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Patent Politics: Intellectual Property, the Railroad Industry, and the Problem of Monopoly

As winter descended on Washington in December 1878, the Forty-fifth Congress gathered for what promised to be a hectic third and final session. Emotions ran high. In this era, Congress habitually reserved much of its business for these brief, intense "lame duck" sessions that fell between the election of legislators in November and the adjournment of Congress the following March. Compounding the usual sense of urgency was the startling result of the recent election: the Democratic party had gained control of the Senate and, when the next Congress convened, would control both the Senate and the House for the first time since before the Civil War. Senate Republicans well understood that they had but a few precious months to close ranks and enact legislation on some of the burning issues of the day: civil rights, the currency, the tariff. Yet when the session opened, none of these issues made their way to the floor. Instead, and despite howls of protest from senators eager to move on to what they plainly regarded as more urgent concerns, the Senate assembled on many afternoons for several weeks to debate a completely different matter: a proposed law concerning the rights of inventors. At this critical juncture in American politics, the Senate found itself embroiled in a long and complex discussion of the virtues and deficiencies of the patent system.[1]

How do we explain it? Perhaps the episode was merely a diversionary tactic orchestrated by one of the Senate's competing factions to forestall legislation on more pressing matters. Such an explanation would fit neatly with the scholarly consensus that the nineteenth-century American government was a mere "state of courts and parties" that lacked the tools

THE JOURNAL OF POLICY HISTORY, Vol. 18, No. 1, 2006.

to respond effectively to the complex issues spawned by rapid economic development. It would be equally congenial to the many historical accounts that deny that the nineteenth-century United States even *had* a state, or that posit that its governmental institutions merely "responded" to changes set in motion by industrialism, a social process presumed to be largely independent of and unrelated to public policy. Both of these interpretations characterize the nineteenth-century Congress as an essentially reactive body balkanized by rival political factions and dominated by party leaders intent on protecting the personal fiefdoms that they had carved out through the judicious disbursement of government contracts and jobs (known as "spoils"). Incapable of enacting constructive legislation, party leaders did all they could to block those who tried. Public policy, as a consequence, lacked coherence, and was little more than the sum total of the particularistic decisions of legislators and judges. Parties ran election campaigns and distributed spoils; courts sorted out the mess. In all matters involving economic regulation, the courts reigned supreme. Since party leaders were preoccupied with placating their supporters, while the federal government lacked effective administrative agencies, it was left to the courts to broker the inevitable disputes that industrialism spawned.[2]

In certain respects, congressional debate over the regulation of the patent system fits into the "courts and parties" framework. The bill's chief opponent was a consummate spoilsman; the bill failed; and the contest shifted to the courts. The senator who kept the issue on the floor was none other than New York's Roscoe Conkling, the flamboyant leader of a faction of the Republican party known as the "stalwarts" in tribute to their fierce allegiance to ex-President Ulysses S. Grant. Stalwarts had long maintained their influence through the judicious disbursement of political patronage, especially in the pivotal state of New York. In 1878, however, Grant was out of office and the stalwarts' influence was waning. Predictably, Conkling's role in the patent debate was obstructionist: rather than seeking legislation of his own, he sought to kill a bill that someone else had proposed.

Conkling's challengers included ascendant Democrats, Republican rivals such as the anti-Grant faction headed up by presidential hopeful James G. Blaine, and—most threatening of all—an insurgent group of Republican legislators known as "liberals," and sometimes termed by historians the "liberal reformers." It was the liberals, led by Bainbridge Wadleigh of New Hampshire, in combination with certain like-minded Democrats, who had introduced the patent bill and shepherded it through the House and Senate committees on patents. Liberals sought

not only a new patent law but also lower tariffs and civil service examinations—all measures that Conkling and the stalwarts vociferously opposed. Although the patent bill would ultimately pass the Senate, Conkling and his allies tied it up in debate long enough to prevent the Senate bill from being reconciled with a companion bill in the House. Frustrated at Conkling's obstructionism, supporters of patent legislation gave up on Congress and sought redress in the courts.

In two important respects, the congressional debate over patent reform diverged from the "courts-and-parties" framework in which it might otherwise seem to fit. For one thing, the debate over patent law *did* address a key issue in nineteenth-century political economy—namely, the appropriate role of government in shaping the course of technical change. This was precisely the kind of issue that the Senate was presumed to avoid. For another, the debate *did* revolve around an administrative agency—the U.S. patent office—that wielded an impressive degree of bureaucratic autonomy.

Patent policy resonated with powerfully felt ideologies and tapped into strongly felt beliefs. Patents were exclusive privileges that the federal government granted to certain individuals for a limited period of time, and, like all monopoly grants, their regulation raised some of the most fundamental questions of the age. The monopoly issue confronted every branch of nineteenth-century American government as well as every jurisdiction: federal, state, and local. In essence, the issue boiled down to two interrelated questions: Did the government have the authority to regulate the monopolies it had created? And, if so, how?

The liberal argument for patent reform cast an unusually bright light on the monopoly issue. This was because it tried to strike a balance between two very different kinds of government-sanctioned monopolies: the federally granted patents held by individual inventors, and the state-granted charters held by the emergent industrial corporations. The liberal argument for patent reform sought to solve a perplexing puzzle: How might the federal government best foster the widespread adoption of technological innovation in an age that was increasingly dominated by giant corporations? At a time when the potential of technological innovation seemed almost boundless, such a puzzle could not help but stimulate a wide-ranging debate not only in Congress but also in the wider society.[3]

The ramifications of the patent issue were practical as well as ideological. At its core, it posed a special challenge for two groups of economic actors, namely, farmers and railroads, who were often at odds not only with Congress but also with each other. Both groups felt besieged by

lawsuits filed by avaricious patent agents—popularly known as "patent sharks"—who demanded, often successfully, sizable payments for the infringement of patents that patent agents controlled.

The root cause of the predicament facing farmers and railroads lay in the new kinds of economic opportunity hastened by the recent transformation of the country's economic institutions. Since the early republic, the center of gravity for economic activity had shifted from the Atlantic seaboard, where it had been coordinated by a relatively tight-knit community of merchants active in overseas trade, to the vast North American interior, where its protagonists included the large and sprawling mass of farmers, miners, shippers, and railroad managers who extracted and shipped agricultural and mineral wealth. This new economic order was not only much larger geographically than the economic order it supplanted; it was also far more dependent on large-scale business enterprise—including, in particular, the railroad. Its origins were political as well as economic. Among its catalysts were the U.S. victory in the U.S.-Mexico War of 1846–48, which enormously increased the size of the country, and the military mobilization of the Union army in the Civil War, which hastened the elaboration of state-spanning enterprises in transportation, manufacturing, and mining.[4]

The new economic order put an enormous strain on many governmental institutions, including the patent system. Farmers and miners often lived far from the federal courts that enforced patent decisions, while railroad managers and shippers coordinated enterprises much larger than those for which the patent system had been designed. The highly concentrated railroad industry, in which a few large corporations exerted a powerful influence, distorted the market mechanisms that the designers of the patent system had presumed to be integral to its operation. Patent holders and railroad managers alike complained that it was impossible to rely on the market to determine a fair price for patented inventions. To complicate matters still further, the expanding economy had generated a surge in patent activity that swamped the patent office, significantly increasing the success rate of would-be patent holders.[5]

