention in Early Modern Europe,” *Journal of Institutional Economics* 2(2006): 319–38; Mario Biagioli, “From Print to Patents: Living on Instruments in Early Modern Europe,” *History of Science* 44 (2006): 139–86; Oren Bracha, “The Commodification of Patents 1600–1836: How Patents Became Rights and Why We Should Care,” *Loyola of Los Angeles Law Review* 38 (2004): 177–244; P. A. David, “Intellectual Property Institutions and the Panda’s Thumb: Patents, Copyrights, and Trade Secrets in Economic Theory and History,” in *Global Dimensions of Intellectual Property Rights in Science and Technology*, 1993, pp.19–61; Pamela O. Long, “Invention, Authorship, ‘Intellectual Property,’ and the Origin of Patents: Notes toward a Conceptual History,” *Technology and Culture* 32 (1991): 846–84; Matthew L. Jones, *Reckoning with Matter: Calculating Machines, Innovation, and Thinking About Thinking from Pascal to Babbage* (Chicago: Chicago University Press, 2016), especially chapter 3 and 4. On Italy more specifically, Guilio Mandich, “Le privative industriali veneziane (1450–1550),” *Rivista del diritto commerciale del diritto generale delle obbligazioni* 34 (1936): 511–47; Guilio Mandich, “Primi riconoscimenti veneziani di un diritto di privativa agli inventori,” *Rivista Di Diritto Industriale* 7 (1958): 101–55; Luca Molà, “Il mercato delle innovazioni nell’Italia del Rinascimento,” in Mattieu Arnoux and Pierre Monnet (eds.) *Le technicien dans la cité en Europe occidentale, 1250–1650* (Rome: École Française de Rome, 2004), pp.215–50; Luca Molà, “Stato e impresa: privilegi per l’introduzione di nuove arti e brevetti,” in Philippe Braunstein and Luca Molà (eds.), *Il Rinascimento italiano e l’Europa*, Vol. 3 of *Produzione e tecniche* (Treviso-Vicenza: Colla, 2007), 533–72; Luca Molà, *The Silk Industry of Renaissance Venice* (Baltimore: Johns Hopkins University Press, 2000),

Industrial Revolution, when patenting became common.¹⁵ Typically, that work has focused both on specific charismatic inventors (Watt, Edison, Sperry, and

pp.186–214; Marie de Mullenheim, “Les privilèges pour invention à Florence à la fin XVIe et au début XVIIe Siècle,” in Marie-Sophie Corcy, Christinane Demeulenaere-Douyère, and Liliane Hilaire-Pérez (eds.) *Les archives de l’invention. Ecrits, objets et images de l’activité inventive* (Toulouse: CNRS/University de Toulouse-Le Mirail, 2003). On the Dutch Republic, see Marius Buning, “Between Imitation and Invention. Inventor Privileges and Technological Progress in the Early Dutch Republic (c. 1585–1625),” *Intellectual History Review* 24 (2014): 415–27; Karel Davids, “Patents and Patentees in the Dutch Republic between c. 1580 and 1720,” *History and Technology* 16 (2000): 263–84; Gerard Doorman, *Octrooien voor uitvindingen in de Nederlanden uit de 16e-18e eeuw: Met bespreking van enkele onderwerpen uit de geschiedenis der techniek* (The Hague: Nijhoff, 1940). On the German Lands and the Holy Roman Empire, see Marcus Popplow, *Neu, nützlich und erfindungsreich* (Munster: Waxmann Verlag, 1998). On Spain: Antonio Barrera-Osorio, *Experiencing Nature: The Spanish American Empire and the Early Scientific Revolution* (Austin: University of Texas Press, 2006), 68–72, 140–46; Nicolás García Tapia, *Técnica y poder en Castilla durante los siglos XVI y XVII*, (Salamanca: Junta de Castilla y León, Consejería de Cultura y Bienestar Social, 1989); Nicolás García Tapia, *Patentes de invención españolas en el Siglo de Oro* (Madrid: Ministro de Industria y Energía centro de Publicaciones, 1990); Pablo Pérez, “Los inventos llevados de España a las Indias en la segunda mitad del siglo XVI,” *Cuadernos de investigación histórica* 7 (1983): 35–54; Jose Antonio Mateos Royo, “State Policy, Institutional Framework and Technical Monopoly in Early Modern Spain: Invention Patents in the Crown of Aragon during the Seventeenth Century,” *History and Technology* 25 (2009): 147–62. On England: Gregor Duthie Duncan, “Monopolies under Elizabeth I, 1558–1585” (PhD thesis, Cambridge University, 1977); Rob Iliffe, “‘In the Warehouse’: Privacy, Property and Priority in the Early Royal Society,” *History of Science* 30 (1992): 29–67; Alessandro Nuvolari and James Sumner, “Inventors, Patents, and Inventive Activities in the English Brewing Industry, 1634–1850,” *Business History Review* 87 (2013): 95–120; Jessica Ratcliff, “Art to Cheat the Common-Weale: Inventors, Projectors, and Patentees in English Satire, ca. 1630–70,” *Technology and Culture* 53 (2012): 337–65; Aurélien Ruellet, “Les privilèges d’invention en France et en Angleterre (ca. 1600–ca. 1660): base de données provisoire,” 2014, <https://halshs.archives-ouvertes.fr/halshs-01116703/document>; Koji Yamamoto, “Reformation and Distrust of the Projector in the Hartlib Circle,” *The Historical Journal* 55 (2012): 375–97.

