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Patent Alchemy: The Market for Technology in US History

The literature on inventors has traditionally focused on entrepreneurs who exploited their ideas in their own businesses and on researchers who worked in large firms' R&D laboratories. For most of US history, however, it was as common for inventors to profit from their ideas by selling off or licensing the patent rights. This article traces the different ways in which inventors resolved the information problems involved in marketing their patents. We focus in particular on the patent attorneys who emerged during the last third of the nineteenth century to help inventors find buyers for their intellectual property.

As the US patent system has come under increasing attack in recent years, critics have directed much of their ire at firms that buy up patents in order to profit from selling off or licensing the rights. They view these businesses, which they variously call “non-practicing entities,” “patent assertion entities,” or more derogatively “trolls,” as parasites that feed off the creativity of others, threatening legitimate

The authors are grateful for the comments and suggestions they have received from Carolyn Cooper, Stanley Engerman, Walter Friedman, Timothy Guinnane, Daniel Kevles, Zorina Khan, David Lamoreaux, Margaret Levenstein, Shih-tse Lo, Tom Nicholas, Claire Priest, Jean-Laurent Rosenthal, two anonymous referees, members of the Yale Economic History lunch, and participants in seminars at Case Western Reserve University, Columbia University, George Mason University, the University of Michigan, the University of Southern California and Yale Law Schools, and at the conference on “Information, Intermediation, and Financial Markets” in Riverside, California. They would also like to thank Andrew Henderson for his able research assistance and the National Science Foundation, the University of California, Los Angeles, and Yale University for financial support. The sections of this article on the late nineteenth and early twentieth centuries draw on ideas and examples from Naomi R. Lamoreaux and Kenneth L. Sokoloff, “Intermediaries in the US Market for Technology, 1870–1920,” in *Finance, Intermediaries, and Economic Development*, ed. Stanley L. Engerman, Philip T. Hoffman, Jean-Laurent Rosenthal, and Kenneth L. Sokoloff (New York, 2003), 209–46, but the quantitative analysis is mostly new.

Business History Review 87 (Spring 2013): 3–38. doi:10.1017/S0007680513000123
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innovation.¹ To many critics, there is something new and unethical about profiting from intellectual property by marketing the rights rather than using it in production, even when the marketing is done by the inventors themselves.² Thus, a recent Federal Trade Commission report, based on extensive testimony from both business people and academics, concluded that the recent proliferation of “ex post patent transactions” resulted from a new set of pathologies afflicting the patent system—pathologies that urgently needed to be reformed.³

Certainly, there has been a change in the way inventors exploit their technological discoveries since the heyday of large-firm research and development (R&D) in the mid-twentieth century, but there is actually nothing new about the practice of extracting economic value from patents by selling off or licensing the rights. During most periods of US history, it was as common for inventors to profit from their creativity in this way as by starting their own firms or working as salaried employees in R&D labs. Indeed, the ability to find buyers quickly for patents was an important driver of inventive activity during the late nineteenth and early twentieth centuries, when patenting rates in the United States were at historic highs.⁴

Talented inventors can be more productive if they are able to specialize in generating new technological ideas and then transfer the work of commercializing those ideas to others. Although this division of labor can theoretically occur either in the market or inside large firms, the dominant view has long been that information problems involved in transacting for technology in the market make the internalization of R&D within large firms a superior way of organizing technological discovery.⁵ More recent scholarship suggests, however, that this perspective both understates the problems involved in managing R&D internally

¹See Robert P. Merges, “The Trouble with Trolls: Innovation, Rent-Seeking, and Patent Law Reform,” *Berkeley Technology Law Journal* 24 (Fall 2009): 1583–1614; and James Besen, Jennifer Ford, and Michael J. Meurer, “The Private and Social Costs of Patent Trolls,” Boston University School of Law Working Paper no. 11–45 (Sept. 2011).

²See, for example, Daniel P. McCurdy, “Patent Trolls Erode the Foundation of the US Patent System,” *Science Progress* 1, no. 2 (2009): 78–86.

³US Federal Trade Commission, “The Evolving IP Marketplace: Aligning Patent Notice and Remedies with Competition” (Mar. 2011), <http://www.ftc.gov/os/2011/03/110307patentreport.pdf>, accessed 12 Oct. 2012.

⁴For numbers of patents, see Susan B. Carter et al., eds., *Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition*, vol. 3 (New York, 2006), 426–29.

⁵Kenneth J. Arrow, “Economic Welfare and the Allocation of Resources for Invention,” in *The Rate and Direction of Inventive Activity*, ed. Universities–National Bureau Committee for Economic Research (Princeton, NJ, 1962), 609–25; David J. Teece, “Technological Change and the Nature of the Firm,” in *Technical Change and Economic Theory*, ed. Giovanni Dosi et al. (London, 1988), 256–81; David C. Mowery, “The Boundaries of the US Firm in R&D,” in *Coordination and Information: Historical Perspectives on the Organization of Enterprise*, ed. Naomi R. Lamoreaux and Daniel M. G. Raff (Chicago, 1995), 147–76.

and overstates the difficulties of transacting for technology in the market.⁶ This article contributes to this newer body of literature by showing that, though the kinds of information asymmetries that buyers and sellers faced in the market for technology changed over time as the structure of the economy evolved, in each period interested parties developed solutions that enabled them to profit by improving the workings of the market. We make this argument by documenting the shift in the forms of intermediation that accompanied the growth of national product markets in the nineteenth century, focusing in particular on the patent attorneys who emerged during the last third of the century to help inventors find buyers for their intellectual property. We then use this analysis to set complaints about today's "IP marketplace" in historical perspective.

Sources and Patterns

One reason the market for technology has received so little attention from historians is that inventors who sought to profit from their intellectual property by selling it off have generally left behind less manuscript materials than inventors who founded their own enterprises. Nonetheless, there are sufficient traces of their activities in the historical record for systematic analysis. Zorina Khan and Kenneth Sokoloff compiled a dataset on the careers of nineteenth-century "great inventors" whose technological achievements were important enough to merit entries in the *Dictionary of American Biography*. They found that inventors who started their own businesses accounted for less than a quarter of the patents obtained by this group during the late nineteenth century. Those who worked as employees accounted for even less—about 10 percent. The bulk of the patents came from inventors who exploited their intellectual property by selling off or licensing the rights. Khan and Sokoloff based their conclusions in part on biographical detail in the *Dictionary* and other textual sources, but their most

⁶Naomi R. Lamoreaux and Kenneth L. Sokoloff, "Inventors, Firms, and the Market for Technology in the Late Nineteenth and Early Twentieth Centuries," in *Learning by Doing in Markets, Firms, and Countries*, ed. Naomi R. Lamoreaux, Daniel M. G. Raff, and Peter Temin (Chicago, 1999), 19–57; Joshua Gans and Scott Stern, "The Product Market and the Market for 'Ideas': Commercialization Strategies for Technology Entrepreneurs," *Research Policy* 32 (Feb. 2003): 333–50; Ashish Arora, Andrea Fosfuri, and Alfonso Gambardella, *Markets for Technology: The Economics of Innovation and Corporate Strategy* (Cambridge, MA, 2001); Margaret B. W. Graham, "Entrepreneurship in the United States, 1920–2000," *The Invention of Enterprise: Entrepreneurship from Ancient Mesopotamia to Modern Times*, ed. David S. Landes, Joel Mokyr, and William J. Baumol (Princeton, NJ, 2010), 401–42. See also the introduction and essays in Sally H. Clarke, Naomi R. Lamoreaux, and Steven W. Usselman, eds., *The Challenge of Remaining Innovative: Insights from Twentieth-Century American Business* (Stanford, CA, 2009).

important data came from the patent records themselves, which included the names of the individuals and companies to whom the inventors assigned (sold or otherwise transferred) ownership of their patents.⁷

The Patent Office has routinely collected information on patent assignments since 1836, when Congress enacted landmark legislation creating the modern examination system. The statute declared that every patent would “be assignable in law, either as to the whole interest, or any undivided part thereof, by any instrument in writing.” To insure that the ownership of patents was certain and clear, assignments had to be submitted to the Patent Office “within three months from the execution thereof.”⁸ Clerks in the patent office copied the assignment contracts into huge ledger volumes known as “libers.” So that basic information about these transactions could be more readily retrieved, they also copied summary details of the contracts into smaller volumes called “digests.”⁹

If the transfer occurred before the Patent Office issued the patent, the name of the assignee appeared on the grant itself and was published along with the name of the inventor in the *Annual Report of the Commissioner of Patents*. Even though most assignments during the late nineteenth century occurred after issue, this type of information can still be quite revealing. A quick examination of the first twenty-five patents granted to Thomas Edison suggests, for example, that Edison depended heavily on assignments to finance the early stages of his career. He transferred at least partial rights to twenty of those patents by the time of issue—nine to a company and the rest singly or in combination to eight different individuals.¹⁰

The manuscript copies of assignment contracts recorded by the Patent Office are even more useful. Table 1, which is based on successive samples from the liber volumes, shows that there were dramatic changes over the course of the nineteenth century in the way patents were assigned. At mid-century, the vast majority of assignments involved transfers of rights for specific geographic areas as small as a township or as large as a cluster of adjacent states. A single patent could

⁷B. Zorina Khan and Kenneth L. Sokoloff, “Institutions and Technological Innovation during Early Economic Growth: Evidence from the Great Inventors of the United States, 1790–1930,” NBER Working Paper no. 10966 (Dec. 2004).

⁸US Congress, “An Act to Promote the Progress of Useful Arts,” ch. 357, 5 Stat. 117 (4 July 1836).

⁹Both sets of volumes are stored in the National Archives in Washington, DC, in the Records of the Patent and Trademark Office, Record Group 241. For a primer on how to use these records, see Carolyn C. Cooper, “Thomas Blanchard’s Woodworking Machines: Tracking Nineteenth-Century Technological Diffusion,” *Industrial Archaeology* 13, no. 1 (1987): 41–54.

¹⁰Edison’s patents are available through the Web site of the Thomas Edison Papers at Rutgers University, <http://edison.rutgers.edu/patents.htm>, accessed 17 July 2012.

Table 1
Trends in Types of Patent Assignments

	1851	1871	1891	1911
Percent of assignments that were geographic	71.4	22.8	4.6	1.2
Percent of assignments that were secondary	43.6	27.8	16.4	12.0
Percent of assignments made before issue	12.0	27.8	55.9	63.5
Total number of assignment contracts	133	794	1,373	1,869

Source: Our sample consists of all assignment contracts filed with the US Patent Office by assignors resident in the United States during the months of January 1851, January 1871, January 1891, and January 1911. These contracts are recorded in “Liber” volumes stored in the National Archives, Record Group 241, Records of the Patent and Trademark Office. Geographic assignments are grants of patent rights that are limited to specific subregions of the United States. Secondary assignments involve patent rights that have previously been assigned to the assignor.

be assigned many times, and assignees often bought patent rights with the idea of reselling them to others, sometimes subdividing them into even smaller units. Between 1851 and 1871, however, the proportion of assignments that were geographically delimited plunged from 71.4 to 22.8 percent, and the number would fall almost to zero by the early twentieth century. The proportion of secondary assignments (transfers made by a previous assignee rather than the patentee) dropped somewhat less dramatically—from 43.6 percent in 1851, to 27.8 percent in 1871, and to 12.0 percent in 1911. Moreover, assignments occurred increasingly early in the life of the patent. By 1911 fully 63.5 percent of all assignments were in advance of issue, up from 12.0 percent in 1851.