To bring the patent system into alignment with these recent changes, various groups lobbied to alter what we would today call "intellectual property law." Their principal targets were federal patent law and the federal court doctrines that defined rights of inventors. Taken together, these initiatives were known as patent reform. In a pattern that would eventually become ubiquitous—but that in the 1870s remained relatively rare—this reform movement was spearheaded by functionally specialized interest groups: for the farmers, the National Grange; for the railroads,

trade groups such as the Eastern and Western Railroad Associations, which employed patent attorneys who mounted a legal defense for the entire railroad industry. Both groups lobbied Congress directly to secure favorable legislation on an issue that was for them of vital concern.[6]

To understand the congressional patent debate that engaged the Senate in December 1878, it is useful to know something about the history of the patent system. The patent system had long been a governmental institution: enshrined in the Constitution, it was older than the country itself. Before the War of Independence, the patent system had been coordinated by Great Britain; after the war, certain provisions of English law found their way into article 1, section 8 of the federal Constitution. In this section, Congress was empowered to "promote the progress of science and the useful arts" by "securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." This section became the foundation for the law of copyright and patents. In the first federal Congress, Congress defined the "limited times" for which an inventor could secure an exclusive grant to be fourteen years, and assigned responsibility for the administration of the patent system to a commission that consisted of the vice president, the chief justice, and the secretary of state, with the secretary of state as the administrator. The first secretary of state, Thomas Jefferson, took his administrative responsibility quite seriously. Jefferson reviewed each patent application personally and issued patents sparingly. The magnitude of this challenge taxed even Jefferson's formidable intellect. Not surprisingly, his successors followed the path of least resistance: instead of evaluating each application on its merits, they merely registered it, granted it a patent, and left its interpretation to the courts. In the early republic, the courts became a forum for a series of celebrated patent disputes involving such landmark inventions as the automated flour mill, the cotton gin, the steamboat, and the telegraph. Not all inventors fared well under this system. Yet, to an extent that is often forgotten, it was the courts—and, in particular, the federal courts—that determined who would be the eponymous inventors of some of the most notable inventions of the age, including the cotton gin (Eli Whitney) and the electric telegraph (Samuel F. B. Morse).[7]

The registry method persisted without major revision until 1836, when Congress significantly altered the procedures involved in obtaining a patent. In that year, Congress established a new administrative agency—the patent office—and a new senior federal administrator—the commissioner of patents. Henceforth, the commissioner and his staff of examiners evaluated every patent application closely to determine if it was technically novel and

sufficiently distinct from patents the patent office had already assigned. To facilitate the pre-approval process, the office required inventors to submit a technical drawing and a three-dimensional model. Should the review prove successful, the model would go on public display in the halls of the patent office's stately new main building in Washington, D.C.

This new procedure greatly increased the prominence of the patent system as a locus of innovation. Although the courts retained the ultimate authority to determine the precise meaning of a patent, the pre-approval review erected a gate between the inventor and the legal system that significantly increased the value of those applications that squeezed through. Successful patent applications received the imprimatur of the federal government—investing them with a moral authority far greater than any pre-1836 patents enjoyed. Patents now became, as it were, not only a form of property (for they had been that before 1836), but a form of property that a federal administrative agency had certified—and that, by implication, the federal government had a special obligation to protect. The value of those patents that passed the test was further enhanced by the fact that no other major industrial country conducted such a stringent pre-approval review. The post-1836 patent system, informed observers agreed, was a distinctively American achievement, and one that deserved much credit for the celebrated inventiveness of the American people. When the eminent British scientist William Thomson—following a visit to the Centennial Exhibition in Philadelphia in 1876, at which he admired the fruits of American technical ingenuity—urged the British government to emulate the United States patent office and institute a pre-approval review, supporters of the patent system gleefully voiced their satisfaction. Thomson had confirmed their most fundamental belief.[8]

While the pre-approval review distinguished the U.S. patent system from its counterparts in Europe, its exclusively federal character distinguished it from most other regulatory arenas in the United States. Federalism was perhaps the single most distinctive governmental institution in nineteenth-century America. In most regulatory arenas, the mandate of the federal government remained strictly limited, with the states retaining broad decision-making powers.[9] In the patent system, however, the federal government was preeminent: state governments played no role in its administration, while state courts played only a small, and, as time passed, increasingly circumscribed role in its regulation.

While Congress was responsible for establishing the general principles guiding the patent system, it played little role in its routine administration. Congress did have the right to grant patent holders seven-year extensions of their rights, should they be able to demonstrate

that unusual circumstances had prevented them from securing a commensurate financial reward during the fourteen-year period of their initial grant. Yet only rarely, and in highly unusual circumstances, did congressmen evaluate the merits of a particular patent. As a consequence, after 1836 the patent system acquired a bureaucratic momentum, and its administrators a measure of bureaucratic autonomy, that distinguished it from most other federal governmental institutions, with the notable exceptions of the postal system and the military.[10] The bureaucratic momentum of the patent office was sustained not only by the patent commissioner but also by the patent examiners, a new class of federal administrators created by the 1836 law. Within a few years, patent examiners would become well versed in highly technical matters and arcane legal principles, while the patent commissioner would become something of a political entrepreneur who publicized the activities of the patent system and lobbied Congress on its behalf.

The principal constraint on the bureaucratic autonomy of the patent office was the size of its budget. Each year the patent commissioner proposed a budget for Congress to consider. In the period between 1836 and the Civil War, this proposal often sparked sharp debate. Commissioners routinely urged Congress to increase the number of examiners, while Congress typically balked—approving at most a smaller increase than the commissioner had requested.

The staffing debate might at first glance seem to involve little more than the inevitable give-and-take of administrative politics. Salaries, after all, were the largest item in the patent office budget. Yet the principal point of contention was not the cost to the federal government of the salaries it paid to the patent commissioner and his staff. As the patent commissioner regularly reminded Congress, the fees that patent applicants generated more than covered this cost. Rather, the crux of the matter was the relationship between the size of the patent office staff and the likelihood that a would-be patent holder could secure a patent. All things being equal, the larger the number of examiners, the more rigorous the pre-approval review process—and the more likely a given application would be denied. By keeping the number of patent examiners small, Congress could, as it were, shift the patent system back toward the registry model that had prevailed before 1836.[11]

A further constraint on the bureaucratic autonomy of the patent office was the congressional mandate that patent commissioners devote part of their annual surplus to an ongoing program of agricultural research. In response to this mandate, patent commissioners included a section in their annual reports on crop yields and recent improvements

in agricultural practice, neither of which had anything to do with the patenting of inventions. Patent commissioners grumbled about the financial drain this research program posed: they would have preferred to use funds to hire more patent examiners. Yet the program endured, and even expanded over time, presumably because it mollified congressmen from farm districts who, in its absence, might have lobbied for the abolition of the patent system as a subsidy for American industry. In the time-honored tradition of American politics, the inability of one constituency to eliminate a subsidy program did not preclude it from securing another subsidy for itself.[12]

The agricultural research program, like the granting of patents, was predicated on the belief that intellectual endeavor would foster material benefits. Yet it differed from the patent process in one fundamental respect. Patents benefited particular individuals; the agricultural reports did not. Although the reports were intended to have commercial value, their benefits were not restricted to a particular farmer; on the contrary, they were presumed to be widely shared. Agricultural research was a collective endeavor that its advocates hailed as the very antithesis of monopoly. The granting of a patent, in contrast, invested specific individuals with exclusive property rights and legal privileges in the expectation that, by pursuing their own self-interest in a competitive market, they would make the fruits of their labors accessible to the general population.