15. The relationship between patenting and the Industrial Revolution has been a longstanding issue of debate: Sean Bottomley, *The British Patent System during the Industrial Revolution 1700–1852: From Privilege to Property* (Cambridge: Cambridge University Press, 2014); Harold. I. Dutton, *The Patent System and Inventive Activity during the Industrial Revolution, 1750–1852* (Manchester: Manchester University Press, 1984); Liliane Hilaire-Pérez, *L’invention technique au siècle des Lumières* (Paris: Albin Michel, 2000); B. Zorina Khan, *The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790–1920* (Cambridge: Cambridge University Press, 2005); B. Zorina Khan, “Selling Ideas: An International Perspective on Patenting and Markets for Technological Innovations, 1790–1930,” *Business History Review* 87 (2013): 39–68; Ryan Lampe and Petra Moser, “Do Patent Pools Encourage Innovation? Evidence from the Nineteenth-Century Sewing Machine Industry,” *The Journal of Economic History* 70 (2010): 898–920; Christine MacLeod, *Inventing the Industrial Revolution: The English Patent System, 1660–1800* (Cambridge: Cambridge University Press, 2002); Christine MacLeod and Alessandro Nuvolari, “Patents and Industrialization: An Historical Overview of the British Case, 1624–1907,” 2010, 32,

others),¹⁶ on the broader social contexts and roots of inventive activity,¹⁷ and on the politics of IP and innovation.¹⁸

<http://dx.doi.org/10.2139/ssrn.2019844>; Petra Moser, “Patents and Innovation: Evidence from Economic History,” *Journal of Economic Perspectives* 27 (2013): 23–44; Tom Nicholas and Hiroshi Shimizu, “Intermediary Functions and the Market for Innovation in Meiji and Taishō Japan,” *Business History Review* 87 (2013): 121–49; Alessandro Nuvolari, “The Making of Steam Power Technology: A Study of Technical Change during the British Industrial Revolution” (PhD thesis, Technische Universiteit Eindhoven, 2004); David Pretel, “The Global Rise of Patent Expertise During the Late Nineteenth Century,” in David Pretel and Lino Camprubí (eds.) *Technology and Globalisation: Networks of Experts in World History* (Cham: Springer, 2018), pp.129–57; Patricio Sáiz, “Social Networks of Innovation in the European Periphery: Exploring Independent versus Corporate Patents in Spain circa 1820–1939,” *Historical Social Research/Historische Sozialforschung* 37 (2012): 348–69; Margrit Seckelmann, *Industrialisierung, Internationalisierung und Patentrecht im Deutschen Reich, 1871–1914* (Frankfurt am Main: Klostermann, 2006).