In other words, at mid-century the typical patent assignment occurred after the patent was issued and conveyed to the buyer rights only to a limited geographical area. Over the next sixty years, however, the market for patents was completely transformed so that the typical assignment occurred before the patent was issued and granted the buyer full national rights. Not surprisingly, the information problems involved in selling patents in these two contexts were fundamentally different. So were the kinds of intermediaries that emerged to facilitate exchange.

Information Problems in Geographically Segmented Markets

In 1855 Stephen C. Mendenhall of Wayne County, Indiana, sold W. K. Abbott, Isaac Bowers, and Levi Whistler, for \$500, the “exclusive right and liberty of making, constructing, using and vending to others to be used” his invention of an improved hand loom for Shenandoah

County, Virginia, “and no other place or places.”¹¹ That same year John T. Clark paid \$325 for the rights to an improved seed planter for Fayette County, Iowa, and Nathaniel Waterbury spent \$5,250 for a “Portable Saw Mill” for four Wisconsin counties and part of a fifth.¹² The amounts of money to be made by subdividing patent rights in this way could be substantial. But to earn these profits, inventors had to find buyers for their patents in distant locations. How did they manage to do it?

In some cases, the economic worth of the inventions was so obvious that it was easy to find buyers. A good example was William Woodworth, inventor of a machine that could plane boards to a uniform thickness, smooth their faces, and cut tongues and grooves in the edges. With the help of a group of financial backers, Woodworth patented his machine in 1828 and then merged his interests with those of the inventor of a competing machine. Woodworth’s machine was so valuable, and the level of protection provided by the two patents so strong, that within two years the group had secured assignees throughout New England and the Middle Atlantic states and had begun to expand westward and southward.¹³ Another example was Thomas Blanchard who invented a lathe that solved the problem of turning out irregularly shaped objects like gunstocks and shoe lasts. Blanchard operated his own gunstock factory in Massachusetts and sold local rights to the lathe to an extensive network of assignees as far west as the Kansas territory and as far south as Arkansas.¹⁴ Obed Hussey and Cyrus McCormick similarly manufactured reapers in their own factories and sold patent rights to producers in different parts of the farm belt.¹⁵

Other inventors had more difficulty attracting assignees. Rufus Porter was a prolific early-nineteenth-century inventor whose creations included an alarm clock, a washing machine, a clothes dryer, a rotary plow, a machine for printing in color, a steam-powered carriage, a movable house, and a flying ship (basically a dirigible). Porter advertised his inventions in journals and newspapers and sent out circulars touting their merits, but his efforts generated few takers.¹⁶ Some of Porter’s problems may have been of his own making—he seems to have had a

¹¹ Liber vol. W-3, Records of the Patent and Trademark Office, Record Group 241, National Archives, 295.

¹² Liber vol. W-3, 9, 335–36.

¹³ Carolyn C. Cooper, “William Woodworth’s Planer: The Patent and Its Politics, 1828–1856,” *Dutchess County Historical Society Yearbook* 91 (2012): 101–16.

¹⁴ Carolyn C. Cooper, “Social Construction of Invention through Patent Management: Thomas Blanchard’s Woodworking Machinery,” *Technology and Culture* 32 (Oct. 1991): 960–98.

¹⁵ Gordon M. Winder, “Before the Corporation and Mass Production: The Licensing Regime in the Manufacture of North American Harvesting Machinery, 1830–1910,” *Annals of the Association of American Geographers* 85 (Sept. 1995): 520–52.

¹⁶ See Jean Lipman, *Rufus Porter: Yankee Pioneer* (New York, 1968), 27–48.

reputation as a creative but improvident dreamer—but his experience was typical. Most inventors found it difficult to distinguish their creations from those of the many other visionaries clamoring for the public's attention.¹⁷

When advertising did not work, patent owners could hire agents in different parts of the country to market their inventions. After William Easby of Washington, DC, invented a method of coagulating fine coal into lumps, he designated A. N. Hart of Philadelphia his agent to sell the patent in Pennsylvania and Ohio. Similarly, James M. Struell, Daniel Brown, and John H. Zeh, owners of a patent awarded to Bradford Rowe for a machine that split and stretched leather, appointed Curtis L. Van Buren of Niagara County, New York, their agent for Ohio, Michigan, Illinois, and Indiana.¹⁸ Some agents sold patent rights in conjunction with other business activities, but others specialized in such sales, driving wagons laden with patent models from town to town seeking buyers for the rights.¹⁹

Such long-distance arrangements were fraught with information problems. Owners of patents had little ability to monitor far-away agents to insure they were genuinely laboring on the patentees' behalf, remitting all the funds they took in, and representing the inventions accurately to potential purchasers. The first two of these difficulties seem to have been resolvable at least to some degree contractually, by paying agents a share of the proceeds rather than a fixed fee and by "providing, in the power of attorney, that all cash received shall be deposited to the joint order of the agent and the inventor, and that all notes taken shall be to their joint order."²⁰ The third problem was much more serious, and there were many allegations of fraudulent misrepresentation.

The most common charge was that agents exaggerated the value of the inventions they were peddling. Several prominent farmers in Mohawk, New York, claimed to have succumbed to a fast-talking agent's slick pitch and purchased stock in a hay-loader patent that they later realized offered "no saving of labor between the machine and pitching by hand."²¹ An Indiana man tried to void a contract to buy a lamp patent on the grounds that the seller misrepresented the lamp's

¹⁷ Advice manuals showered inventors with suggestions about how to market their patents. See, for example, William Edgar Simonds, *Practical Suggestions on the Sale of Patents* (Hartford, CT, 1871).

¹⁸ Liber vol. G-2, 319-20, 420-21.

¹⁹ For a picture of one such wagon from a somewhat later period, see Cooper, "Social Construction of Invention," 963.

²⁰ Simonds, *Practical Suggestions*, 28-29.

²¹ See "Patent Rights, and the Way Farmers are Humbugged," *Transactions of the New York State Agricultural Society* 28 (1868): 501-3.

capabilities, asserting that it would burn much longer than it actually did and understating its manufacturing cost by more than 50 percent.²² Similarly, an Illinois man contended that he had been misled into buying the local patent rights to a machine that the seller had falsely claimed was capable of making shingles “without checking or splitting them.”²³

Itinerant agents sometimes bilked unsuspecting buyers by selling patents they had no right to market or that did not even exist. In 1867 a resident of Charlton, New York, paid \$700 for the rights to “Spoor’s Patent Gate” for ten counties to someone who claimed (falsely, as it turned out) to be the agent of the patentee.²⁴ A man in Arkansas paid \$800 for local patent rights to a medicine known as “Newsom’s Vegetable Tonic,” though no patent had ever been granted for this concoction.²⁵ A Massachusetts businessman agreed to buy a patent for an elastic horseshoe, but the patent the seller delivered was for another device altogether.²⁶

Legitimate sellers of patents worried that the “grossly false representations” of fraudulent agents might bring the whole business of the “traveling salesman of patents into disrepute,” but the problem was difficult to solve.²⁷ Several states enacted legislation to prevent agents from selling patents that were invalid or for which they had no power of attorney. In 1869, for example, Indiana passed a statute that required an agent to file a copy of the patent “duly authenticated” with the county clerk along with an affidavit that “the letters patent are genuine, and have not been revoked or annulled; and that he has full authority to sell or barter the right so patented.”²⁸ This law, however, was soon overturned by a federal circuit court, which ruled that the Constitution granted Congress the power to create and regulate the patent system and that the states had no authority to interfere.²⁹ Although the case was never appealed to the Supreme Court, some states

²² *Hardesty v. Smith*, 3 Ind. 41 (1851).

²³ *Adams v. Johnson*, 15 Ill. 345 (1854). Of course, buyers could use claims of fraud as an excuse to renege, but this would itself be possible only in an environment fraught with information asymmetries.

²⁴ “In the Matter of Hon. Platt Potter and Winsor B. French, Esq.,” Appendix: Breach of Privilege Cases, *Reports of Cases in the Supreme Court of the State of New York*, vol. 55 (Albany, NY, 1870), 665–66.

²⁵ *Brown v. Wright*, 17 Ark. 9 (1856).

²⁶ *Foss v. Richardson*, 81 Mass. 303 (1860).

²⁷ Simonds, *Practical Suggestions*, 28. The classic study of this problem is George A. Kerlof, “The Market for ‘Lemons’: Quality Uncertainty and the Market Mechanism,” *Quarterly Journal of Economics* 84 (Aug. 1970): 488–500.

²⁸ *Supplement to the Statutes of Indiana in Force 1870*, vol. 3, 364–65. For a list of states passing such laws, see F. A. Cresee, *Practical Pointers for Patentees: Containing Valuable Information and Advice on the Sale of Patents* (New York, 1902), 88–91.

²⁹ *Ex parte Robinson*, 20 F. Cas. 961 (1870).

repealed their own statutes in light of the decision. In other states, the laws remained in effect, though they do not seem to have been seriously enforced.³⁰

Purchasers of patent rights who thought they had been defrauded could sue the seller, assuming he did not abscond, but the courts generally followed a rule of caveat emptor. As one judge wrote, “The simple fact that the improvement . . . was of no utility, is not sufficient” to find in favor of the buyer.³¹ In another case, a judge acknowledged the worthlessness of the patent (“no doubt the plaintiff parted with his property most foolishly”) but refused to undo the sale on the grounds that there is no fraud “when a buyer of an article . . . has a full opportunity to examine it, and when the means of information relative to facts and circumstances affecting the value of the commodity are equally accessible to both parties.”³² Many courts were unwilling to rescind contracts made on the basis of false statements, even when the misrepresentations involved claims about “the durability and probable sale of the patented articles,” if the seller’s claims could reasonably have been checked by the buyer, if they could be considered matters of opinion, or if there was no evidence that the vendor knew they were false.³³ Plaintiffs were likely to be victorious only if they were able to show that they had been completely dependent on information provided by the seller that was deliberately deceptive.³⁴

The best way to solve the problem of fraudulent agents—and, at the same time, improve inventors’ chances of reaching potential assignees—was to improve the quality of the information about patents that was publicly available. With this end in mind, state and local agricultural societies began to conduct trials to assess the merits of new farming technologies. Similarly, mechanics’ associations organized exhibitions at which owners of worthy patents could win prizes and thus distinguish

³⁰ Cresee, *Practical Pointers*, 88–91. The Supreme Court later ruled that a state could impose licensing requirements on sellers of patented articles so long as it did not discriminate in favor of residents. By that time, however, geographic patent assignments were no longer of much importance. See *Webber v. Virginia*, 103 US 344 (1881).

³¹ *Hardesty v. Smith*, 3 Ind. 41 (1851) at 43.

³² *Rockafellow v. Baker*, 31 Pa. 319 (1862) at 320, 321.

³³ *Miller v. Young’s Administrator*, 33 Ill. 355 (1864). See also *Gatling v. Newell*, 12 Ind. 99 (1859); *Bond and Green v. Clark*, 35 Vt. 577 (1863). For a summary of the case law, see William C. Robinson, *The Law of Patents for Useful Inventions*, vol. 3 (Boston, 1890), 659–70.