Farmers were by no means the only group of Americans to have problems with the patent system. Equally dissatisfied, though often for different reasons, were the managers of the country's burgeoning railroad network. Railroads were prodigious users of technology. Railroad managers routinely assembled complex ensembles of equipment from disparate sources, while railroad employees often deployed devices and procedures that they themselves had designed. For the most part, railroad managers neither encouraged their employees to patent inventions nor endeavored to generate profits by controlling patented inventions. Only rarely did a railroad try to secure a competitive advantage by assembling a patent portfolio, as would, for example, the telegraph companies that strung wires along their routes. Instead, railroads competed by securing lucrative rights-of-way from state legislatures and by developing the surrounding territory. This reluctance of railroads to profit from patented inventions can be explained neither by the absence of competition in the railroad industry nor by any principled aversion to government assistance. In the nineteenth century, competition between railroads was often intense, and railroad promoters were highly adept at

securing government-granted privileges: state legislatures, for example, regularly guaranteed them a monopoly over a particular right-of-way, and almost invariably limited their financial liability in the case of loss. Yet, with few exceptions, railroad managers chose not to secure patent rights for the myriad technical improvements that they and their employees devised.

The hesitance of railroad managers to seek patent protection reveals much about the character of technical change in the industry. In the nineteenth century, the railroad industry was so dynamic that railroad managers assumed they would profit more from the open exchange of technical information than they would by securing exclusive rights to specific inventions. Railroad managers diverged from this policy only in those relatively rare instances when they believed that a particular patent would enable them to establish an ancillary business along their right-of-way. In the 1860s, for example, the managers of the Pennsylvania Railroad took advantage of their controlling interest in several lucrative steelmaking patents to build a number of large steelworks along a route that they served.[13]

While railroad managers displayed a limited interest in patents, suppliers of railroad technology sought them out with an avidity unmatched in most other industries. In 1852, the patent office devised a separate category for inventions designed specifically for railroading. By the end of the Civil War, the number of railroad-specific patents had increased from fifty per year to more than five hundred.[14] Railroads also used numerous patentable devices and procedures that were not specific to the railroad, and that ranged from paints, lubricants, and building materials to pumps, office machinery, and electrical equipment.

The avidity with which suppliers courted the railroads was in no way surprising. Railroads were an excellent market. Large and complex, they relied on a prodigious variety of technical equipment, which they often purchased in bulk. In addition, and in contrast to many other industries, this equipment was often in plain view. For railroad suppliers, this posed a dual advantage. Not only did it provide many opportunities to discover room for improvement, but it also made it relatively easy to determine if one of their patents had been infringed.

Despite these lures, suppliers of patented equipment faced significant challenges in plying the railroad trade. Outsiders often had trouble gaining access to the tracks and equipment necessary to test and refine their inventions. When independent inventors and other suppliers did come up with something new, they encountered a technically savvy customer with formidable technical capabilities that had been honed by the

operational demands of maintaining a far-flung network of locomotives, cars, and equipment. Many railroads operated their own machine shops and foundries and could easily manufacture much of the equipment that they purchased from suppliers. Indeed, many railroad-specific patents had originated as inventions devised by the employees who worked in these facilities. Not surprisingly, railroad managers tended to assume that the solutions their employers devised to operational problems would become part of the industry's generic stock of technical knowledge. The sheer number of railroad-specific patents confronted suppliers with a still-further challenge. If railroad managers detected a conflict between two patented inventions, they might refuse to purchase either one, confident that they could fend off an infringement suit by contending that the ownership of the product or process in question remained in dispute.

So long as the territory railroads embraced remained small and the organizational complexity of their equipment limited, the potential costs of patent infringement suits remained low. By the 1860s, however, several railroads—in the East, the Pennsylvania, the Baltimore & Ohio, and the New York Central; in the West, the principal lines running west and south from Chicago—had become so geographically extensive and the scale of their operations so complex that the potential costs suddenly grew much larger. Such vast integrated enterprises were far more vulnerable to patent infringement lawsuits than their smaller and less complex predecessors. Should a patent holder persuade a court that he deserved to receive a financial award from a railroad that had infringed on his patented invention, the patent holder might well be able to secure a large settlement—since the settlement would be based on the number of pieces of equipment on which the patented invention had been used. As railroads expanded, the potential for a large settlement increased, and patent infringement suits multiplied. Typically, they involved devices and procedures that railroad managers assumed had either become generic or that were covered by patents for which they had paid a nominal fee.

The most celebrated patent infringement suits involved inventions known as "double-acting" brakes. By the 1860s double-acting brakes had been adopted by railroads throughout the country. Double-acting brakes greatly simplified the routine operations of a train by permitting a brakeman to apply brakes on both ends of a railroad car by turning a single wheel. The technique reduced labor costs and, according to some, extended the life of the railroad cars' wheels. No single prototype existed. The very lack of uniformity in railroad practice provided an opening for Thomas Sayles, an enterprising patent agent who acquired the rights to

three different kinds of double-acting brake. In effect, Sayles tried to create a single, comprehensive composite invention whose rights he controlled. Each variant in this composite had been patented between 1849 and 1852, and one had been reissued in 1853, long before the railroads had expanded to their present dimensions. Nonetheless, Sayles claimed, each of his patents embraced an indispensable element of *any* double-acting brake, while any railroad that used such a brake—which, by the 1860s, meant almost every railroad in the country—had either to pay him a licensing fee or risk a lawsuit for patent infringement.

Sayles's audacity caught railroad managers unawares. To compound their woes, they soon received a major setback in the courts. In *Sayles v. Chicago and Northwestern Railway Company* (1871), a federal court case adjudicated in Chicago, Judge Thomas Drummond awarded Sayles damages in a railroad patent infringement suit on the basis of a recently articulated legal doctrine known as the "doctrine of savings." Prior to this time, courts had customarily required infringers to pay patent holders three times the patent holders' ordinary license fee. Under certain circumstances, however—or so several courts had recently ruled—it was impossible to determine just what a fair price for a patent would be. Not surprisingly, many of these cases involved railroads: after all, it was here, in a technically complex and rapidly expanding industry dominated by large corporations, that it was becoming increasingly difficult to rely on market criteria to value assets.[15] In such a situation, or so Drummond and several of his colleagues on the federal bench decreed, infringers would henceforth be liable to pay patent holders three times the savings they had derived from the use of a patented invention. In the case of Sayles's double-acting brake, attorneys for Sayles pressed Drummond to accept their calculation that the savings railroads had obtained by using Sayles's patent amounted to $455 per railroad car per year. If this total were multiplied to include every railroad car that might be found guilty of infringing on Sayles's patent, the total liability confronting the railroad industry—or so one railroad patent lawyer estimated—would total $45 million, an enormous sum.[16] Although Drummond responded by lowering the per-car total, the total liability for an individual railroad of modest size remained well over $40,000. Larger lines operating more cars and infringing for longer periods would pay far more.