16. Christopher Beauchamp, *Invented by Law: Alexander Graham Bell and the Patent That Changed America* (Cambridge: Harvard University Press, 2015); Carolyn C. Cooper, “Thomas Blanchard’s Woodworking Machines: Tracking 19th-Century Technological Diffusion,” *IA: The Journal of the Society for Industrial Archeology* 13 (1987): 41–54; Carolyn C. Cooper, *Shaping Invention: Thomas Blanchard’s Machinery and Patent Management in Nineteenth-Century America* (New York: Columbia University Press, 1991); Matthew L. Jones, “Improvement for Profit: Calculating Machines and the Prehistory of Intellectual Property,” in Mario Biagioli and Jessica Riskin (eds.) *Nature Engaged: Science in Practice from the Renaissance to the Present* (New York: Palgrave Macmillan US, 2012), pp.125–46; Christine MacLeod, *Heroes of Invention: Technology, Liberalism and British Identity, 1750–1914* (Cambridge: Cambridge University Press, 2007); Robert C. Post, *Physics, Patents and Politics: Biography of Charles Grafton Page* (New York: Science History Publications, 1977); Eva Hemmungs Wirtén, *Making Marie Curie: Intellectual Property and Celebrity Culture in an Age of Information* (Chicago: University of Chicago Press, 2015).
17. It is impossible to do justice to the enormous number of books and articles that have been published on social context of innovative activity, the relation between IP and cultural heritage, and the production of indigenous knowledge. We can name but a few. Isabella Alexander, *Copyright Law and the Public Interest in the Nineteenth Century* (Oxford: Hart, 2010); Jane E. Anderson, *Law, Knowledge, Culture: The Production of Indigenous Knowledge in Intellectual Property Law* (Cheltenham: Edward Elgar, 2009); Ronald V. Bettig, *Copyrighting Culture: The Political Economy of Intellectual Property* (Boulder: Westview Press, 1996); Wiebe E. Bijker, “The Social Construction of Bakelite: Toward a Theory of Invention,” in Wiebe E. Bijker, Thomas Parke Hughes, and Trevor Pinch (eds.) *The Social Construction of Technological Systems: New Directions in the Sociology and History of Technology* (Cambridge: MIT Press, 1987), pp.159–90; Boatema Boateng, *The Copyright Thing Doesn’t Work Here: Adinkra and Kente Cloth and Intellectual Property in Ghana* (Minneapolis: University of Minnesota Press, 2011); Michael F. Brown, *Who Owns Native Culture?* (Cambridge: Harvard University Press, 2004); D. Graham Burnett, *Trying Leviathan: The Nineteenth-Century New York Court Case That Put the Whale on Trial and Challenged the Order of Nature* (Princeton: Princeton UP, 2010); Rosemary J. Coombe, *The Cultural Life of Intellectual Properties: Authorship, Appropriation, and the Law* (Durham: Duke University Press, 1998); Peter Drahos, *Intellectual Property, Indigenous People and Their Knowledge* (Cambridge: Cambridge University Press, 2014); Peter Drahos and Susy Frankel, *Indigenous Peoples’ Innovation: Intellectual Property Pathways to Development* (Canberra: ANU

But if historians of science and technology have taken patents very seriously, we believe that, with some notable exceptions, they have typically treated the law as a black box. We have careful studies of the role of patents in the articulation and dissemination of specific technologies, the changing models of technological development (from devices to systems), the tensions between corporations and skilled labor (through the work for hire doctrine), or the relation between patenting and technology transfer, among various other topics. While historiographically sophisticated, however, much of this literature has preferred to see and treat patents as the form inventions take when