³⁴ *Gatling v. Newell*, 12 Ind. 99 (1859). For other grounds on which assignments claimed to be fraudulent were upheld, see *Adams v. Johnson*, 15 Ill. 345 (1854); *Myers v. Turner*, 17 Ill. 179 (1855); *Jolliffe & Holland v. Collins*, 21 Mo. 338 (1855); and *Galpin v. Atwater*, 29 Conn. 93 (1860). For examples where courts did not side with sellers see *McClure v. Jeffrey*, 8 Ind. 73 (1856); *Bierce v. Stocking*, 77 Mass. 174 (1858); *Pierce v. Wilson*, 34 Ala. 596 (1859); *Lester v. Palmer*, 86 Mass. 145 (1862); *Clough v. Patrick*, 37 Vt. 421 (1865), and *David v. Park*, 103 Mass. 501 (1870).

themselves in the eyes of potential purchasers.³⁵ The problem, however, was that the many local competitions generated little in the way of consensus about which inventions were most meritorious. If an invention won prizes in some contests but not others, how could its worth be accurately determined?³⁶

Periodicals offered an alternative solution to the problem of assessing a patent's value. When the Franklin Institute initiated its journal in the late 1820s, it took upon itself the task of commenting on the merits of recently patented inventions. This particular venture probably hurt inventors more than it helped, however. In the years before Congress instituted the examination system, the journal's editor considered the overwhelming majority of inventions worthless and subjected them to biting criticism.³⁷ Once the examination system was in place, moreover, the journal gradually ceased its evaluations and simply listed all inventions receiving patents along with brief summaries of the inventors' claims.

After the passage of the 1836 Patent Act, there were several other attempts to create journals to publicize information about patents, but none succeeded until Orson D. Munn bought *Scientific American* in 1846. Munn ran a patent agency, Munn & Company, whose main business was to assist inventors in filing applications for patents, and he saw *Scientific American* as a way of attracting clients from around the country who would submit applications by mail.³⁸ *Scientific American* featured articles about important inventions, but most patents received only brief descriptions like the ones in the *Journal of the Franklin Institute*. In sharp contrast to the practice of the older publication, however, the editors sometimes added *favorable* commentary that called specific inventions to the reader's attention. For example, they appended to a brief description of a machine for cutting ornamental molding the statement that the machine, "we are told, will last longer, do

³⁵ See, for example, the evaluations of new technologies that the New York Agricultural Society published in its annual *Transactions*; *The Seventh Exhibition of the Massachusetts Charitable Mechanic Association at Faneuil and Quincy Halls, in the City of Boston, September, 1853* (Boston, 1853), vi; and "Report of the Twentieth Exhibition of American Manufacturers," published as an appendix to the *Journal of the Franklin Institute* 20 (1850). More generally, see B. Zorina Khan, "Promoting the Useful Arts: Technological Innovation outside the Patent System, 1790–1880," unpublished paper (Aug. 2009); and Bruce Sinclair, *Philadelphia's Philosopher Mechanics: A History of the Franklin Institute, 1824–1865* (Baltimore, 1974).

³⁶ On this point, see especially Khan, "Promoting the Useful Arts." Khan's evidence shows, moreover, that prizes were not awarded exclusively or perhaps even primarily on grounds of technical merit.

³⁷ "American Patents," *Journal of the Franklin Institute* 20 (Dec. 1835): 385–407.

³⁸ Michael Borut, "The *Scientific American* in Nineteenth Century America," unpublished PhD dissertation, New York University (1977), 42–62.

more work and of a better quality, than any machine of the kind now known,” concluding that “we regard it as an excellent improvement.”³⁹ Similarly, they followed their account of a pressure stopper for chain cables with an explanation of why the invention was useful, concluding with the assessment that “this is a very cheap, simple, and effective invention.”⁴⁰

Why some inventions received plaudits and not others is unclear. The decision might have been based strictly on the merits, but Munn & Company’s own advertisements hinted that inventors were more likely to secure this special treatment if the agency handled their patents: “All inventions patented through our establishment, are noticed, *at the proper time*, in the SCIENTIFIC AMERICAN. This paper is read by not less than 100,000 persons every week, and enjoys a very widespread and substantial influence.”⁴¹ Munn & Company thus had to walk a fine line in order to maintain the integrity of its publication and simultaneously to attract inventors’ business through the promise of favorable publicity. For the most part, however, it seems to have managed to strike the right balance.⁴² By the late 1850s *Scientific American* had become the preeminent journal in the field. At the same time, inventors clamored to have their patents handled by the agency. Although there is no way to calculate Munn’s share of patent applications during this period, we know it was large because the firm filed approximately 15 percent of all the patent assignments in the United States in the years immediately following the Civil War.⁴³

Munn & Company was not primarily an intermediary; its main business was processing patent applications, not selling patent rights.⁴⁴ However, in the course of promoting its own agency, it facilitated the work of intermediaries by disseminating information about meritorious

³⁹ *Scientific American* 11 (6 Oct. 1855): 26.

⁴⁰ *Ibid.*

⁴¹ *Ibid.*, 31. Munn greatly exaggerated the journal’s circulation. Based on Munn’s own diary, Borut concluded that circulation peaked at around 25,000 during the 1850s. See Borut, “*Scientific American*,” 65–71.

⁴² A series of articles that *Scientific American* published during the late 1840s and early 1850s exposing popular inventions as fraudulent or based on bad science may have helped build the journal’s reputation. See Borut, “*Scientific American*,” esp. 101–2. However, David A. Hounshell found that, as late as the 1880s, even the magazine’s feature articles were for sale. See Hounshell, “Public Relations or Public Understanding? The American Industries Series in *Scientific American*,” *Technology and Culture* 21 (Oct. 1980): 589–93.

⁴³ This figure is based on an examination (for patentees whose surnames began with the letter “B”) of the correspondents recorded as handling patent assignments in the Patent Office Digests.

⁴⁴ Borut concluded from examining advertisements in *Scientific American* that Munn & Company did not use the journal to promote the sale of patents. See Borut, “*Scientific American*,” 125–26.

patents to a broad audience (and often by including in its notices details about whom to contact to purchase the rights).⁴⁵

Information Problems in National Markets

Scientific American survived and prospered, but Munn & Company's dominance was short lived. The growth of the nation's transportation and communications network in the years following the Civil War dramatically changed the market for technology in ways that undercut the company's business model. Manufacturers could now sell their products in national markets, and they wanted their patent rights to have an equivalent geographic scope. Moreover, because securing national rights to valuable patents could be an important source of competitive advantage, firms sought to acquire patents before information on them had become publicly available—even before the patent had been issued. If firms waited to buy an invention until it had been evaluated at a fair or in a publication like *Scientific American*, they would not have any information advantage over competing buyers. Not surprisingly, therefore, as the market shifted towards the sale of national patent rights, Munn & Company's share of assignment contracts plummeted—to nearly 5 percent by the early 1870s and to negligible levels by the 1890s.⁴⁶

The emergence of this new national market for technology stimulated the entrance of a host of would-be intermediaries who clamored to sell patents on behalf of inventors. As before, many of these intermediaries seem to have been unscrupulous. Advice manuals warned inventors not to be taken in by the agencies' "attractive and temptingly prepared" sales pitches. "[V]ery few of these concerns [had] any facilities whatever for selling patents"; they were little more than schemes for extracting money from patentees in the guise of fees for advertising circulars and other marketing expenses.⁴⁷

⁴⁵ As one might expect, Munn & Company's success fostered imitation. In 1864 two of the agency's employees quit to found a competing journal, the *American Artisan*, in combination with a patent agency, Brown, Coombs & Company. A few years later another agency called the US Patent Right Association began publishing the *Patent Right Gazette*, and in the 1870s the American Patent Agency began publishing the *American Inventor*. Unlike *Scientific American*, however, none of these other publications lasted very long. Judging from the entries in WorldCat, the *American Artisan* survived from 1864 to 1875; the *Patent Right Gazette* from 1871 to 1877; and the *American Inventor* from 1878 to 1887.

⁴⁶ Again, this figure is based on an examination (for patentees whose surnames began with the letter "B") of the correspondents recorded as handling patent assignments in the manuscript Digests.

⁴⁷ Cresee, *Practical Pointers*, 41–42; W. B. Hutchinson and J. A. E. Criswell, *Patents and How to Make Money Out of Them* (New York, 1899), 162. See also Simonds, *Practical Suggestions*, 7–9; and An Experienced and Successful Inventor, *Inventor's Manual: How to Work a Patent to Make It Pay*, rev. ed. (New York, 1901), 61. It is difficult to assess the validity of these charges, but it does appear that few patents were actually sold by such agencies. We

Advice manuals recommended that inventors shun such intermediaries and sell their patents themselves. But marketing patents could be enormously time consuming and expensive, as the procedures set forth in the manuals attest: The first step was to have the invention “illustrated and described in one or more of the scientific and mechanical publications of the day,” or, if the inventor could not afford it, summarized in the “regular advertising columns” of publications that would “meet the eye of the class or classes of persons to whom the invention [would be] of special interest.”⁴⁸ Patentees should also prepare circulars describing their inventions and their potential uses, procure a list of businesses most likely to be interested in the inventions, and mail the circulars to these firms. More importantly, they should follow up the circulars with personal solicitations.⁴⁹

Inventors who took the warnings about intermediaries seriously, but who did not want to market their patents themselves, sometimes turned for help to local merchants or manufacturers they knew and trusted, even though these people had little or no experience with the relevant technology. When James Edward Smith, a machinist and professional inventor, designed a cigar machine, he approached George E. Molleson, the owner of a local granite quarry who had previously advanced him money for an invention, for help in getting “a practical moneyed man who understood the manufacture of cigars to take an interest” in his machine.⁵⁰ Other inventors chose similar agents, as can be seen from AT&T’s records. The intermediaries who submitted telephone patents for the company to purchase ranged from textile manufacturers to engineering consultants.⁵¹

The problem with using such local businessmen as agents was that they were unlikely to be known to potential purchasers, who as a result had no particular reason to believe their assertions about the merits of the inventions. However, there was another type of local businessman—the patent attorney—who was well situated to earn the trust of both sellers and buyers of inventions. The ranks of these professionals had begun to grow after the establishment of the patent examination system in 1836, when initially high rejection rates for patents encouraged

have collected samples of assignment contracts from the Patent Office Digests and have not found any assignments handled by agencies that appear in these advertisements.

⁴⁸ Simonds, *Practical Suggestions*, 24–25.

⁴⁹ *Ibid.*, 19–28; Hutchinson and Criswell, *Patents; An Experienced and Successful Inventor, Inventor’s Manual*; Cresee, *Practical Pointers*, 46–52.

⁵⁰ “Testimony Taken on Behalf of James Edward Smith,” *Hammerstein v. Smith* (1890), 68, Case 13618, Paper No. 48, Box 1868, Interference Case Files, 1836–1905, Records of the Patent and Trademark Office, Record Group 241, National Archives.

⁵¹ T. D. Lockwood, Reports of Inventions (Not Approved), 1904–8, Box 1383, courtesy of AT&T Archives and History Center, Warren, NJ.

Table 2
Registered Patent Attorneys by Region

Region ^a	Number of Registered Patent Attorneys per Million People			Regional Distribution of Registered Patent Attorneys (column percent)		
	1883	1889	1910	1883	1889	1910
New England	22.4	89.3	99.2	16.7	10.9	9.5
Middle Atlantic	18.6	112.4	116.5	36.2	37.0	32.9
East North Central	8.8	72.8	76.7	18.4	25.5	20.4
West North Central	2.1	51.2	61.0	2.4	11.8	10.4
West	4.0	29.7	79.1	1.3	2.3	7.9
District of Columbia	715.0	1,072.1	2,386.2	23.6	6.4	11.5
Delaware and Maryland	4.6	39.6	40.1	0.9	1.2	0.9
Other South	0.2	10.1	16.3	0.6	4.8	6.6
United States	10.7	61.5	74.5	100.0	100.0	100.0

Sources: US Patent Office, *Roster of Registered Attorneys Entitled to Practice Before the United States Patent Office* (Washington, DC: Government Printing Office, 1883, 1889, and 1907); and US Patent Office, *Attorneys Admitted to Practice Before the United States Patent Office from January 2, 1907, to March 15, 1910* (Washington, DC: Government Printing Office, 1910). State population figures are from the US Census Office, *Census of Population, Reported by States* (Washington, DC: Government Printing Office) for 1880, 1890, and 1910.