Sayles, of course, was but one patent holder. What might happen, railroad managers brooded, should other patent holders institute similar suits? Compounding their unease was their recognition that, in similar cases, the courts had ruled that the doctrine of savings applied not only when the infringing enterprise had lost money in its overall business

operations but also when a money-making enterprise had proven in court that the patented invention had not been worth the investment.[17]

Potential cost-saving technologies such as double-acting brakes were but one class of patented inventions that confounded railroad managers. Equally daunting was the challenge posed by inventions designed to improve railroad safety. Many of these devices replaced human input with some kind of automatic mechanism. For example, an automatic signal might be activated by the tripping of an electric circuit embedded in a railroad track, eliminating the need for a signalman. An automatic brake, similarly, might be configured to operate independently of the intervention of a brakeman. For various reasons, railroad managers showed little enthusiasm for such novelties and generally resisted public clamor to experiment with them. The public had a right to railroad safety, they proclaimed, but not to dictate to the railroads how they ought best to attain it.[18]

In the changing political climate of the postwar period, the managers' intransigence grew increasingly untenable. To improve railroad safety, several states and municipalities enacted ordinances requiring railroads to fence their lines, slow down in congested areas, stop at crossings, and install in their locomotives fire-preventing spark arrestors. State railroad commissions, originally established primarily to monitor railroad finance, soon turned their attention to the hazards railroads posed.[19] In response to the public outcry that followed a deadly railroad accident in Revere, Massachusetts, in 1871, Massachusetts railroad commissioner Charles Francis Adams Jr. issued two widely circulated reports on railroad safety. The first was directed primarily at industry insiders and stressed the importance of careful planning and the strict enforcement of rules. The second was intended for the railroad-traveling public and included a discussion of such technical fixes as automatic brakes and automatic signals. To determine which worked best, Adams went so far as to promise that the Massachusetts railroad commission would supervise experimental trials.[20]

Among the greatest beneficiaries of Adams's publicity campaign was George Westinghouse Jr., a young inventor who had devised an automatic braking system that used compressed air. Hardly anyone doubted that Westinghouse's air brake could stop a train faster and more reliably than almost any other product on the market. Yet before Adams had issued his second report, only a few railroad managers had placed substantial orders for the devices, and many of those had acted only at the urging of disgruntled passengers. Adams's reports, and the ensuing government-sponsored trials, were a boon for Westinghouse.

The public clamor for air brakes became intense, and legislation mandating their installation was seriously debated not only in several states but also in Congress. Seizing the moment, Westinghouse negotiated lucrative air-brake contracts with several large railroads, and sued others for patent infringement.

Westinghouse's conduct deeply troubled Adams. His reports, he now came to see, had encouraged state legislatures to consider legislation that would, in effect, have granted Westinghouse a lucrative monopoly over an entire class of railroad equipment. To remedy his mistake, Adams and certain railroad managers desperate to circumvent Westinghouse laid plans for a new series of trials intended to showcase promising alternatives to Westinghouse's air brake—such as a brake occupied by vacuum. To the chagrin of Adams and the railroads, Westinghouse promptly purchased the patents that covered the vacuum principle. Before long, Westinghouse would also add to his patent portfolio automatic signaling.

Westinghouse's rapid ascendancy convinced railroad managers of their extreme vulnerability to patent holders with inventions that capitalized on new commercial opportunities that the railroads had done so much to create. To make matters worse, Westinghouse was not alone. Sleeping-car mogul George Pullman, for example, parlayed a portfolio of equipment patents into a popular service—the sleeping car—that railroad passengers came to demand. In an age in which it had become possible to travel thousands of miles by railroad, one could make a good deal of money by providing specialized services for those passengers who had the means and the desire to travel in predictable comfort and style. Meatpackers similarly took advantage of their patents on refrigerator car design to bring dressed meat to consumers in widely dispersed urban markets, in the process depriving railroads of a lucrative business in shipping livestock. While neither Pullman nor the meatpackers benefited as directly from government-generated publicity as had Westinghouse, they too found a sympathetic forum in the courts, which repeatedly voided all attempts by state and local interests to prevent them from operating on a nationwide scale.[21]

Taken together, the doctrine of savings and the emergence of ambitious, nationally oriented inventor-entrepreneurs such as Westinghouse and Pullman put railroad managers in an unenviable position. Were present trends to continue, or so they feared, it seemed likely that the returns on technical innovation in their industry would flow primarily to outsiders. Cost savings derived from productivity-enhancing innovations would pass to patent holders under the doctrine of savings, while innovations that increased safety, enhanced comfort, or provided new

kinds of services would reap large profits for outsiders like Westinghouse and Pullman. Committed to preventing the patent system from throttling their industry, railroad managers turned to Congress—one of the few forums with the necessary authority to grant them relief.

Railroad managers harassed by patent infringement lawsuits first approached Congress in early 1874. Working through industry-wide trade associations that they had established to defend themselves against patent agents, they lobbied to block Congress from exercising its authority to extend Sayles's patents. To their surprise, they found support from an unexpected quarter. For reasons unrelated to the railroad managers' specific grievance—yet that followed directly from the transformation in the scale of economic activity that the railroad had done so much to foster—the issuance of patent extensions had found its way onto the national political agenda.

Patent extensions emerged as a national issue in 1872, when Congress extended a patent for a sewing machine that had originally been granted many years earlier to Elias Howe. This legislative grant enabled the Singer Sewing Machine Company (which controlled Howe's patent) to stifle its competitors while it built its own nationwide marketing network. Although convenient for Singer, the extension outraged the thousands of farmers who had joined together to form the National Grange. Grangers despised Singer. Most bought their sewing machines from Montgomery Ward, a mail-order house that had established a large following among farmers by working through Grange-sponsored cooperatives. Montgomery Ward received a substantial percentage of its revenue from the sale of "knock off" sewing machines, which it sold for roughly half Singer's price. To the Grangers, the price differential between a Singer sewing machine and a Montgomery Ward sewing machine neatly symbolized the oppressive tax patent monopolists extracted from farmers. As the 1874 congressional campaign season heated up, Grangers made opposition to the Singer patent-extention bill a key test of political loyalty. Grange leaders urged their members to defeat any congressman who had supported the bill.[22] Fearing the worst, chastened members of the House committee on patents rejected virtually every new application for patent extensions, including Sayles's. Sayles, they reasoned, had already obtained an adequate return on his investment, having collected substantial damages from his victory in Chicago.

Buoyed by Sayles's defeat, patent attorneys employed by railroad trade associations drafted a model bill to curb the doctrine of savings and limit the financial awards that patent holders could secure from infringers.

To ensure its enactment, these novice lobbyists hoped to tap resentment toward the patent system among Grangers, who, or so they assumed, had sufficient political clout to secure whatever patent legislation they desired. This was a tricky strategy, since the Grangers also disliked the railroads—whom they accused of charging unduly high and unfairly discriminatory rates to ship agricultural staples. Well aware of the Grangers' distrust, railroad attorneys lobbying on behalf of the proposed legislation took particular pains to conceal their role in the bill's formulation.

For a time it looked as if the railroad lobbyists might prevail. The 1874 congressional elections had bolstered the Grangers' political clout by restoring control of the House to the Democrats, a party sympathetic to farmer concerns. In the following session, emboldened farmers flooded Congress with complaints about "patent sharks" who threatened them with lawsuits for the unauthorized use of such ubiquitous devices as the swing gate and the driven well. A patent for the latter claimed to cover the principle of tapping an underground water source by driving a pipe into the ground. To the outrage of thousands of farmers and ranchers in the arid Southwest, patent agents had swarmed into the region warning gate and well users that, if they wished to avoid paying fifty-dollar license fees, they must travel to St. Louis to defend themselves in court. The southwesterners' outrage at the patent agents' audacity was compounded when it became known that the patent office had originally assigned the well patent to a Union army officer who claimed to have invented it while on active duty during the Civil War. Even staunch Unionists wondered why they should have to pay for the rights to an invention that had been devised in wartime by a federal employee.