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- Press, 2013); Graham Dutfield, Kit Boey Chow, and Uma Suthersanen (eds.), *Innovation Without Patents: Harnessing the Creative Spirit in a Diverse World* (Cheltenham: Edward Elgar, 2007); Allison Fish, "The Commodification and Exchange of Knowledge in the Case of Transnational Commercial Yoga," *International Journal of Cultural Property* 13 (2006): 189–206; Haidy Geismar, *Treasured Possessions: Indigenous Interventions into Cultural and Intellectual Property* (Durham: Duke University Press, 2013); Murphy Halliburton, *India and the Patent Wars: Pharmaceuticals in the New Intellectual Property Regime* (Ithaca: Cornell University Press, 2018); Laetitia La Follette (ed.), *Negotiating Culture: Heritage, Ownership, and Intellectual Property* (Amherst: University of Massachusetts Press, 2013); Jessica Christine Lai, *Indigenous Cultural Heritage and Intellectual Property Rights* (Cham: Springer, 2014); Marianne De Laet, "Patents, Travel, Space: Ethnographic Encounters with Objects in Transit," *Environment and Planning D: Society and Space* 18 (2000): 149–68; James Leach, "Owning Creativity: Cultural Property and the Efficacy of Custom on the Rai Coast of Papua New Guinea," *Journal of Material Culture* 8 (2003): 123–43; Anthea Kraut, *Choreographing Copyright: Race, Gender, and Intellectual Property Rights in American Dance* (New York: Oxford University Press, 2016); Fiona Macmillan, "The Problematic Relationship between Traditional Knowledge and the Commons," in S. Pinton and L. Zagato (eds.) *Cultural Heritage: Scenarios 2015–2017* (Venice: Edizione Ca Foscari, 2017), pp.675–92; Ikechi Mgbefo, *Global Biopiracy: Patents, Plants, and Indigenous Knowledge* (Ithaca: Cornell University Press, 2006); Darrell Addison Posey and Graham Dutfield, *Beyond Intellectual Property: Toward Traditional Resource Rights for Indigenous Peoples and Local Communities* (Ottawa: IDRC, 1996); Marilyn Strathern, *Property, Substance and Effect: Anthropological Essays on Persons and Things* (London: Athlone Press, 1999); Martha Woodmansee and Peter Jaszi, "Beyond Authorship: Refiguring Rights in Traditional Culture and Bioknowledge," in Mario Biagioli and Peter Galison (eds.) *Scientific Authorship: Credit and Intellectual Property in Science* (New York: Routledge, 2003), pp.195–223.
18. Michael D. Birnhack, *Colonial Copyright: Intellectual Property in Mandate Palestine* (Oxford: Oxford University Press, 2012); Catherine L. Fisk, *Working Knowledge: Employee Innovation and the Rise of Corporate Intellectual Property, 1800–1930*. (Durham: University of North Carolina Press, 2014); Catherine L. Fisk, *Writing for Hire: Unions, Hollywood, and Madison Avenue* (Cambridge: Harvard University Press, 2016); Joseph M. Gabriel, "A Thing Patented Is a Thing Divulged: Francis E. Stewart, George S. Davis, and the Legitimization of Intellectual Property Rights in Pharmaceutical Manufacturing, 1879–1911," *Journal of the History of Medicine and Allied Sciences* 64 (2009): 135–72; Andrew Mertha, *The Politics of Piracy: Intellectual Property in Contemporary China* (Ithaca: Cornell University Press, 2005); Jay Sanderson, *Plants, People and Practices: The Nature and History of the UPOV Convention* (New York: Cambridge University Press, 2017); Madhavi Sunder, *From Goods to a Good Life: Intellectual Property and Global Justice* (New Haven: Yale University Press, 2012); Alex Wellerstein, "Patenting the Bomb: Nuclear Weapons, Intellectual Property, and Technological Control," *Isis* 99 (2008): 57–87; Jessica Silbey, *The Eureka Myth: Creators,*

they become “clothed” by the law, rather than look more closely at how the law construes invention, and how that construction has changed over time. Similarly, economic and business historians have been counting and tabulating patents, treating their chronological trends and distribution across periods and countries as quantitative indicators of innovation and economic growth – something one added up rather than studied in detail. This approach has not changed in more recent studies using large data sets and complex network models.¹⁹ While quantitative studies of patents have ranged from informative to fascinating, the questions they pursued have not required them to look “into” IP.

For instance, there has been substantial discussion in the historiography of science and technology about what an invention is and how it may differ from a scientific finding or claim, but we have not, until recently, paid attention to the fact that the legal notion of invention differs significantly from what inventors and engineers (or historians of technology) mean by that term. (This is made patently clear when scientists and lawyers talk past each other during court proceedings).²⁰ Conversely, STS practitioners have studied collaborative knowledge-making communities or the emergence of new fields like synthetic biology, often focusing on the constraints posed by IP and on the establishment of commons modeled on those promoted by the free software movement.²¹ Still, while STS has carefully studied laboratories and other sites of the technosciences, it has paid little

Innovators, and Everyday Intellectual Property (Stanford: Stanford University Press, 2014); Shobita Parthasarathy, *Patent Politics: Life Forms, Markets, and the Public Interest in the United States and Europe* (Chicago: The University of Chicago Press, 2017); Doogab Yi, “Who Owns What? Private Ownership and the Public Interest in Recombinant DNA Technology in the 1970s,” *Isis* 102 (2011): 446–74.