^aNew England includes Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont; Middle Atlantic includes New Jersey, New York, and Pennsylvania; East North Central includes Illinois, Indiana, Michigan, Ohio, and Wisconsin; West North Central includes Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota; West includes Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming; and Other South includes Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia.

inventors to seek expert assistance. The earliest practitioners tended to be former patent examiners or other Patent Office employees who understood there was money to be made by helping inventors secure favorable judgments.⁵² Very quickly, however, the profession expanded outward from Washington, and new entrants with backgrounds in science and engineering, as well as some training in law, swelled its ranks.⁵³

⁵² Robert C. Post, "‘Liberalizers’ versus ‘Scientific Men’ in the Antebellum Patent Office," *Technology and Culture* 17 (Jan. 1976): 24–54.

⁵³ Standards for entry into the legal profession were quite lax during this period, and some patent attorneys had little formal training in the law. To conduct business with the Patent Office all patent attorneys had to do was register. From time to time, the Patent Office "disbarred" attorneys, probably because of malfeasance. On professional legal standards in the nineteenth century, see Maxwell Bloomfield, *American Lawyers in a Changing Society, 1776–1876* (Cambridge, MA, 1976); and Maxwell Bloomfield, "Law: The Development of a Profession," in *The Professions in American History*, ed. Nathan O. Hatch (Notre Dame, IN, 1988), 33–49.

By the early 1880s the Patent Office's list of approved attorneys included about 540 names. Slightly more than half of these agents resided in New England and the Middle Atlantic states, almost a quarter in the District of Columbia, another fifth in the Midwest, with the rest scattered through a few southern and western locations. Over the next several decades the numbers of these practitioners would multiply more than a dozen times, though patent attorneys continued to be most densely concentrated in the older industrial regions of the country (see Table 2).⁵⁴

We can study the increasing importance of these patent attorneys in the market for technology by analyzing the summary information about assignments recorded in the Patent Office digests. These synopses include the name and address of the person to whom all correspondence concerning the assignment was to be sent, as well as similar information about the assignors and assignees that were party to the transaction. As Table 3 shows, the proportion of assignments handled directly by either the assignor or the assignee fell quite dramatically over time. For primary assignments (that is, transactions where the assignor was the patentee), the proportion dropped from 34.9 percent in 1871 to 24.6 percent in 1891 to 11.0 percent in 1911. Over those same years, the share of primary assignments in which the correspondent was a patent attorney increased sharply from 34.4 to 60.4 to 79.0 percent, whereas the proportion handled by other third parties fell from 28.7 to 13.1 to 9.7 percent.⁵⁵ The pattern was similar for assignments that were national in scope. In sum, patent attorneys tended to handle precisely the kinds of assignments that were growing in importance as a consequence of the development of national product markets in the late nineteenth century.

Relationships between Patent Attorneys and Buyers of Patents

We hypothesize that patent attorneys had advantages over other potential intermediaries in the market for technology because they obtained a great deal of information about both buyers and sellers of patents in the course of their regular business. At the same time, both buyers and sellers learned a great deal about them. Buyers got to know them when they sought assessments of inventions they intended to purchase or when they used them to conduct research at the Patent Office.

⁵⁴ The table probably overstates the rate of growth of patent attorneys during the 1880s. The Patent Office had just begun to compile its list of registered agents, and it is likely that much of this growth represents an increase in the proportion of agents who were registered rather than in the number of agents themselves.

⁵⁵ Because our first list of registered agents is for 1883, the table probably understates the importance of patent agents and attorneys relative to other third parties in 1871.

Table 3
 Categories of Assignment Contracts by
 Type of Correspondent

<i>Type of Correspondent</i>	<i>Total Contracts (column percent)</i>	<i>Assignment Category (column percent)</i>			
		<i>Primary</i>	<i>Secondary</i>	<i>National</i>	<i>Geographic</i>
1871	(<i>n</i> = 284)	(<i>n</i> = 195)	(<i>n</i> = 70)	(<i>n</i> = 184)	(<i>n</i> = 78)
Assignor	3.9	4.6	2.9	4.3	3.8
Assignee	31.7	30.3	38.6	23.9	57.7
Registered patent attorney	28.5	34.4	8.6	40.2	6.4
Other third party	28.9	28.7	31.4	31.0	32.1
Unknown	7.0	2.1	18.6	0.5	0.0
1891	(<i>n</i> = 412)	(<i>n</i> = 321)	(<i>n</i> = 69)	(<i>n</i> = 325)	(<i>n</i> = 55)
Assignor	3.4	2.8	5.8	4.3	0.0
Assignee	21.6	21.8	21.7	18.8	50.9
Registered patent attorney	53.9	60.4	30.4	63.4	23.6
Other third party	14.1	13.1	17.4	13.2	25.5
Unknown	7.0	1.9	24.6	0.3	0.0
1911	(<i>n</i> = 605)	(<i>n</i> = 453)	(<i>n</i> = 47)	(<i>n</i> = 493)	(<i>n</i> = 33)
Assignor	2.3	2.4	4.3	2.4	6.1
Assignee	8.3	8.6	17.0	7.9	33.3
Registered patent attorney	66.8	79.0	55.3	79.7	24.2
Other third party	9.9	9.7	23.4	9.7	36.4
Unknown	12.7	0.2	0.0	0.2	0.0

Notes and sources: The sample consists of all assignment contracts recorded in the assignment digests of the US Patent Office (stored at the National Archives in Record Group 241, Records of the Patent and Trademark Office) during the first three months of 1871, 1891, and 1911 for inventors whose surnames began with the letter "B." The table includes only patents granted to US residents. We classified each assignment contract (and the patents it included) by the identity of the correspondent. We first distinguished those contracts for which the correspondent was a party to the contract—that is, either the patentee (or other assignor) or the assignee. Then, working with lists of patent attorneys authorized to conduct business with the Patent Office for 1883, 1889 and 1907–10 (see Table 2), we categorized the correspondents we found on these lists as a separate class of intermediaries. A third category consisted of correspondents who were not parties to the contract but who did not appear on any of the lists of registered attorneys. Finally, we included in an "unknown" category cases where no correspondent was reported in the digest. Contracts that could not be classified because they were missing information about the type of assignment are excluded from the breakdowns. The 1871 data understates the role of registered patent attorneys because we were not able to find a list of agents before 1883. For definitions of the types of assignments, see Table 1.

Thus, Frank P. Parker and Frederick J. Bosse brought patent attorney Edward Van Winkle a “non-refillable bottle” and several other devices invented by John L. Adams and requested that he test them and assess their patentability. When Van Winkle, who had a background in engineering, responded with a positive report, the men engaged him to process Adams’s patent applications and also papers assigning the patents to themselves.⁵⁶ Similarly, executives of the Waltham Watch Company asked Arthur H. Brown, a patent attorney in the firm of Wright, Brown, Quinby & May, to provide them with a detailed technical assessment of an instrument they were considering manufacturing under exclusive license.⁵⁷ Later the executives again turned to the firm to request copies of all patents “now in force covering self winding watch and clock devices, especially those operated by electricity” in order to find out whether a particular improvement they had developed for their chiming hall clocks infringed on patents owned by a rival manufacturer.⁵⁸

By performing these kinds of tasks, patent attorneys earned manufacturers’ respect and trust. They also gained knowledge about the manufacturers’ businesses and the kinds of patents the firms might be interested in purchasing—information that put them in a better position to sell patents. For example, after reporting the results of a search of agricultural machinery patents undertaken on behalf of Rollin H. White of the White Motor Company, the Cleveland patent agency of Thurston and Kwis added, “It occurred to us that perchance you might desire to control the Landrin patent #1,055,765. . . . Perhaps the construction disclosed in this patent would never be used by you, but . . . it might serve your purpose to control it so as to prevent others from making it.”⁵⁹ Similarly, Van Winkle took advantage of his ongoing work with Parker to tell him “how to make some money with the Murphy block [signal],” another patent he was promoting at the time.⁶⁰

Van Winkle’s business diaries reveal that businessmen who invested in patents stayed in frequent contact in order to gain advance

⁵⁶ See the entries in Van Winkle’s business diary for 12 Jan.; 2 Feb.; 22, 23 and 29 Mar.; 6, 20, and 28 Apr.; and 16 Aug. 1905, Edward Van Winkle Papers, Ac. 669, Rutgers University Libraries Special Collections, Rutgers, NJ. On December 29, 1905, the same two men brought Van Winkle a soap shaving machine invented by a Mr. Luis to examine and evaluate.

⁵⁷ See the letter of 22 July 1912 from Conover Fitch, vice president of the Waltham Watch Company to Wright, Brown, Quinby & May, and Arthur H. Brown’s report of 27 July 1912, Wright, Brown, Quinby & May Correspondence Files, Mss. 598, Case 2, Waltham Watch Company records, Baker Library Historical Collections, Harvard Business School, Boston, MA.

⁵⁸ Letters of 25 Jan. 1915 and 18 Sept. 1917 from the Waltham Watch Company, Wright, Brown, Quinby & May Correspondence Files.

⁵⁹ Letter of 31 Aug. 1914 from Thurston and Kwis to Rollin H. White, Container 1, Folder 4, Rollin H. White and Walter C. White Papers, Ms. 4734, Western Reserve Historical Society, Cleveland, OH.

⁶⁰ See 10 May 1905, Van Winkle Diary.

information about new technologies. One of the most striking characteristics of these men was the wide range of technologies in which they were interested. For example, a businessman named Richardson invested in patents for hat-frame formers, rails for high-speed railroads, electric railroad systems, and pliers.⁶¹ Another businessman, Arthur DeYoung, explored technologies as diverse as coin counters, arc lamps, and dry mounting processes for photographs.⁶² The most intriguing case was a man identified in the records only as Mr. Oliver, whose investments spanned the technological gamut from envelopes to drills to arc lamps to sewing machines to railroad signaling systems.⁶³

The variety of patents these men investigated suggests they were not primarily manufacturers seeking to improve the efficiency of their production processes or expand their product lines. At the same time, they also do not seem to have been what people today call “trolls” (“sharks,” in nineteenth-century parlance). There are no references in Van Winkle’s diary to seeking out infringers, let alone seeking them out to extort licensing fees. On the contrary, the men who appear in these pages seem to have functioned more than anything like modern-day angel investors or venture capitalists. Richardson, an inventor himself, provided funds to help other inventors patent their devices in exchange for a share of their intellectual property.⁶⁴ Sometimes he helped the inventor resolve technological details, getting his name on the patent as a co-inventor.⁶⁵ De Young seems to have been primarily interested in promoting companies that commercialized inventions he thought particularly promising.⁶⁶ Oliver operated in a variety of ways. In one transaction he agreed to provide Van Winkle with capital to develop an invention, presumably in exchange for a share in the patent.⁶⁷ He also bought patents outright, for example offering an inventor named Peters a note for \$100,000 in exchange for a patent for a wireless receiver he planned to market to the US government.⁶⁸ In addition, Oliver worked with Van Winkle in at least two efforts to organize companies, the Simplex Machine Company and

⁶¹ See, for examples, 30 Jan.; 16 and 17 Mar.; 1 Apr.; 1 and 7 May 1905, Van Winkle Diary.

⁶² See, for examples, 6 and 28 Jan.; and 13 June 1905, Van Winkle Diary.