Railroad lobbyists counted on farmer outrage to help them slip their bill through Congress. Although they prevailed in the House, they failed in the Senate, where the bill died. The bill's defeat—or so contended a member of the House committee on patents, in an assertion that went unchallenged—had been ensured by the backstage maneuvering of "a single senator," presumably Roscoe Conkling.[23]

As railroad attorneys hatched plans to reopen the patent issue during the following session, they found the political landscape decisively transformed. When they had originally introduced the patent bill, even careful students of federal patent policy—such as, for example, the editors of *Scientific American*—had associated it not with the railroads, but, instead, with the Grangers. By the summer of 1877, the cat was out of the bag. Exposed by *Scientific American* as the handiwork of covetous corporations, the patent bill had drawn the attention of wary congressmen, who insisted that, prior to it coming up for a vote, it be substantially

revised and subjected to extensive public hearings conducted by patent committees in both the House and the Senate.[24]

The subsequent hearings, which took place in the winter of 1877–78, posed for railroad lobbyists a major challenge. Here they confronted not only lawyers representing their primary antagonists—Sayles, Westinghouse, and Pullman—but also the Grangers, who, while still fiercely hostile to the patent system, objected strenuously to the omission from the proposed legislation of an "innocent purchaser" provision exempting from legal action anyone who had unwittingly infringed a patent. The phrase "innocent purchaser" touched for many a sensitive nerve—since it had recently been deployed, in a quite different context, by federal courts in the South and West to block state governments from voiding fraudulent railroad bond issues on the rationale that these governments had an obligation to protect the "innocent purchaser" of the bonds. Farm groups did not understand why this principle could not be extended to patents, and had sponsored several "innocent purchaser" patent bills that had been passed by the House.[25]

Challenged by patent holders and rebuffed by farmers, railroad lobbyists turned for support to congressmen who considered themselves liberal in the nineteenth-century sense of opposing big government and supporting market competition.[26] Often dubbed "liberal reformers" to underscore their commitment to constructive legislative change, these congressmen opposed the kind of radical attack on the patent system that farm groups had mounted. Yet in no sense were they merely reactionary defenders of the status quo. On the contrary, liberals hoped to recast the patent system to bring it into better balance with the emergent corporate order. The sponsor of the railroad lobbyists' bill, Bainbridge Wadleigh of New Hampshire, belonged to this group, as did most of its supporters in the Senate. To help make their case, Wadleigh and his allies put railroad lobbyists in touch with like-minded patent lawyers. Prominent among them was Chauncey Smith, a highly successful Cambridge, Massachusetts-based attorney with extensive experience in patent litigation. Smith and his fellow patent lawyers, most of whom hailed from New England (a region that boasted many corporations reliant on patented inventions), redrafted the patent bill and generated friendly testimony on its behalf, which Wadleigh and his Senate allies then drew heavily upon in making the case for reform.

The liberals' argument for patent reform hinged on their probing analysis of the relationship of invention to innovation in an economy increasingly characterized by large and geographically extensive corporations. Where, they asked, was the locus of innovation? And who

should enjoy its fruits? Even in the early days of the patent system, Wadleigh explained, inventors never captured all the savings that their inventions had generated. In fact, inventors had always received only a portion of their return, with the rest flowing to users. Should inventors try to capture the entire return, they would find it necessary to charge for the use of their inventions such an exorbitant price that they would never find a buyer. "In the introduction of inventions to the public use," or so Chauncey Smith informed the Senate committee, in sustaining Wadleigh's argument, "the case rarely if ever, occurs where an inventor is able to place in his own pocket any considerable amount of the value which the community derives from his invention." Accordingly, any statute or legal decision that presupposed such an outcome must "involve in some way some lurking fallacy."[27] Here, in a single phrase, was the essence of the liberals' argument.

The challenge of rewarding inventive activity was particularly vexed, the liberals explained, by the fact that in many industries—such as the railroads—technical change almost always involved far more than the one-time purchase of a patented device in the open market. Here, for example, a great deal of technical change took place independently of the patent system, in the ordinary course of operating the business. To hammer home this point, liberals relied heavily on the evidence that the railroad patent attorneys had presented in their congressional testimony. "All inventions run in lines," one attorney-cum-lobbyist lectured the Senate committee, in a brief tutorial on the nature of technical change: "There is a certain progress and steady improvement in all the arts, and . . . not by virtue of the patent law exclusively. These lines of invention are what is called 'the art.'"[28]

Such arguments persuaded the liberals that at least some railroad employees were at least as creative (since they were well versed in the "art") as the independent inventors that the patent system had been established to encourage. "In the army of inventions that are presented to the railroad companies," one railroad attorney explained, the patent holder had "simply the broad seal of the United States in his hands" while taking it for granted that the railroad itself would "manufacture and introduce the article."[29] To be useful, inventions had to be integrated into a complex array of technical devices and operating procedures, many of which had been devised not by patent holders but, rather, by their users—that is, the railroads. Surely, then, the enterprises that used such inventions should be given some of the credit for creating the conditions that brought them into use. In short, when courts equated the complex process of innovation with the simple act of invention, they exaggerated

the contribution of the outside inventor and slighted the creativity of the company deploying the device or procedure. In so doing, they lost sight of the basic rationale for patent infringement cases, which was not to embolden patent holders to extort fantastically large sums from corporations but to prevent infringers from securing the financial rewards that were the inventors' rightful due.

The railroads' argument proved persuasive to many congressmen, including Wadleigh. It was nothing short of outrageous, Wadleigh contended, for an amateur independent inventor brandishing a sketchily drawn patent claim to hold hostage a legion of technically trained experts. The original design covered by one of Sayles's patents for double-acting brakes, Wadleigh observed, was a "very simple one indeed"—and, he believed, had been proven in court to have been devised by "several workmen in railroad shops" who "did not apply for a patent" and had put it into use on their railroad before anyone else.[30]

Other advocates of patent reform made a related, yet distinct, argument about more technically distinctive inventions, such as the Westinghouse air brake. Without denying that Westinghouse's invention was, in fact, original to Westinghouse, one railroad representative wondered why Westinghouse should be granted a monopoly that exempted him from the competition that characterized all "other branches of trade." "Why should we be obliged to buy any power brake of Westinghouse," the representative asked rhetorically:

> and, in order to be able to protect the lives and property of the people, pay them $150 for what it costs them $10 or $12 to make in the first instance, and then be obliged to buy every part that wears out, whether the piston or the rubber tube, from the manufactory of the patentee, and pay him a like profit? . . . I say it is an outrage, and that so far from receiving such profits upon the manufacturing, they ought to receive a reasonable patent royalty, and be subject to the competition in manufacturing that characterizes all other branches of trade.[31]

The liberals' argument inverted the traditional relationship between the inventor of a novel product or process and its users. Traditionally, inventors were progressive benefactors and users reactionary monopolists. For the liberals, in contrast, the users of patented inventions were the progressive benefactors who rendered them accessible to the general population, while inventors were selfish monopolists fully prepared to withhold the fruits of invention from the general population should it

prove impossible to extort a king's ransom for their use. "The great evil of our society now"—lamented Representative Stephen Hurlbut of Illinois, in an astute summary of the case for patent reform that linked it to a broader cultural concern about the changing meaning of work—"is this undue and unsound desire, which amounts to a mania among the people, to grow suddenly rich without work. I think that the present patent law as it is administered—not in the law itself, but as it is administered—tends to create that appetite, and foster that gambling spirit. I think it holds out the same temptation in the instances of these enormous profits, that have been made from time to time, that are held out by the lottery."[32]