19. Timothy Lenoir and Eric Giannella, “Technological Platforms and the Layers of Patent Data,” in Mario Biagioli, Peter Jaszi, and Martha Woodmansee (eds.) *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: University of Chicago Press, 2008), pp.359–84.
20. Kara Swanson, “Biotech in Court: A Legal Lesson on the Unity of Science,” *Social Studies of Science* 37 (2007): 357–84.
21. Jane Calvert, “The Commodification of Emergence: Systems Biology, Synthetic Biology and Intellectual Property,” *BioSocieties* 3 (2008): 383–98; Luis Campos, “The BioBrick™ Road,” *BioSocieties* 7 (2012): 115–39; Alessandro Delfanti, *Biohackers: The Politics of Open Science* (London: Pluto Press, 2013); Kelty, *Two Bits* (note 9); Johan Söderberg and Alessandro Delfanti, “Hacking Hacked! The Life Cycles of Digital Innovation,” *Science, Technology, & Human Values* 40 (2015): 793–98; Alexander Schwerin and Luis Campos (eds.), *Making Mutations: Objects, Practices, Contexts* (Berlin: Max Planck Institute for the History of Science, 2010); Sophia Roosth, “Bibricks and Crocheted Coral: Dispatches from the Life Sciences in the Age of Fabrication,” *Science in Context* 26 (2013): 153–71. Contemporary scholarship on the commons and the public domain is too numerous to list exhaustively, but see James Boyle, *The Public Domain. Enclosing the Commons of the Mind* (New Haven: Yale University Press, 2008); Lawrence Lessig, *The Future of Ideas: The Fate of the Commons in a Connected World* (New York: Random House, 2002); Michele Boldrin and David K. Levine, *Against Intellectual Monopoly* (Cambridge: Cambridge University Press, 2010); Tine De Moor, *The Dilemma of the Commoners: Understanding the Use of Common Pool Resources in Long-Term Perspective* (Cambridge: Cambridge University Press, 2015);

attention to the practices and sites where IP law is articulated – patent offices, congressional hearings, courts of law, archives, depositories, and so on.²² In other words, there have been few attempts to look *inside the law* to study how it construes invention, in what sites and with what material and discursive technologies it does so.

The articulation of the new disciplinary and methodological space we propose here is not meant as a criticism of the approaches of previous scholars who have worked at the intersection of IP and the technosciences. Without their work, we would not be able to ask the questions we are posing now. What concerns us, and what we try to show through this special issue, is that historians of science and technology and STS practitioners can open up the black box of IP as effectively as they can that of the technosciences and that, in so doing, they can enrich their discipline while making significant contributions to legal studies. No doubt, this is not an easy task. Perhaps because of the technical density of the discipline, the mechanics of patent law have so far remained the province of expert lawyers, at least in terms of the capacity to represent or explain the peculiar language of the patent claim or the intricacies of patent prosecution. At the same time, for the same reason that scientists and physicians are rarely able to double as outstanding historians of science or medicine, the lawyers' training and professionalization hinders their ability to double as historians of the interaction between law and technology, or to make the law as "strange" as sophisticated STS practitioners and historians can render the technosciences.

What is needed is a hybrid kind of scholar who can understand the concepts and practices of both the law and the technosciences, and the institutions (patent offices, law schools, patent agents and attorneys, patent examiner's academies, and so on) that negotiate

David Lange, "Recognizing the Public Domain," *Law and Contemporary Problems* 44 (1981): 147–78; Robert P. Merges and Amy L. Landers, *Intellectual Property and the Public Domain* (Cheltenham: Edward Elgar Publishing, 2017); Alexander Peukert, *Die Gemeinfreiheit: Begriff, Funktion, Dogmatik* (Tübingen: Mohr Siebeck, 2012); Derek Wall, *The Commons in History: Culture, Conflict, and Ecology* (Cambridge: MIT Press, 2014).

22. This is surprising given the significant focus that STS has placed on courts of law as the stage for knowledge production and the constitution of evidence: Ian Burney, *Bodies of Evidence: Medicine and the Politics of the English Inquest, 1830–1926*, New. (Baltimore: Johns Hopkins University Press, 1999); Ian Burney, *Poison, Detection and the Victorian Imagination* (Manchester: Manchester University Press, 2012); Ian Burney, "Our Environment in Miniature: Dust and the Early Twentieth-Century Forensic Imagination," *Representations* 121 (2013): 31–59; Simon A. Cole, *Suspect Identities: A History of Fingerprinting and Criminal Identification* (Cambridge: Harvard University Press, 2009); Harry Collins and Robert Evans, *Rethinking Expertise* (Chicago: University of Chicago Press, 2009); Gary Edmond, "The Law-Set: The Legal-Scientific Production of Medical Propriety," *Science, Technology, & Human Values* 26 (2001): 191–226; Tal Golan, "Revisiting the History of Scientific Expert Testimony," *Brooklyn Law Review* 73 (2007): 879–942; Stephen Hilgartner, *Science on Stage: Expert Advice as Public Drama* (Stanford: Stanford University Press, 2000); Sheila Jasanoff, *Science at the Bar: Law, Science, and Technology in America, A Twentieth Century Fund Book* (Cambridge: Harvard University Press, 1995); Christopher Lawless, *Forensic Science: A Sociological Introduction* (London: Routledge, 2016); Michael Lynch et al., *Truth Machine: The Contentious History of DNA Fingerprinting* (Chicago: University of Chicago Press, 2009); Jennifer L. Mnookin, "Semi-Legibility and Visual Evidence: An Initial Exploration," *Law, Culture and the Humanities* 10 (2014): 43–65; Alison Winter, "A Forensics of the Mind," *Isis* 98 (2007): 332–43.