⁶³ See, for examples, 4, 16, and 23 Feb.; 7 Apr.; 11 and 20 May; and 6 Sept. 1905, Van Winkle Diary.

⁶⁴ See, for examples, 3 Feb., 21 Mar., and 17 July 1905, Van Winkle Diary.

⁶⁵ See 30 Jan., 7 May, and 18 July 1905, Van Winkle Diary.

⁶⁶ See 6 and 28 Jan.; and 21 Oct. 1905, Van Winkle Diary.

⁶⁷ See 24 Aug. 1905, Van Winkle Diary.

⁶⁸ See the diary entry for 20 May 1905. Oliver and Peters subsequently had some disagreement about the terms of the arrangement, and it is not clear whether the deal actually went through. See also 21 and 24 Jan.; 25 and 28 Feb.; 2 Mar.; 13, 22, and 27 May 1905, Van Winkle Diary.

the Automatic Security Signal Company, both based on inventions patented by an inventor named William M. Murphy.⁶⁹

All this is not to say there were no problems with sharks, or trolls, in the late nineteenth century. The best-known examples of such predators targeted railroads and farmers. In the case of railroads, a shark named Thomas Sayles bought rights to three overlapping patents for “double-acting” brakes that had been issued initially to three different sets of inventors. Whenever a railroad licensed one of the patents, Sayles would sue it for infringing on the other two. In response to these and other less notorious claims, the railroads banded together in trade associations to take joint legal action. Battling Sayles all the way to the US Supreme Court, they won an important victory in 1878 in which the Court effectively limited the amount that sharks could extract by ruling that infringers were liable only for the incremental benefits they garnered from using a particular invention over possible substitutes.⁷⁰

In the cases involving agriculture, the outcome was mixed. During the 1870s and '80s, western farmers were deluged with threats of legal action if they refused to pay licensing fees for a range of devices they were using—from barbed wire to milk cans to plows to drivewells (basically, pumps attached to pipes driven into the earth with a sledge hammer.)⁷¹ These cases seem to have flourished because there was uncertainty about the value and legitimacy of many of the patents on such devices and because farmers in the more remote parts of the country were still prey to the kinds of unscrupulous itinerant agents described above.⁷² Like the railroads, farmers banded together in associations to fight the harassment in court. In the case of drivewells, farmers eventually managed to get the offending patent invalidated. In other cases, for

⁶⁹ See 27 Feb.; 7 and 8 Mar.; 24 and 26 June; 26 July; 6 and 8 Sept.; and 17 Nov. 1905, Van Winkle Diary. Disagreements developed in this case too between Oliver and the inventor. See, for example, 21 and 31 July; 8 and 17 Aug.; and 22 Nov. 1905, Van Winkle Diary.

⁷⁰ Steven W. Usselman, *Regulating Railroad Innovation: Business, Technology, and Politics in America, 1840–1920* (New York, 2002), 108–117, 169–76; and Steven W. Usselman, “Patents Purloined: Railroads, Inventors, and the Diffusion of Innovation in Nineteenth-Century America,” *Technology and Culture* 32 (Oct. 1991): 1047–75. For the Supreme Court decision, see *Railway Co. v. Sayles*, 97 US 554 (1878).

⁷¹ Earl W. Hayter, “The Patent System and Agrarian Discontent, 1875–1888,” *Mississippi Valley Historical Review* 34 (June 1947): 59–82; Earl W. Hayter, “The Western Farmers and the Drivewell Patent Controversy,” *Agricultural History* 16 (Jan. 1942): 16–28; Gerard N. Magliocca, “Blackberries and Barnyards: Patent Trolls and the Perils of Innovation,” *Notre Dame Law Review* 82 (June 2007): 1809–38.

⁷² Hayter, “Patent System.” Another source of the difficulty was a ruling by the Commissioner of Patents in 1870 that for a couple of decades allowed the Patent Office to grant design patents for “useful” changes of form. For a discussion of the confusion created by that decision, see Gerard N. Magliocca, “Ornamental Design and Incremental Innovation,” *Marquette Law Review* 86 (Summer 2003): 845–94; and Gerard N. Magliocca, “Blackberries and Barnyards.”

example barbed wire, they repeatedly lost in the courts. Nonetheless, the farmers' increasingly well-organized opposition took its toll on the sharks' business—first, by raising the litigation costs involved in enforcing patent rights, and second, by changing the political environment in ways that discouraged local officials from aiding patent owners. By the time the Populist movement swept through the region in the 1890s, the problem had significantly abated.⁷³

Aside from these prominent examples, the incidence of shark-like behavior seems to have been relatively rare in the late nineteenth century. A search of newspapers and periodicals in the ProQuest database turned up only a couple of additional examples and very little concern about the problem outside the railroad and farm sectors.⁷⁴ Moreover, we have not found any examples from this period of purchases of significant numbers of patents by what today would be called “non-practicing entities.” A large random sample of assignments at issue in 1891 turned up only 24 assignees that acquired more than ten patents, and all but one of them were companies like Singer Manufacturing, Westinghouse Air Brake, and the Thompson-Houston Electric Company that were active producers. By 1911 many more assignees were acquiring more than ten patents, but virtually all of them were well-known, large-scale manufacturing companies.⁷⁵

Relationships between Patent Attorneys and Inventors

The ability of attorneys like Van Winkle to sell patents depended in turn on their ability to form strong bonds with prolific inventors.

⁷³ Hayter, “Patent System”; Hayter, “Western Farmers”; and Earl W. Hayter, “An Iowa Farmers' Protective Association: A Barbed Wire Patent Protest Movement,” *Iowa Journal of History and Politics* 37 (Oct. 1939): 331–62.

⁷⁴ The additional examples were flour milling (“Imposition on Millers: The Brua Patent Used to Extort Unearned Royalties,” *New York Times*, 10 Jan. 1896, 14) and brewing (“Brewers' Patent Suits,” *Scientific American* 43 [16 Oct. 1880]: 246). Besides these cases and a few references to the problems in railroads and agriculture, we turned up only a couple of articles about patent sharks: “A Note of Warning,” *Stone* 17 (1 Nov. 1898): 436; and “The Patent Bill,” *New York Times*, 11 Jan. 1879, 4.

⁷⁵ The one individual on the list in 1891 was at the low end of the scale with 14 patents. Three of the 48 assignees with more than 10 patents in 1911 were individuals. They too were at the low end with 11, 14, and 17 patents respectively, compared to 318 for General Electric, 176 for United Shoe Machinery, and 98 for Westinghouse Electric and Manufacturing Company. The samples include about half the population of assignees. We collected them by recording the number of patents received by assignees that appeared on every other page of the lists of assignees in the *Annual Report of the Commissioner of Patents* for 1891 and 1911. Because we included all patents received by each assignee, we necessarily included patents from pages that were not part of the sample. Hence, our counts overstate the proportion of assignments obtained by assignees acquiring large numbers of patents.

Table 4
Loyalty of Inventors to Preferred Patent Attorneys

Number of Career Patents	Number of Inventors	Number of Attorneys the Inventor Tried before Finding the Preferred Attorney (row percent in category)			Percent of Patents Handled by the Preferred Attorney after the Inventor Found Him (row percent in category)			Average Percent of Inventor's Patents Handled by Preferred Attorney
		0	1-2	3+	<50	≥50 and <75	≥75	
1890-91								
1-2	55	92.7	7.3	0.0	0.0	10.9	89.1	89.1
3-9	65	58.5	40.0	1.5	12.3	32.3	55.4	64.2
10-19	27	44.4	37.0	18.5	22.2	25.9	51.9	55.2
20+	33	27.3	42.4	30.3	18.2	24.2	57.6	61.1
Total	180	61.1	30.0	8.9	11.1	23.3	65.6	69.9
1910-11								
1-2	111	94.6	5.4	0.0	0.0	8.1	91.9	91.9
3-9	65	58.5	36.9	4.6	15.4	18.5	66.2	65.4
10-19	25	28.0	56.0	16.0	8.0	44.0	48.0	56.6
20+	28	17.9	64.3	17.9	14.3	32.1	53.6	62.6
Total	229	67.7	27.1	5.2	7.0	17.9	75.1	76.9

Notes and sources: The table is based on random samples of patents we took from the *Annual Reports of the Commissioner of Patents* for the years 1890-91 and 1910-11. It includes all patentees from those samples whose last names began with the letter "B." We collected the patents these inventors obtained in the twenty-five years before and after their appearance in the samples and then retrieved the name of the patentees' attorneys from the drawings submitted with the patents. The preferred attorney is defined as the attorney who handled the largest fraction of the patentee's inventions. For some patents, especially the earliest ones in the 1890-91 sample, the drawings did not include the name of the attorney. The number of patents without attorneys' names is small (on average about one per inventor for those with at least 10 patents in the 1890-91 sample), but these patents potentially decrease our count of the number of attorneys tried before finding the preferred one. For more information on the samples, see Lamoreaux and Sokoloff, "Inventors, Firms, and the Market for Technology."

Table 4 examines the relationships between inventors and their attorneys for two samples from the late nineteenth and early twentieth centuries. Of course, inventors with long, productive careers often had extensive dealings with several different attorneys sequentially, but even if we treat each patentee as having had only one "preferred attorney" ever, the proportion of patents handled by this single professional is impressive. On average, just one attorney handled more than 60 percent of the patents received by members of the most productive group of inventors (those with 20 plus patents). Moreover, most of these productive

inventors (57.6 percent of the 1890–91 group and 53.6 percent in 1910–11) entrusted their preferred attorneys with more than three-quarters of the patents they obtained subsequent to meeting them.⁷⁶

The relationships that developed through these repeated dealings encouraged inventors to use their attorneys as sounding boards for new technological ideas. When Joseph Arbes, a New York City fur manufacturer and sewing-machine inventor, came up with an idea for a blind stitching machine that used a flat-sided needle, he immediately dispatched a sketch of the needle to his attorney, William E. Knight, for a judgment as to its patentability—even before he had tried it out on a sewing machine. Knight apparently thought the invention was not promising, so Arbes experimented with the needle for a few more months before trying it out on Knight again.⁷⁷ Edward Van Winkle similarly advised James Eichel, an inventor who showed him a prototype for a new type of pliers, that he should wait to apply for a patent “until he had progressed further.”⁷⁸

When patent attorneys filed applications on behalf of inventors or acted as inventors’ sounding boards, they acquired knowledge of promising technologies long before they came on the market. This early information was particularly advantageous when the attorneys functioned as intermediaries because firms wanted to beat out their competitors in securing rights to important new inventions. Evidence from the assignment digests suggests that patent attorneys improved the speed with which patents were assigned. Table 5 breaks down primary assignments by the interval that elapsed between the dates of issue and assignment of the patent, and by type of correspondent.⁷⁹ Patent attorneys handled the vast majority of assignments contracted before the patent was issued—81.1 percent in 1891 and 89.3 percent in 1911.⁸⁰

⁷⁶ Because the results for the two samples are so similar, we combine them in the analysis that follows. The main difference between the two is that productive patentees in 1910–11 found their preferred attorneys slightly more quickly on average than in 1890–91.

⁷⁷ See “Testimony on Behalf of Joseph Arbes,” 10, 22–23, 26, *Arbes v. Lewis* (1900), Case 20,049, Box 2,715, Interference Case Files, 1836–1905.

⁷⁸ 7 May 1905, Van Winkle Diary.

⁷⁹ We focus our discussion on the second two panels because we do not have any lists of registered patent agents before 1883. To the extent that the patent agents listed as correspondents were not functioning as intermediaries, it should be harder to find support in the data for our hypothesis that patent agents improved the functioning of the market.