The liberal critique of the patent law did not go unopposed. Among the liberals' most determined foes were New York Senator Roscoe Conkling and a small group of like-minded senators, which included Maryland senator William D. Whyte and Illinois senator David Davis. On the patent issue, Conkling and his allies were bound together less by their admiration for ex-president Ulysses S. Grant than by their long-standing engagement with patent law. Whyte had served as a defense attorney in an influential case that helped established the doctrine of savings. Davis, a former Supreme Court justice, had taken part in many leading patent cases in his years on the bench, and had long cultivated a reputation as a champion of farmers and other independent proprietors. Conkling himself was a seasoned patent lawyer who had recently defended two manufacturers in major infringement suits.[33]

This group's opposition to patent reform drew on a distinctive blend of judicial reasoning and ideologically charged political rhetoric that many found compelling in an age in which corporations had yet to acquire the moral legitimacy that proprietors—then and now—could take for granted. Why, Conkling asked, was it impossible to calculate the savings that an invention might bring *certain* users, such as a railroad or a large manufacturer, but not to others, such as a village blacksmith? How, Conkling asked precisely, did these two kinds of enterprise differ? To drive his point home, Conkling proposed an array of hypothetical examples in which users had incorporated patented inventions and goaded Wadleigh to explain why the doctrine of savings did or did not apply. Why did a state-spanning railroad that incorporated a patented invention into a locomotive deserve relief when a village blacksmith who relied on a patented alloy to harden his metal or who unwittingly installed a patented axle in a wagon did not?

Supporters of patent reform rebuffed Conkling's assault by emphasizing that, under the proposed law, blacksmiths and farmers would

enjoy, in at least certain circumstances, the same privileges as railroads. Undaunted, Conkling raised the rhetorical stakes by assailing the corporations that had supported the bill. "The bill is objectionable," Conkling declared, because it carved out a protection not for the "innocent" and the "defenseless," but rather for "exactly those persons who do not need it": "It is an exemption of aggregated capital, of powerful combinations, of intelligent persons from a rule of law which in the same bill we propose to visit upon the ignorant, the weak, and those who accidentally become subject to it."[34]

Conkling found particularly objectionable those clauses of the proposed legislation that would have excluded railroads and other organized interests from the doctrine of savings. "Who are excluded?" Conkling asked sneeringly: "We know not from this bill, but from other information of which we cannot fail to take notice we do know who the excluded parties are, namely the strong, the rich, the powerful, the owners of aggregated capital, the great mill-owners, the railway corporations of the country."[35]

Conkling's anticorporate rhetoric was echoed by Illinois senator Davis. The reformers' assault on the doctrine of savings, Davis warned, was rooted less in any desire to render the fruits of innovation more accessible, than it was in the "monopoly power" of patent users—including, of course, the railroads—whose "concentrated power is sufficient to ruin any patentee who attempts to bring them to public account."[36]

While Conkling and Davis's rhetoric was unquestionably overheated, it would be a mistake to dismiss it as altogether fatuous. On the contrary, it drew on a highly influential tradition of social thought that exalted producers and demonized corporations.[37] Conkling was hardly a disinterested bystander; as a patent lawyer, he had long derived a tidy income from patent infringement suits—and, thus, had a vested interest in maintaining the status quo. Yet there is good reason to doubt that his anticorporate animus was insincere. His public pronouncements, for example, were echoed by his private dealings: even when Conkling was out of the spotlight, he remained loyal to the time-honored values of the proprietary capitalism of his youth.[38] Conkling's hostility toward the railroad made him somewhat unusual among prominent public figures of his day. Conkling was, or so railroad magnate Collis Huntington believed, incorruptible—a view that seems, at least among railroad leaders, to have been widely shared. Conkling's archrival James K. Blaine was far more willing to hasten an accommodation with the emergent corporate order, especially if there was something in it for himself.[39]

Conkling's defense of the existing patent system, in sum, derived less from the self-interest of a patent lawyer than from a principled allegiance

to the proprietary values that the patent system had been originally intended to sustain. From the standpoint of the proprietary capitalist, the giant railroad corporation was less the harbinger of a new, more technically progressive age than a Frankenstein's monster—a mutant that had grown far larger and more unruly than its government creators had intended. The true monopolist was not the patent holder, and certainly not the independent inventor, but these frightening "aggregations of capital." Anyone who defended this alien creature, whether a liberal like Wadleigh or a political rival like Blaine, deserved the most emphatic rebuke.[40] Yet this was as far as Conkling was willing to go. Unlike the Grangers, Conkling refused to support innocent purchaser provisions that would have gutted the existing patent system. Like the similar appeals to repudiate bonds and other financial obligations of government, these proposals threatened the property rights that Conkling deemed essential to proprietary capitalism—rights that he believed the government had an obligation to defend.

Even before Conkling's obstructionism killed the proposed patent reform bill, railroad attorneys who had lobbied Congress had begun to reap dividends from an alternative approach that focused on the courts. In October 1878, in *Railway Company v. Sayles*, the U.S. Supreme Court rendered its judgment regarding Thomas Sayles's claims for double-acting brakes. In his opinion, Justice Joseph P. Bradley refrained from making any sweeping pronouncements about the possible relevance to the case of the doctrine of savings; instead, Bradley honed in on the specific details of the patent claims that Sayles had advanced. In particular, Bradley denied Sayles's contention that every double-acting brake system necessarily relied on essential, indispensable principles derived from each of the three patents that Sayles controlled. On the contrary, Bradley concluded, the patents merely covered three possible solutions to a problem that had been "in the air" thirty years before, when the original patents had been issued. Each patent covered a particular arrangement—and nothing more. Railroads that had obtained rights to the patent that covered the arrangement they relied on, or that had adopted some other design, need not fear that they might one day have to pay patent holders tens of thousands of dollars for infringing on their patents. In this way, to draw on a concept familiar to students of patent law today, Bradley had severely restricted the scope of Sayles's patents.[41]

Bradley's ruling in *Railway Company v. Sayles* was but one of several in which he advanced an argument that could be plausibly characterized as pro-railroad. Before Bradley joined the Supreme Court, he had served

for many years as chief counsel to the Camden and Amboy Railroad, an enterprise notorious for its artful manipulation of the legal process. And while on the Court, Bradley had steadfastly rebuffed litigants who sought legal rulings to relieve state and local legislatures from the obligation to pay railroad bondholders even in instances in which the original bond issue had been tainted by fraud.

Yet if Bradley's railroad rulings are considered in their entirety, a more nuanced picture emerges. For example, in the landmark case of *Munn v. Illinois* (1877), Bradley upheld the constitutionality of state railroad regulation—a decision railroad managers vociferously opposed—while, in various railroad passenger liability cases, Bradley consistently held up railroads to high standards. It would be equally misleading to assume that Bradley invariably favored corporate interests in patent disputes. In a famous 1888 telephone patent case, for example, Bradley dissented from Chief Justice Morrison Waite's monumental decision to uphold the legality of Alexander Graham Bell's telephone patents, a decision that became a cornerstone of the legally sanctioned monopoly of telephone giant American Bell.[42]

Bradley's ruling in *Railway Company v. Sayles*, like most of his decisions pertaining to business, is best explained not by his supposed procorporate bias but, rather, by his creative engagement with the problem of monopoly. Relying on distinctions far more supple than those that Conkling had employed, Bradley articulated in these decisions a theoretically compelling yet empirically grounded critique of monopoly power. Not only in *Munn*, but also in the *Slaughterhouse Cases* (1873), Bradley based his decisions primarily on his assessment of whether or not the institution that had become the subject of litigation did or did not enjoy in practice an exclusive monopoly. Bradley's rulings in the railroad passenger safety cases, similarly, hinged on his determination that railroad passengers lacked the alternative means of transit that would have absolved the carrier from the responsibilities that monopoly power entailed.[43]