the connections between the two.²³ In the past, historians of technology or business and economic historians rarely developed the skills required to look at patents as artifacts in and of themselves rather than simply as means to secure the protection of certain technologies and innovations, but we are now beginning to see a growing number of historians and STS practitioners who can appreciate both the technosciences and the technologies of the law.

While the title of this issue refers to a field that is still emergent and thus difficult to define, we do not use “Technologies of the law” as a metaphor. Once we carefully look at how patent law construes its object – the invention – in specific settings and periods (and we do so with the same care and detail that a historian of technology would pay to an inventor’s development of a technology or device) it becomes clear that IP is much more than a text, a doctrine, or a specific form of enunciation, but that it involves a staggering amount of infrastructure, technologies, and labor.²⁴ Setting aside the general question of where the law draws its authority from, tracing a patent application from pre-application work to the eventual grant demonstrates the indispensable function of the specific training of patent attorneys and examiners,²⁵ of the bureaucracy of the patent office,²⁶ of the system of patent classification (which frames the “species” of an invention and the scope of its examination),²⁷ of the constitutive role of patent specifications in both their linguistic and pictorial dimensions,²⁸ of the highly specialized language of

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23. The work of Annelise Riles was influential in this respect, especially her “A New Agenda for the Cultural Study of Law: Taking on the Technicalities,” *Buffalo Law Review* 53 (2005): 973–1033; Annelise Riles, “Afterword: A Method More Than a Subject,” in David Cowan and Daniel Wincott (eds.) *Exploring the “Legal” in Socio-Legal Studies* (London: Palgrave Macmillan, 2015), pp.257–64.
24. On law as a mode of enunciation see Bruno Latour, *An Inquiry into Modes of Existence: An Anthropology of the Moderns* (Cambridge: Harvard University Press, 2013), 357–79; Bruno Latour, *The Making of Law: An Ethnography of the Conseil d’Etat*. (Cambridge: Polity, 2010).
25. Kara Swanson, “Rubbing Elbows and Blowing Smoke: Gender, Class, and Science in the Nineteenth-Century Patent Office,” *Isis* 108 (2017): 40–61; Kara Swanson, “The Emergence of the Professional Patent Practitioner,” *Technology and Culture* 50 (2009): 519–48.
26. Stathis Arapostathis and Graham Dutfield, *Knowledge Management and Intellectual Property: Concepts, Actors and Practices from the Past to the Present* (Northampton: Edward Elgar, 2013); Christopher Beauchamp, “Who Invented the Telephone? Lawyers, Patents, and the Judgments of History,” *Technology and Culture* 51 (2010): 854–78; Peter Drahos, *The Global Governance of Knowledge: Patent Offices and Their Clients* (Cambridge: Cambridge University Press, 2010); Gabriel Galvez-Behar and Shigehiro Nishimura, “Managing Industrial Property: Some Historical Perspectives,” *Entreprises et histoire* 82 (2016): 5–10.
27. Hyo Yoon Kang, “Science Inside Law: The Making of a New Patent Class in the International Patent Classification,” *Science in Context* 25 (2012): 551–94; Jose Bellido and Hyo Yoon Kang, “In Search of a Trade Mark. Search Practices and Bureaucratic Poetics,” *Griffith Law Review* 25 (2016): 147–71.
28. John N. Adams and Gwen Averley, “The Patent Specification the Role of Liardet v Johnson,” *The Journal of Legal History* 7 (1986): 156–77; Mario Biagioli, “Patent Republic: Representing Inventions, Constructing Rights and Authors,” *Social Research: An International Quarterly of Social Sciences* 73 (2006): 1129–72. Bill Rankin, “The ‘Person Skilled in the Art’ Is Really Quite Conventional: U.S. Patent Drawings and the Persona of the Inventor, 1870–2005,” in Mario Biagioli, Martha Woodmansee, and Peter Jaszi (eds.) *Making and Unmaking Intellectual Property: Creative Production in Legal and Cultural Perspective* (Chicago: Chicago University Press, 2011), pp.55–78.