⁸⁰ They also handled a disproportionate number of contracts for which we lack information on the patent’s date of issue. After searching for these patents in the Lexis-Nexis and Google patent databases, we concluded that most of them, especially in 1871 and 1911, were assignments recorded before issue for which the Patent Office had neglected to go back and add the patent number. In other cases, however, the assignment was for an invention that never made it through the patent approval process. These latter cases are useful reminders that assignees who contracted for patents before the date of issue could not be certain that the patent would ever be allowed, which made the soundness of the patent attorney’s judgments all the more important.

Table 5
 Assignment Contracts by Type of Correspondent
 and Timing of the Assignment

<i>Type of Correspondent</i>	<i>Primary Assignment (column percent)</i>				
	<i>Missing Date of Issue</i>	<i>Before Issue</i>	<i>Within 5 Years of Issue</i>	<i>6+ Years after Issue</i>	<i>All Contracts</i>
Panel A: 1871	(n = 83)	(n = 3)	(n = 100)	(n = 9)	(n = 195)
Assignor	2.4	33.3	5.0	11.1	4.6
Assignee	7.2	33.3	49.0	33.3	30.3
Registered patent attorney	60.2	0.0	16.0	11.1	34.4
Other third party	30.1	33.3	27.0	33.3	28.7
Unknown	0.0	0.0	3.0	11.1	2.1
Panel B: 1891	(n = 27)	(n = 122)	(n = 144)	(n = 28)	(n = 321)
Assignor	0.0	1.6	4.2	3.6	2.8
Assignee	18.5	10.7	28.5	39.3	21.8
Registered patent attorney	55.6	81.1	48.6	35.7	60.4
Other third party	14.8	6.6	17.4	17.9	13.1
Unknown	11.1	0.0	1.4	3.6	1.9
Panel C: 1911	(n = 104)	(n = 233)	(n = 91)	(n = 25)	(n = 453)
Assignor	0.0	2.1	4.4	8.0	2.4
Assignee	6.7	4.7	15.4	28.0	8.6
Registered patent attorney	86.5	89.3	54.9	40.0	79.0
Other third party	5.8	3.9	25.3	24.0	9.7
Unknown	1.0	0.0	0.0	0.0	0.2

Note: For a description of the sample and definitions of the various types of correspondents, see Table 3.

The greater speed with which patents handled by patent attorneys were assigned can also be seen from the regressions in columns 1 and 2 of Table 6. Here we restrict the analysis to primary assignments made in 1891 and 1911 for which we know the identity of the correspondent. The dependent variable is a dummy for whether the assignment occurred before issue. The independent variables of interest are the dummies for the type of correspondent (the omitted category is the assignor—that is, the patentee). The other independent variables include dummies for the region in which the inventor resided (the omitted category is the Middle Atlantic) and for the degree of urbanization of the inventor’s county (the omitted category is counties whose largest city contained less than 25,000 people). These variables control for the possibility that patent attorneys’ apparent advantage was simply an artifact of their over-representation in cities and regions where there were

Table 6
 Regressions on Whether Patents Were Assigned before Issue

	(1)	(2)	(3)	(4)
	<i>Location of Patentee and Assignee</i>			
	<i>Entire Sample (n = 634)</i>	<i>Same State (n = 428)</i>	<i>Different State (n = 175)</i>	
Year is 1911	0.197 (4.57)***	0.222 (5.02)***	0.198 (4.05)***	0.284 (3.30)***
Correspondent was assignee	-0.105 (0.81)	-0.108 (0.82)	-0.065 (0.47)	-0.084 (0.37)
Correspondent was registered patent attorney	0.277 (2.32)**	0.270 (2.22)**	0.305 (2.27)**	0.090 (0.41)
Correspondent was other third party or unknown	-0.192 (1.42)	-0.183 (1.34)	-0.210 (1.32)	-0.099 (0.43)
Patentee's county had city with population ≥25,000 but <100,000	0.152 (2.33)**	0.108 (1.60)	0.001 (0.02)	0.213 (1.45)
Patentee's county had city with population ≥100,000 but <250,000	0.128 (1.80)*	0.078 (1.05)	0.016 (0.19)	0.185 (1.34)
Patentee's county had city with population ≥250,000	0.083 (1.42)	0.031 (0.52)	0.010 (0.14)	-0.042 (0.35)
Patentee resided in the West	-0.002 (0.02)	0.000 (0.00)	0.001 (0.01)	0.051 (0.30)
Patentee resided in the West North Central	-0.159 (1.96)**	-0.139 (1.70)*	-0.056 (0.57)	-0.259 (1.97)**
Patentee resided in the East North Central	0.084 (1.53)	0.078 (1.42)	0.087 (1.52)	-0.080 (0.70)
Patentee resided in New England	0.098 (1.49)	0.092 (1.37)	0.059 (0.86)	0.061 (0.40)
Patentee resided in Delaware or Maryland	-0.194 (1.35)	-0.216 (1.49)	-0.040 (0.22)	-0.271 (1.49)
Patentee resided in the District of Columbia	0.226 (1.55)	0.222 (1.51)	0.226 (1.64)	0.105 (0.43)
Patentee resided in the Other South	-0.150 (1.55)	-0.119 (1.23)	0.060 (0.57)	-0.310 (2.28)**
Patentee obtained 2-3 patents in the two years before and after		0.070 (1.30)	-0.018 (0.29)	0.221 (2.08)**
Patentee obtained >3 patents in the two years before and after		0.187 (3.58)***	0.112 (1.97)**	0.218 (2.00)**

Notes and sources: See next page.

many inventors and manufacturers and so it was relatively easy to match buyers and sellers of inventions. We also include a dummy for contracts that were recorded in 1911. The Patent Office took less time on average to examine patent applications in 1891 than in 1911, so it is possible that more patents were assigned before issue in the latter year simply because of the longer processing period. Finally, it might be easier for inventors who obtained lots of patents to find purchasers because they were already well known to potential buyers, so we collected the number of patents the inventor received in the two years prior to the year of the contract and the two years following (the omitted category is patentees who obtained less than two patents in these four years).

Although the results in Table 6 cannot establish causality, they are consistent with our hypothesis that patent attorneys improved the speed with which patents were assigned. Assignments before issue were strongly and significantly associated with use of a registered patent attorney, even after controlling for the region of the patentee, whether the patentee resided in an urban location, and the year of the assignment. Although patentees who obtained more than three patents in the two years immediately before and after the date of observation were more likely to assign their patents at issue, the attorneys' advantage persisted. Indeed, the marginal effects suggest that the probability of assigning a patent before issue was almost 30 percent greater if a registered attorney handled the assignment than if one of the parties to the transaction did.

If patent attorneys were effective intermediaries—if they improved inventors' ability to profit from their intellectual property—one might expect a jump in the number of patents that an inventor obtained after establishing a relationship with a preferred attorney. Table 7 examines

Table notes and sources: Absolute value of z statistics in parentheses. The estimates are probits, and the reported figures are marginal effects. For a description of the sample and definitions of the various types of correspondents, see Table 3. For definitions of the regions, see Table 2. We include only primary assignments from the 1891 and 1911 samples in the analysis and drop observations that did not include information about the identity of the correspondent. The dependent variable is a dummy variable that takes a value of 1 if the assignment occurred before the patent was issued. Cases for which the date of the patent's issue is missing are treated as assignments before issue (the basic results do not change if we drop the observations instead). The omitted categories are: for the correspondent dummies, that the correspondent was the assignor (patentee); for the urbanization dummies, that the patentee's county did not have a city of at least 25,000 people; for the regional dummy, that the patentee resided in the Middle Atlantic; and for the inventor's patenting record, that the inventor had one or zero patents in the two years before and after the sample year. We collected the patent counts by looking up the patentee in the *Annual Reports of the Commissioner of Patents* for the two years before and after the sample observation. Columns 3 and 4 contain fewer cases than columns 1 and 2 because we are missing addresses for some of the parties to the contracts.

*Significant at 10% level; ** significant at 5% level; *** significant at 1% level.

Table 7

Effect of Establishing a Relationship with a Preferred Attorney: Percent Increase in the Number of Patents Applied for Successfully in the Five Years after Meeting the Attorney Compared to the Previous Five Years (Share of B Patentees from the 1890–91 and 1910–11 Samples)

<i>Number of Career Patents</i>	<i>Number of Inventors</i>	<i>Share of Inventors (row percent)</i>			
		<i>≤0% Increase in Patents</i>	<i>1–99% Increase in Patents</i>	<i>100–299% Increase in Patents</i>	<i>≥300% Increase in Patents</i>
<i>All Inventors</i>					
1–2	166	85.5	0.0	14.5	0.0
3–9	130	28.5	6.2	42.3	23.1
10–19	52	11.5	11.5	42.3	34.6
20+	61	18.0	18.0	24.6	39.3
Total	409	47.9	6.1	28.4	17.6
<i>Inventors with at least 1 patent in the 5 years before and at least 1 patent in the five years after</i>					
1–2	0	—	—	—	—
3–9	21	38.1	38.1	23.8	0.0
10–19	28	21.4	21.4	50.0	7.1
20+	40	17.5	27.5	25.0	30.0
Total	89	23.6	28.1	32.6	15.7

Notes: The table reports, for inventors with different numbers of career patents, the share that increased their number of patents after meeting their preferred attorney by each percentage category. We exclude from the calculations the first patent for each inventor that was handled by the preferred attorney. To avoid dividing by zero, we also always added 1 to the denominator. Patents are classified into periods according to the date on which the patent application was filed (available for all but the very earliest patents). For a description of the dataset and explanation of how we determined the preferred attorney for each inventor, see Table 4 and the text.

the percentage increase in the number of patents an inventor applied for and obtained in the five years after meeting the preferred attorney compared to the five years before. The top panel includes all inventors, the bottom only those who filed successfully for at least one patent in each of the two periods. In both panels, the vast majority of inventors with at least ten career patents substantially increased their rate of patenting in the five years after meeting their preferred attorney compared with the five previous years—most of them by more than 100 percent.⁸¹

⁸¹The results here and in our subsequent analysis were essentially the same when we used three-year intervals.

Table 8
 Magnitude of the Effect of Establishing a Relationship with a Preferred Attorney Relative to Other Five-Year Comparisons (Share of B Patentees from the 1890–91 and 1910–11 Samples)

<i>Number of Career Patents</i>	<i>Number of Inventors</i>	<i>Share of Inventors (row percent)</i>			
		<i>≤0% Increase More in Patents</i>	<i>1–49% Increase More in Patents</i>	<i>50–99% Increase More in Patents</i>	<i>≥100% Increase More in Patents</i>
<i>All Inventors</i>					
1–2	166	85.5	0.0	0.0	14.5
3–9	130	38.5	0.0	3.8	57.7
10–19	52	34.6	1.9	3.8	59.6
20+	61	44.3	3.3	4.9	47.5
Total	409	57.9	0.7	2.4	38.9
<i>Inventors with at least 1 patent in the 10 years before and at least 1 patent in the 10 years after</i>					
1–2	0	—	—	—	—
3–9	23	87.0	0.0	0.0	13.0
10–19	28	60.7	3.6	3.6	32.1
20+	41	48.8	4.9	7.3	39.0
Total	92	62.0	3.3	4.3	30.4

Notes: The table reports, for inventors with different numbers of career patents, the share with changes in patenting in the five years after meeting the preferred attorney relative to the five years before that were greater than the changes for other comparison periods by each percentage category. The comparisons periods were 1) the five years before meeting the preferred attorney relative to the five years prior to that, and 2) the period six to ten years after meeting the attorney relative to the first five years after the meeting. For additional details on the calculations, see Table 7. For a description of the dataset and explanation of how we determined the preferred attorney for each inventor, see Table 4 and the text.