In reaching his decisions, Bradley took great care to establish the specific facts involved in each particular situation. A similar sensibility informed his rulings in patent cases. Determined to balance the rights of patent holders against those of the public, Bradley immersed himself in technical detail. If inventors could persuasively establish a solid claim to distinctiveness and originality, Bradley was willing to interpret their patent broadly—even if his ruling might cause substantial harm to established industries that relied on their invention. But his standards were strict.[44]

The disciplined imagination that informed Bradley's approach toward what we would today call patent scope is evident in two of his rulings—both widely cited—that had obvious parallels to his decision in *Railway Company v. Sayles*. In *Mitchell v. Tilghman* (1874), Bradley dissented from the majority, which had narrowly construed a patent for a method of obtaining glycerin from animal fat. The glycerin patent, like the patents for double-acting brakes, dated back to the 1850s; in this case, however, Bradley ruled against an infringer who claimed his particular means of obtaining glycerin fell outside the patent.[45] When, in *Tilghman v. Proctor* (1881), the Supreme Court revisited the glycerin patent, Bradley's broad reading prevailed. This decision proved to be a major financial embarrassment for Procter and Gamble, the nation's largest manufacturer of glycerin.[46] In a majority decision in *Brown v. Selby* (1874), Bradley likewise construed broadly an 1854 patent for a mechanical corn planter. Here Bradley once again reversed a decision by Judge Drummond, the judge in the Sayles case; yet, on this occasion, he did so on precisely the opposite grounds. Drummond had held the corn planter patent invalid because its inventor had "swelled claims" and had tried to "lay his hands on the corn planting machine entire."[47] Bradley demurred in an erudite ruling that was, as legal historian Charles Fairman has observed, of "extraordinary length" and based entirely on the "factual details of the case."[48]

By grounding so many of his patent decisions in specifics, Bradley kept patent law relatively unencumbered by abstract principles—such as the doctrine of savings—that might unintentionally foster the abuse of monopoly power. Bradley's method proved influential: not only was he the author of many of the most important Supreme Court patent decisions, but he won over many of his legal colleagues to the merits of his approach. In following this course, the federal courts could apply patent law much more flexibly than could Congress, which must in its legislation prescribe comprehensive remedies applicable to all cases.

In at least one court ruling, however, Bradley provided a sweeping justification for the changing locus of innovation in the emerging corporate order. "The process of development in manufactures," Bradley declared in 1883 in *Atlantic Works v. Brady*,

> creates a constant demand for new appliances, which the skill of the ordinary head-workmen and engineers is generally adequate to devise, and which, indeed, are the natural and proper outgrowth of such development. Each step forward prepares the way for the next, and each is usually taken by spontaneous trials in a hundred

> different places. To grant a single party a monopoly of every slight advance made, except where the exercise of invention somewhat above ordinary mechanical or engineering skill is distinctly shown, is unjust in principle and injurious in its consequences . . .
>
> It was never the object of [the patent] laws to grant a monopoly for every trifling device, every shadow of a shade of an idea, which would naturally and spontaneously occur to any skilled mechanic or operator in the ordinary progress of manufacturers. Such an indiscriminate creation of exclusive privileges tends rather to obstruct than to stimulate invention.
>
> It creates a class of speculative schemers, who make it their business to watch the advancing wave of improvement and gather its foam in the form of patented monopolies, which enable them to lay a heavy tax upon the industry of the country without contributing anything to the real advancement of the art. It embarrasses the honest pursuit of business with fears and apprehensions of concealed liens and unknown liabilities to law suits and vexatious accountings for profits made in good faith.[49]

Interestingly, Bradley's effusive tribute to the technical virtuosity of the "ordinary head-workmen"—as well as his conviction that the patent system had never been intended to grant a monopoly to a "class of speculative schemers" intent on capitalizing on "every trifling device" and "every shadow of the shade of an idea"—echoed almost word for word the arguments that railroad patent attorneys had devised in the double-acting brake cases and that, in their capacity as lobbyists, they had subsequently deployed in the congressional hearings on patent reform in 1878–79. Not surprisingly, railroad leaders were quick to publicize Bradley's statement; it was, for example, quoted at length in the 1885 annual report of the Eastern Railroad Association.[50]

Bradley's peroration in *Atlantic Works v. Brady* tilted the balance to the railroads in their ongoing struggle to keep independent inventors and patent holders at bay. Building on Bradley's ruling, railroad managers worked through trade groups such as the Eastern Railroad Association to identify technical precedents for patented inventions in their own shops and facilities. The principle of priority was important since, in American law, inventors could not rightfully claim a patent for inventions already in use at the time of their application. Railroad managers also redoubled their efforts to monitor their own inventive activity.

In addition to prohibiting unauthorized experiments, they discouraged employees from marketing patented inventions themselves, and required employees who might have devised patentable inventions to assign their rights to their employers. Before long, control over railroad technology passed into the hands of organized bureaucracies that established centralized testing facilities staffed by experts.[51] The age of the independent inventor was passing; the age of corporate research and development had begun.[52]

The challenge railroads posed for the patent system was but one dimension of a more general phenomenon. Railroads were the harbingers of an emergent corporate order that was closely bound with the coordination of complex technical systems. By 1900, analogous technical systems would come to dominate many industries. For a time in the early twentieth century—a period often termed the "Progressive Era"—the regulation of these technical systems would become a central focus of American politics at the federal, state, and local level.[53] From this period of intense contestation would emerge the twentieth-century administrative state.[54]

The organizational capabilities of the twentieth-century state would have startled lawmakers of Roscoe Conkling's generation. Yet it would be a mistake to exaggerate its novelty, for it built on much that had gone before. The public debate over patent reform in the post–Civil War decades, both in Congress and the courts, had demonstrated the intellectual earnestness and moral intensity with which contemporaries grappled with the emergent corporate order decades before the rise of big business would preoccupy lawmakers of the Progressive Era. Indeed it was the high intellectual caliber with which lawmakers grappled with such complex issues as patent rights—far more than the often-exaggerated moral failings of individual politicians—that may well be the most distinctive policy legacy of the age.[55]

The caliber of this debate owed much to the particular social milieu in which it occurred—a milieu in which the competing moral claims of proprietary capitalism and corporate capitalism remained in creative tension. The principal challenge lawmakers confronted was the design of a regulatory regime that could accommodate both. The solutions they proposed naturally differed in some important respects from those of their early twentieth-century successors. By the Progressive Era, corporations had become ubiquitous, and politicians from across a wide spectrum looked for the federal government to reach some sort of accommodation with them. In the 1870s, the ranks of reformers were far smaller, and the relationship of the federal government toward the corporation remained

far more adversarial, a circumstance that did much to energize public debate. Why congressmen like Conkling were so unabashed in attacking corporate power is an intriguing question. At least in part, it was because corporations remained on the periphery of the more traditional, proprietary economic order that continued to account for the bulk of the country's economic activity.[56]

Although legislators and judges dominated the public debate, other groups loomed large. Patent lawyers, specialized journalists, industry lobbyists, and the federal administrators who staffed the patent office all shaped the evolving regulatory regime. The role of the patent office was particularly notable, not the least because it is so often overlooked. Here was a bastion of administrative autonomy deep within the federal bureaucracy that exerted a subtle yet pervasive influence on public policy. The patent office anchored the ever-broadening community of experts, including influential figures in Congress and the courts who interacted with it as lawmakers and litigants. Among these litigants were the railroad patent attorneys who, during the congressional patent debate of 1878–79, evolved into some of the nation's earliest corporate lobbyists. By floating ideas that would soon be incorporated into proposed legislation and court decisions, this small yet influential group carved out for itself a distinctive niche in the policy arena. In so doing, they became an integral part of the policy process.[57] At the vanguard of what we would today call interest-group politics, these lobbyists—in conjunction with trade groups such as the Eastern and Western Railroad Associations and the National Grange—helped not only to shape the political economy of the late nineteenth century but also to link it with the political economy of today.