patent claims (which is often unintelligible to the uninitiated),²⁹ of repositories of patented biological materials and – in earlier periods – the role of patent models and of the museums that both stored and made them public.³⁰

Given the common tendency to think of the law as a body of doctrine or a form of enunciation, the claim that law has technologies may be already radical enough. We find it productive, however, to take a further step and start considering IP as a technology or a system of related technologies that produce all sorts of effects and objects well beyond the definition of invention, for example the definition of what elements of language may be protected as trademarks,³¹ or the way copyright may be made to protect software not as an invention but as an expressive text. Jurists would likely say that these developments are

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29. Charles Bazerman, *The Languages of Edison's Light* (Cambridge: MIT Press, 1999); Geof Bowker, "What Is A Patent?," in Wiebe E. Bijker and John Law (eds.) *Shaping Technology/Building Society: Studies in Sociotechnical Change* (Cambridge: MIT Press, 1992), pp.53–74; Dan L. Burk and Jessica Reyman, "Patents as Genre: A Prospectus," *Law & Literature* 26 (2014): 163–90; Greg Myers, "From Discovery to Invention: The Writing and Rewriting of Two Patents," *Social Studies of Science* 25 (1995): 57–105.
30. J. A. Brearly, "Old Patent Office Models," *Journal of the Patent Office Society* 8 (1926, 1925): 280–4; D. Seaborne Davies, "The Early History of the Patent Specification," *Law Quarterly Review* 50 (1934): 86–109, 260–74; Kendall J. Dood, "Patent Models and the Patent Law: 1790–1880," *Journal of the Patent Office Society* 65 (1983): 187–216, 234–74; Alain Pottage, "Law Machines: Scale Models, Forensic Materiality and the Making of Modern Patent Law," *Social Studies of Science* 41 (2011): 621–43; Kendall J. Dood, "Why Models?," in Robert E. Post (ed.) *American Enterprise: Nineteenth-Century Patent Models* (New York: Cooper-Hewitt Museum, 1984), pp.14–16; Jessica Christine Lai and Antoinette Maget Dominicé, *Intellectual Property and Access to Im/Material Goods* (Cheltenham: Edward Elgar Pub, 2016); Marcus Popplow, "Models of Machines: A 'Missing Link' Between Early Modern Engineering and Mechanics?," *Max-Planck-Institut für Wissenschaftsgeschichte Preprint* 225 (2002); William Ray and Marlys Ray, *The Art of Invention: Patent Models and Their Makers* (Princeton: Pyne Press, 1974); Megan Richardson and Julian Thomas, *Fashioning Intellectual Property: Exhibition, Advertising and the Press, 1789–1918* (Cambridge: Cambridge University Press, 2012); F. D. Prager, "Examination of Inventions from the Middle Ages to 1836," *Journal of the Patent and Trademark Office Society* 46 (1964): 268–91.
31. The historical literature on trademarks is still fairly limited, but see Lionel Bently, "The Making of Modern Trade Mark Law: The Construction of the Legal Concept of the Trade Mark (1860–1880)," in Lionel Bently, Jane C. Ginsburg, and Jennifer Davis (eds.) *Trade Marks and Brands: An Interdisciplinary Critique* (Cambridge: Cambridge University Press, 2011), pp.3–41; Andrew Bevan and David Wengrow (eds.), *Cultures of Commodity Branding* (Walnut Creek: Left Coast Press, 2012); Bert De Munck, "The Agency of Branding and the Location of Value. Hallmarks and Monograms in Early Modern Tableware Industries," *Business History* 54 (2012): 1055–76; Abraham S. Greenberg, "The Ancient Lineage of Trade-Marks," *Journal of the Patent Office Society* 33 (1951): 876–87; Gary Richardson, "Brand Names Before the Industrial Revolution," Working Paper 13930 (Cambridge: National Bureau of Economic Research, 2008); Benjamin G. Paster, "Trademarks – Their Early History," *The Trademark Reporter* 59 (1969): 551–72; Edward S. Rogers, "Some Historical Matter Concerning Trade-Marks," *Michigan Law Review* 9 (1910): 29–43; Dagmar Schäfer, "Inscribing the Artifact and Inspiring Trust: The Changing Role of Markings in the Ming Era," *East Asian Science, Technology and Society* 5 (2011): 239–65; Dagmar Schäfer, "Peripheral Matters: Selvage/Chef-de-Piece Inscriptions on Chinese Silk Textiles" 47 (2013):

doctrinal – articulations of the logic of the law – but we propose that they represent the development and recursive operation of the law as a technology.