Of course, the number of patents obtained by productive patentees might be expected to rise over the course of their careers, so it is not obvious how much of this increase should be attributed to the improved access to the market provided by preferred attorneys. Table 8 attempts to take this career trajectory into account by comparing the percentage change in the number of patents obtained in the five years after finding the preferred attorney relative to the five years before with 1) the change in patenting in the five years before meeting the attorney relative to the five previous years, and 2) the change in patenting in the period from six to ten years after meeting the attorney relative to the first five years. Confining our attention to patentees who obtained at least one patent in the ten years before meeting the preferred attorney and at least one

patent in the ten years afterward, a substantial share (39.3 percent of those with 10–19 career patents and 51.2 percent of those with 20 or more) had changes in patenting during the five years after establishing the relationship that were greater than the changes in either of the two comparison periods.⁸² These proportions seem large, especially given that there is no reason to assume that all patent attorneys improved inventors' access to the market for technology.

Not all patent attorneys were skilled intermediaries, and not all of them deserved inventors' trust. Just as advice manuals cautioned inventors not to use intermediaries who advertised in trade publications, some patent attorneys took the position that it was improper for members of their profession to function as intermediaries. Thus, H. W. Boardman & Company announced in a pamphlet promoting the firm's services that it was "a rule rigidly adhered to in this establishment, never to take contingent interests in applications for Patents, nor to negotiate sales of Patent rights, or become the owners in whole or in part of them." Such activity potentially put the interests of the patentee in conflict with those of his attorney: "If an attorney become a dabbler in Patents (as many do), how is it possible for an Inventor to be assured that he is not disclosing his secret to the very party who will be the most interested in defeating his application?"⁸³

Certainly, patent solicitors who "dabbled" in patents may have put their own interests before those of either the patentee or the assignee. In this respect the market for technology was much like today's real estate market, where an agent's primary goal is a sale, and where buyers and sellers alike face a great deal of uncertainty about whom the agent is truly representing. Although these kinds of conflicts of interest have been mitigated in the case of real estate by a combination of regulation and self-policing, during the late nineteenth and early twentieth centuries

⁸²The proportion for which the change in the absolute number of patents was greater after meeting the preferred attorney than in either of the other two comparisons was even larger: 57.1 percent for those with 10–19 patents and 61.0 percent for those with 20 or more patents. This analysis still does not eliminate the possibility that inventors tended to find their preferred attorneys early in their careers, just at the point where their rate of patenting was taking off. To test for this possibility, we regressed the change in patenting that occurred in the five years after the inventor met the preferred attorney compared to the five years before on the number of years that elapsed between the inventor's first patent and the first one filed by the preferred attorney. We found no statistically significant association, which suggests that inventors got a boost from hooking up with a preferred attorney regardless of career stage. We controlled for the year in which the inventor filed his or her first patent, whether the inventor was part of the 1910–11 (as opposed to 1890–91) sample, and the region in which the patentee resided. We also checked for an interaction between the year of the inventor's first patent and the number of years that elapsed before hooking up with a preferred attorney. Because none of the key variables were significant, we do not report the results.

⁸³H. W. Boardman & Co., *Hints to Inventors and Others Interested in Patent Matters* (Boston, 1869), 13.

the market for technology was essentially unregulated, and professional organizations like bar associations were extremely weak.⁸⁴ Under such circumstances, one would expect to see reputational mechanisms playing an increasingly important role and to observe that successful patent agents and lawyers had made substantial investments in cultivating reputations for fair, as well as insightful, dealing.⁸⁵

There is no question that patent agents' work sometimes put them in situations where there was a clear conflict of interest. One of the businessmen with whom Van Winkle dealt regularly wanted an option to buy out inventor Edward A. Howe's interest in some patents. Van Winkle recorded the offer as follows: "He will give \$3000 to 4000 for the last two patents and give me a commission of 10%. If I can get the patents for less, will receive a larger fee."⁸⁶ Van Winkle called on the inventor and "had a hard fight to get Howe to accept terms." Ultimately, however, after a session lasting two and a half hours, Howe agreed to the deal, "provided R [the buyer] will give him a free hand in all future patents."⁸⁷ Somehow, throughout all these negotiations, Van Winkle managed to remain completely above board about his interest in the deal. He continued to maintain excellent relations with Howe, who did business with him for the rest of the period covered by the diary. Indeed, after the buyer ultimately decided not to take up the patents, Howe confided to Van Winkle that he had "only signed option so that I [Van Winkle] could collect my fee."⁸⁸ Although this statement should probably not be taken at face value, it is testimony to the strength of the relationship that Van Winkle had been able to establish with this inventor.

Van Winkle's business diaries reveal the enormous amount of time he devoted to cultivating these kinds of personal relationships—not just with inventors but also with businessmen interested in patents. Van Winkle spent the bulk of each day receiving visitors, calling on people, and talking business over lunches and dinners at the Columbia Club or other similar venues. This constant round of face-to-face meetings helped secure him the trust of parties on both sides of the market. In addition, they were an important source of tips about potential buyers for inventions, new technologies to be explored, and clients that might be

⁸⁴On the weakness of bar associations, see Bloomfield, "Law." As mentioned above, the Patent Office maintained a list of patent agents certified to practice before it, and small numbers of agents were from time to time disqualified.

⁸⁵For a more formal analysis, see Asher Wolinsky, "Competition in a Market for Informed Experts' Services," *Rand Journal of Economics* 24 (Autumn 1993): 380–98. See also Mark J. Garmaise and Tobias J. Moskowitz, "Informal Financial Networks: Theory and Evidence," *Review of Financial Studies* 16 (Winter 2003): 1007–40.

⁸⁶16 May 1905, Van Winkle Diary.

⁸⁷16 and 17 May 1905, Van Winkle Diary.

⁸⁸31 July 1905, Van Winkle Diary.

attracted to his practice. While Van Winkle was handling an elevator-safety invention for a man named Pratt, for example, he received information from a friend with whom he often dined “that C. L. C. Howe of the N.Y. Life Co. was looking for a safety for Elevators.” Van Winkle called on Howe that same afternoon, noting in his diary, “There might be something doing later.”⁸⁹ On another occasion, he lunched with one Charlie Halsey, who “said he had some cigarette machine patents + papers which he would bring to my office and let me look over.”⁹⁰ Another lunch with an inventor named Robert E. Booream, whose work embraced electric-bridge hoists, washers for gold mining, and methods of roadway construction, yielded the notation that the two men had “lightly touched on business. We will no doubt be associated.”⁹¹ Van Winkle’s use of the word “associated” suggests that he envisioned his work with Booream as encompassing more than simply filing patent applications; the diary entries later show him putting Booream in contact with a mining engineer.⁹²

The networks that attorneys like Van Winkle built through their daily round of meetings were primarily local, but patent agents also exploited connections with colleagues in distant locations. Some of these links were formal. In 1895, two years after Boston patent lawyer Frederick Fish had taken on Charles Neave as a partner, he sent Neave to New York City to open a branch office.⁹³ Similarly, when Samuel S. Fisher, US Commissioner of Patents during the Grant administration, returned to private practice in Cincinnati, he took in Samuel A. Duncan as a partner and almost immediately packed him off to New York.⁹⁴ Other links were based on familial connections, letters of introduction, or repeat business. The Boston firm of Wright, Brown, Quinby & May, for instance, had ties with a Chicago firm established by the brother of

⁸⁹ 31 Mar. 1905, Van Winkle Diary.

⁹⁰ 8 Aug. 1905, Van Winkle Diary.

⁹¹ 24 Jan. 1905, Van Winkle Diary. See also 5 Mar.; and 7 and 12 June 1905.

⁹² 7 and 8 June 1905, Van Winkle Diary. One might wonder whether inventors’ dependence on patent attorneys enabled the latter to earn supra-normal returns at the patentees’ expense. However, the number of patent attorneys increased so dramatically in the late nineteenth century, both in absolute terms and relative to the size of the population, that it is likely that any excess returns would have been competed away. Certainly, no attorney ever attained a dominance in the last quarter of the century comparable to that of Munn & Company in the years immediately following the Civil War. The top attorney in our 1871 sample accounted for 5.5 percent of the patent assignments and the top four attorneys 13.5 percent. Those percentages dropped steadily until 1911, when the top attorney handled only 1.3 percent of the assignments and the top four only 4.6 percent. It would also be desirable to know whether patent attorneys benefitted patentees by securing them better prices for their inventions. Unfortunately, the data do not allow us to explore this possibility. By the late nineteenth century contracts typically specified that the assignment was “for one dollar and other consideration.”

⁹³ John E. Nathan, *Fish & Neave: Leaders in the Law of Ideas* (New York, 1997), 13, 19.

⁹⁴ *In Memoriam: Samuel S. Fisher* (Cincinnati, OH, 1874), 24.

one of its partners. It also funneled business through a firm in Philadelphia with which it had long been associated.⁹⁵

That these links to agents in other locations could be used to market patents is suggested by a letter from one intermediary to Lemuel Jenks, a patent lawyer in Boston, asking for Jenks's assistance in marketing a device: "We have offered said Patent so far to the B&O and NC RR Comps. . . . We intend to sell it to one person for the six New England States and I therefore wish you would give me your opinion in that matter: to viz what price you think we should ask; what would we have to pay you for your assistance [*sic*] in carrying out and effecting a sale."⁹⁶ A patent solicitor in London wrote members of the firm of Blatchford, Seward & Griswold, calling their attention to a rust-prevention patent in which "an old and much esteemed client of ours" held an interest and asking the partners "whether you can find us a purchaser of the American patent" for a commission of 5 percent.⁹⁷ After a businessman named Kendall let Van Winkle "have the foreign patents in melting furnaces," Van Winkle forwarded the information to an agent in another city, who returned the favor by sending Van Winkle "specimens + literature" about a dry adhesive photographic-mounting process. Van Winkle in turn shopped the photographic invention "around to Chas Walsh + he thought it would be a valuable thing to control, he is going to get ideas on the matter and see what he can do towards making some money out of the scheme [*sic*]."⁹⁸

These connections to other cities, however, do not seem to have been as effective in selling patents as the deep local networks that agents like Van Winkle worked so hard to develop. The last two columns in Table 6 allow us to compare the speed of assignment for transactions in which the patentee and the assignee resided in the same state with those in which they resided in different states. The coefficient on the dummy for whether the correspondent was a patent agent is large and significant when the patentee and assignee resided in the same state, but shrinks in size and loses significance when the patentee and assignee were in different states. Therefore, although mid-nineteenth-century inventors were able to sell geographically segmented patent rights over long

⁹⁵ See the Wright, Brown, Quinby & May Correspondence Files for letters among patent agents in different cities. Virtually all agents also had regular dealings with at least one attorney in Washington, who could be called upon to conduct searches of patent records and perhaps represent them in preliminary interviews with patent examiners.

⁹⁶ Letter of 30 Apr. 1870 from Aug. H. [last name illegible] to Jenks, Box 3, Folder 59, Mss. 867, Lemuel P. Jenks records, Baker Library Historical Collections, Harvard Business School.

⁹⁷ Letter of 12 July 1877 from Roger Cartwright of London to Blatchford, Seward & Griswold, Box 5, Folder 243, Records of Blatchford, Seward & Griswold, 1841–1910, Archives and Special Collections, Massachusetts Institute of Technology.