While these infrastructures, “material forensics,”³² and media change in time, they never disappear to leave behind a purely discursive and doctrinal law. As Kang shows, the recent digitization of patent applications, their on-screen analysis, and the online modes of prior art search is changing the examiners’ sense of what the invention is, but do not return to or reach an unmediated, transparent apprehension of “invention.”³³ In addition to these material technologies, we need to add the procedural rules, standards of evidence, canonical forms of argumentation, and discursive framing devices one finds deployed both in the statute and in the courtrooms where patents are challenged. Baudry’s contribution suggests that we should add “styles of patent examination” to this list of techniques.³⁴ As he shows, French academic savants put in charge of examining patent applications in the post-revolutionary period construed patentable technology in a very specific fashion, distinct from and subaltern to academic science. Similarly, Arapostathis demonstrates how, in lawsuits involving the Marconi patents, the notion of patentable invention was construed by mobilizing specific types of expert witnesses, and specific historical accounts of discovery and invention – narratives that, we believe, should also be counted as technologies.³⁵ Finally, Bellido’s and Pottage’s contribution shows that the integral role of technology is not limited to patent law, and that trademark law as we know it would not exist without dictionaries – tools that, while eminently mundane, also provide a key test for the validity of trademarks by functioning as archives of genericness against which the mark’s distinctiveness is to be judged.³⁶

The second half of our title – “law as technology” – may strike some readers as counter-intuitive. No doubt, law as technology is less descriptive and more suggestive than “technologies of the law,” but we do not treat it as metaphor either. For instance, Biagioli’s contribution shows how the very existence and legitimacy of patent law depends on its purported ability to function as a balance establishing an equilibrium between the interests of the inventor and that of the public.³⁷ That is, patent law has to function as an instrument, not only as a legal instrument but, effectively, as a political technology. More generally, we use the notion of law as technology to indicate, for instance, that patent law does not evolve

705–33; Frank I. Schechter, *The Historical Foundations of the Law Relating to Trade-Marks* (New York: Columbia University Press, 1925); David Wengrow, “Prehistories of Commodity Branding,” *Current Anthropology* 49 (2008): 7–34.

32. Alain Pottage, “Law Machines: Scale Models, Forensic Materiality and the Making of Modern Patent Law,” *Social Studies of Science* 41 (2011): 621–43.

33. Hyo Yoon Kang, “Ghosts of Inventions: Patent Law’s Digital Mediations,” *History of Science*, In Press.

34. Jérôme Baudry, “Examining Inventions, Shaping Property: The Savants and the French Patent System,” *History of Science*, In Press.

35. Stathis Arapostathis, “Marconi’s Legal Battles: Discursive, Textual, and Material Entanglements,” *History of Science*, In Press.

36. Jose Bellido and Alain Pottage, “Lexical Properties: Trademarks, Dictionaries, and the Sense of the Generic,” *History of Science*, In Press.

37. Mario Biagioli, “Weighing Intellectual Property: Can We Balance the Social Costs and Benefits of Patenting?,” *History of Science*, In Press.

either by merely articulating its doctrine in response to technological developments, nor does it simply deploy its various technologies to draw a line between patentable and unpatentable technology as if that line was clear and distinct within the technology, or that, alternatively, there is a technology, distinct from the law, on which the law can draw lines as if on a blackboard. As Buning shows in this issue, analyzing the social-epistemological dimensions of a priority dispute about an early modern globe, legal categories are not ontologically determined but are constructed through an unsettled process of negotiation. The line between what does and does not count as invention (as well as the fundamental distinctions in other branches of IP between original and copy, distinctive and generic, idea and expression) are not drawn on some kind of medium but construed by the recursive operations of both the discourse and technologies of IP law. These distinctions may be redrawn with the emergence of new objects and technologies, but they are not determined by them. It is this constructive feature of the law that we are trying to capture with the notion of “law as technology,” a dimension that is sadly made invisible by statements that “the law always lags behind the development of technology,” as if the law only *represents*, however belatedly, the objects that the technosciences confront it with.

Thinking about the technologies of the law and the law as technology will, we hope, help us question what we mean by both “technology” and “law.” It may also help us reframe the complex assemblages that we used to call “intersections between science and law” as something that should be approached through subtler and more complex concepts that do not assume and reify the assumption that on one side we have technology (material) and on the other we have law (doctrinal or textual).

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