⁹⁸ 27 Mar. 1905, 28 Apr., 9 May, 1 and 2 June 1905, Van Winkle Diary.

distances, by the late nineteenth century they disposed of *national* patent rights most effectively in *local* markets, where patent agents who were functioning as intermediaries could cultivate close personal relationships with people on either end of the transaction. Local though they were, these markets seem to have played a critical role in the technological dynamism of the period. As our quantitative analysis suggests, once inventors paired up with their preferred attorneys, their patenting activity took off.

Epilogue: The Resurgence of the Market for Technology in the Late Twentieth Century

During the heyday of the industrial research laboratory in the mid-twentieth century, large-scale businesses dominated the exchange of patented technology, which mainly took the form of cross-licensing agreements to each other.⁹⁹ By the end of the century, however, small firms and independent inventors were once again major participants in the market. Although in 1970 small firms obtained only about 5 percent of patents issued worldwide, twenty years later the proportion was closer to a third, and it has since continued to grow.¹⁰⁰ In the face of stepped-up competition, large firms began to cut their research budgets and acquire more of their technology from outside sources. In the process, their share of non-federal R&D expenditures dropped from about two-thirds in 1980 to only about one-third in 2005.¹⁰¹

⁹⁹ On the growing importance of industrial R&D in the middle third of the twentieth century, see Naomi R. Lamoreaux, Kenneth L. Sokoloff, and Dhanoos Sutthiphisal, "The Reorganization of Inventive Activity in the United States in the Early Twentieth Century," in *Understanding Long-Run Economic Growth: Geography, Institutions, and the Knowledge Economy*, eds. Dora L. Costa and Naomi R. Lamoreaux (Chicago, 2011), 235–74. This is not to say that independent inventors completely disappeared or that large firms stopped acquiring technology in the market. See Eric S. Hintz, "The Post-Heroic Generation: American Independent Inventors, 1900–1950," unpublished PhD dissertation, University of Pennsylvania (2010); Tom Nicholas, "Spatial Diversity in Invention: Evidence from Early R&D Labs," *Journal of Economic Geography* 9 (Jan. 2009): 1–31; and Tom Nicholas, "The Role of Independent Invention in US Technological Development, 1880–1930," *Journal of Economic History* 70 (Mar. 2010): 57–82. Over time, however, large firms increasingly relied on internally generated technology. See Mowery, "Boundaries of the US Firm."

¹⁰⁰ Diana Hicks et al., "The Changing Composition of Innovative Activity in the US—A Portrait Based on Patent Analysis," *Research Policy* 30 (Apr. 2001): 681–703. The authors define small patentees as companies that are either outside the Tech-Line database or that had less than 25 patents in the five years ending in 1993. The Tech-Line database includes the companies most active in patenting, about 400 all told.

¹⁰¹ Ashish Arora and Alfonso Gambardella, "The Market for Technology," in *Handbook of the Economics of Innovation*, eds. Bronwyn H. Hall and Nathan Rosenberg, vol. 1 (Amsterdam, 2010), 641–78. The authors define large companies as those with more than 25,000 employees. See also the essays in Richard S. Rosenbloom and William J. Spencer, eds., *Engines of Innovation: US Industrial Research at the End of an Era* (Boston, 1996).

As was the case in the nineteenth century, many small inventors of new technologies sought to sell or license their patents through the market rather than exploit them in their own enterprises. Using the Patent Office's electronic database of assignments, Carlos Serrano calculated that patent owners at some point sold 12.4 percent of all patents obtained during the last two decades of the twentieth century. The proportions were highest for individual inventors (16.2 percent) and small companies (17.5 percent), especially in high-tech sectors like computers and communications (23.9 percent for small companies) and drugs and medical (20.1 percent for small companies).¹⁰² Using data on renewals, Serrano calculated that patents that were sold were on average about three times more valuable than those that were not.¹⁰³

Inventors looking for buyers or licensees for their intellectual property or for venture capital for new enterprises face many of the same information problems in the early twenty-first century as their predecessors did a hundred years before, and they are solving them in much the same way—by forming bonds with well-connected professionals whose judgment they trust. The resulting networks are still remarkably local in character. Lynne Zucker and Michael Darby have shown for the biotechnology sector that links between university scientists and nearby firms facilitate the commercialization of new discoveries.¹⁰⁴ In computers and software, inventors are much more likely to be successful if they are able to plug into one of the local networks of venture capitalists and lawyers that have formed in places like Boston, Massachusetts; Austin, Texas; and most notably the Silicon Valley region of California. Many of these venture capitalists got their start in local enterprises and, as a result, have deep connections in the surrounding tech community. They are also linked to local attorneys who

¹⁰² Carlos J. Serrano, "The Dynamics of the Transfer and Renewal of Patents," *RAND Journal of Economics* 41 (Winter 2010): 686–708. The proportions of patents sold are all seven or eight percentage points higher if the patents are weighted by importance according to the number of subsequent patents that cited them.

¹⁰³ Since 1980, patent holders have had to pay renewal fees to keep their patents active for more than four years. Carlos J. Serrano, "Estimating the Gains from Trade in the Market for Innovation: Evidence from the Transfer of Patents," NBER Working Paper 17304 (Aug. 2011).

¹⁰⁴ Lynne G. Zucker, Michael R. Darby, and Jeff S. Armstrong, "Geographically Localized Knowledge: Spillovers or Markets?" *Economic Inquiry* 36 (Jan. 1998): 65–86; and Lynne J. Zucker, Michael R. Darby, and Marilyn B. Brewer, "Intellectual Human Capital and the Birth of US Biotechnology Enterprises," *American Economic Review* 88 (Mar. 1998): 290–306. See also Louis Galambos, with Jane Eliot Sewell, *Networks of Innovation: Vaccine Development at Merck, Sharp & Dohme, and Mulford, 1895–1995* (New York, 1995); and Walter W. Powell, Kenneth W. Koput, and Laurel Smith-Doerr, "Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology," *Administrative Science Quarterly* 41 (Mar. 1996): 116–45.

have built up their own networks (much as Van Winkle did a century before) and who can help their clients secure financing or connect with potential buyers or licensees.¹⁰⁵

As in the past, the growth of the market for technology has given rise to new problems of asymmetric information that opportunists can exploit to their advantage. The most notorious examples today are intermediaries who buy patents with the aim of extracting licensing fees from infringers, sometimes from large businesses with deep pockets (like the railroads in the late nineteenth century), sometimes from small businesses with limited resources (like the farmers of the same period). As in the past, moreover, such opportunists are particularly active in the segments of the market most afflicted by information problems—in software, for example, where patent claims tend to be both broad and abstract and practitioners have difficulty knowing exactly what a patent covers, what its merits are, and whether a court will hold it valid.¹⁰⁶

Opportunism in the market for technology gets much more media attention nowadays than it did in the nineteenth century.¹⁰⁷ However, it is not clear that the “troll” problem is commensurately more serious than it was in the earlier period. A recent analysis of cases in the Stanford Litigation Clearinghouse, a database that includes every patent lawsuit filed since the beginning of 2000, confirms that patent litigation is indeed concentrated in areas such as software where information problems are worst, and that non-practicing entities instigate a majority of the suits. When these suits reach the courts, however, the parties bringing them generally find themselves on the losing end. Software patents are particularly likely to be invalidated, as are patents owned by

¹⁰⁵ For Silicon Valley, see AnnaLee Saxenian, *Regional Advantage: Culture and Competition in Silicon Valley and Route 128* (Cambridge, MA, 1994); Emilio J. Castilla, et al., “Social Networks in Silicon Valley,” in *The Silicon Valley Edge: A Habitat for Innovation and Entrepreneurship*, eds. Chong-Moon Lee and William F. Miller (Stanford, CA, 2000), 218–47; Martin Kenney and Richard Florida, “Venture Capital in Silicon Valley: Fueling New Firm Formation,” in *Understanding Silicon Valley: The Anatomy of an Entrepreneurial Region*, ed. Martin Kenney (Stanford, CA, 2000), 98–123; Mark C. Suchman, “Dealmakers and Counselors: Law Firms as Intermediaries in the Development of Silicon Valley,” in *Understanding Silicon Valley*, 71–97; and Mark C. Suchman, “On the Advice of Counsel: Law Firms and Venture Capital Funds as Information Intermediaries in the Structuration of Silicon Valley,” unpublished PhD dissertation, Stanford University (1994).

¹⁰⁶ On software patents, see James Bessen and Michael J. Meurer, *Patent Failure: How Judges, Bureaucrats, and Lawyers Put Innovators at Risk* (Princeton, NJ, 2008), esp. ch. 9. Software and business methods have only recently been made patentable, and the kinds of problems they have created are analogous to those resulting from the recognition of design patents for useful changes of form in the late nineteenth century. See Magliocca, “Ornamental Design.”

¹⁰⁷ A search of mainstream publications on the word “troll” easily turns up hundreds, even thousands, of times more articles than comparable searches for the late nineteenth century.

non-practicing entities. Between 2000 and 2009 the win rate for the latter was only 8–9.2 percent, depending on the calculation method, whereas for companies engaged in production it was 40 to 50 percent.¹⁰⁸

Of course, trolls can still do a lot of economic damage just by threatening litigation. Most of the filings in the database were settled before the courts reached a verdict; mere threats to sue did not, of course, make it into the database at all. The terms of the settlements are not known, so it is certainly possible that firms have chosen to pay substantial licensing fees rather than bear the costs of litigation. Nevertheless, given trolls' low win rates and the courts' tendency to invalidate software patents, whatever level of fees they are currently extracting from legitimate innovators seems unlikely to be an equilibrium result. As in the late nineteenth century, one might expect defendants to revise their assessments of the probability of winning and start fighting more of these cases in court, perhaps again banding together in associations for this purpose. Already we can see the emergence of a myriad of new entities that aim to profit from bolstering the bargaining position of defendants, ranging from companies specializing in probabilistic assessments of patents' validity, to consortiums and "libraries" that collect patents for use in countersuing trolls, to litigation clearinghouses and specialist law firms.¹⁰⁹

Only time will tell if the current problems with the patent system will be as amenable to solution as those inventors faced in the past. In the meantime, it is important to be wary of cures that potentially are worse than the disease. Market trade in patents is not a new development. Nor are the information asymmetries to which it has given rise. Throughout US history, the alchemical lure of the market for patents has provided a powerful incentive for technological creativity at the same time as it has attracted opportunists. Although only a small number of inventors have ever achieved great riches by selling off or licensing

¹⁰⁸ See John R. Allison, Mark A. Lemley, and Joshua Walker, "Extreme Value or Trolls on Top? The Characteristics of the Most-Litigated Patents," *University of Pennsylvania Law Review* 158 (Dec. 2009): 1–37; and John R. Allison, Mark A. Lemley, and Joshua Walker, "Patent Quality and Settlement among Repeat Patent Litigants," *Georgetown Law Journal* 99 (Mar. 2011): 677–712. The category of non-practicing entities includes inventor-owned enterprises, universities, and many other entities besides trolls. Allison and his co-authors compared frequently litigated patents (that is, those that are the subject of at least eight legal filings) to a random sample of patents that show up in the litigation records only once. Nearly three-fourths of the patents involved in frequent litigation were in computer software and business methods. The figure for litigation failures varies depending on whether default judgments are included. Information on the Stanford database is available at <http://www.law.stanford.edu/node/149621>, accessed 12 Oct. 2012.

¹⁰⁹ For descriptions of some of these entities, see Raymond Millien and Ron Laurie, "Meet the Middlemen," *Intellectual Asset Management Magazine* 28 (Feb.–Mar. 2008): 53–58, www.iam-magazine.com.

the rights to their intellectual property, their example has encouraged untold thousands to follow in their footsteps, shifting out the economy's technological frontier in the process.

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