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Notes

1. *Arguments before the Committees on Patents of the Senate and the House*, 45th Cong., 3d sess., 1878, S. Misc. Doc. 50, serial 1788 (hereafter *Arguments*).

2. The literature on the late nineteenth-century state is vast. For a brief introduction, see Richard R. John, "Farewell to the 'Party Period': Political Economy in Nineteenth-Century America," *Journal of Policy History* 16: 2 (2004): 117–25. Two useful review essays are Charles W. Calhoun, "Late Nineteenth-Century Politics Revisited," *History Teacher* 27 (May 1994): 325–37, and Calhoun, "Political Economy in the Gilded Age: The Republican Party's Industrial Policy," *Journal of Policy History* 8 (April 1996): 291–309. For a critique of the "courts and parties" framework, see John, "Governmental Institutions as Agents of

Change: Rethinking American Political Development in the Early Republic, 1787–1835," *Studies in American Political Development* 11 (Fall 1997): 347–80.

3. On the monopoly problem in nineteenth-century America, see Herbert Hovenkamp, *Enterprise and American Law, 1836–1937* (Cambridge, Mass., 1991). On the link between the monopoly problem and patent policy, see Steven W. Usselman, *Regulating Railroad Innovation: Business, Technology, and Politics in America, 1840–1920* (New York, 2002), chap. 4.

4. Usselman, *Regulating Railroad Innovation,* chap. 1, and James Livingston, *Pragmatism and the Political Economy of Cultural Revolution, 1850–1940* (Chapel Hill, 1994), chap. 2. See also Alfred D. Chandler Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), part 2.

5. In 1847, the Patent Office received 1,531 patent applications and issued 572 patents (a 37 percent success rate). In 1871, it received 19,472 patent applications and issued 13,033 patents (a 67 percent success rate). *Report of the Commissioner of Patents,* 42d Cong., 2d sess., 1872, H. Ex. Doc. 86, serial 1511, 8.

6. For a brief but valuable discussion of patent lobbying during the Grant administration, see Margaret Susan Thompson, *The 'Spider's Web': Congress and Lobbying in the Age of Grant* (Ithaca, 1986), esp. 264–70.

7. The nineteenth-century patent system has attracted a great deal of attention. See, for example, Hugo Meier, "Technology and Democracy, 1800–1860," *Mississippi Valley Historical Review* 43 (March 1957): 618–40; Robert C. Post, *Physics, Patents, and Politics: A Biography of Charles Grafton Page* (New York, 1976); Eugene S. Ferguson, *Oliver Evans: Inventive Genius of the American Industrial Revolution* (Greenville, Del., 1980), 52–59; Brooke Hindle, *Emulation and Invention* (New York, 1981), 16–23 and 42–43; Morgan Sherwood, "The Origins and Development of the American Patent System," *American Scientist* 71 (September–October 1983): 500–506; Kenneth L. Sokoloff and B. Zorina Khan, "The Democratization of Invention during Early Industrialization: Evidence from the United States," *Journal of Economic History* 50 (June 1990): 363–78; Carolyn C. Cooper, *Shaping Invention: Thomas Blanchard's Machinery and Patent Management in Nineteenth-Century America* (New York, 1991); Steven Lubar, "The Transformation of Antebellum Patent Law," *Technology and Culture* 32 (October 1991): 932–59; I. Bernard Cohen, *Science and the Founding Fathers: Science in the Political Thought of Thomas Jefferson, Benjamin Franklin, John Adams, and James Madison* (New York, 1995), 237–43; B. Zorina Khan, "Property Rights and Patent Litigation in Early Nineteenth-Century America," *Journal of Economic History* 55 (March 1995): 58–97; and Khan, *The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790–1920* (Cambridge, forthcoming).

8. Crosbie Smith and M. Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin* (New York, 1989).

9. Harry N. Scheiber, "Federalism and the American Economic Order, 1789–1910," *Law and Society Review* 10 (1975): 57–118.

10. On the postal system, see Paul Starr, *The Creation of the Media: Political Origins of Modern Communications* (New York, 2004), chap. 3, and Richard R. John, *Spreading the News: The American Postal System from Franklin to Morse* (Cambridge, Mass., 1995), esp. chaps. 1–3. On the military, see Mark R. Wilson, "The Politics of Procurement: Military Origins of Bureaucratic Autonomy," in this issue of the *Journal of Policy History.*

11. Robert C. Post, "'Liberalizers' versus 'Scientific Men' in the Antebellum Patent Office," *Technology and Culture* 17 (January 1976): 24–54.

12. On regional perceptions of the patent system, see Ari Hoogenboom, *The Presidency of Rutherford B. Hayes* (Lawrence, Kans., 1988), 117.

13. Usselman, *Regulating Railroad Innovation,* chap. 2.

14. Patent totals are taken from the patent commissioner's annual reports, which appeared annually in the congressional serial set. For the period discussed here, these reports include only sketchy information about patents specific to railroads. For the 1852

total, see *Report of the Commissioner of Patents for 1852,* 32d Cong., 2d sess., 1853, Sen. Ex. Doc. 55, serial 667, 438. The total for 1865 appears in the *Report of the Commissioner of Patents for 1865,* 39th Cong., 1st sess., 1866, H. Ex. Doc. 52, serial 1257, 18.

15. The key cases are: *Mowry v. Whitney,* 14 Wall 620 (1872), reversing *Whitney v. Mowry,* 29 F. Cas. 1105 (1870); *Mevs v. Conover,* 131 U.S. 142 (1877), affirming *Conover v. Mevs,* 6 F. Cas. 322 (1868) and *Conover v. Mevs,* 11 Blachf. 197 (1873); and *Cawood Patent,* 94 U.S. 695, reversing in part *Turrill v. Illinois Central Railroad Company,* 24 F. Cas. 383 (C.C.N.D.Ill. 1867), 24 F. Cas. 385 (1871), and 24 F. Cas. 387 (1873).

16. *Sayles v. Chicago and NW Ry Co.,* 21 F. Cas. 600 (1871). The case first came before the federal district court in 1865 and reached the Supreme Court in 1878. *Sayles v. Chicago and NW Ry Co.,* 21 F. Cas. 597 (1865); *Railway Company v. Sayles,* 99 U.S. 554, 556–57 (1878). See also *Arguments,* 229; and John J. Harrower, *History of the Eastern Railroad Association* (1905), 23, 29.

17. For the relevant cases, see note 15 above.

18. On the forty-year contest between the government and the railroads over safety appliances, see Usselman, *Regulating Railroad Innovation,* chaps. 3, 8.

19. David O. Stowell, *Streets, Railroads, and the Great Strike of 1877* (Chicago, 1999).

20. On Adams, see Thomas K. McCraw, *Prophets of Regulation* (Cambridge, Mass., 1984), chap. 1.

21. Charles W. McCurdy, "American Law and the Marketing Structure of the Large Corporation, 1875–1890," *Journal of Economic History* 38 (September 1978): 631–49; Richard Franklin Bensel, *The Political Economy of American Industrialization, 1877–1900* (New York, 2000), chap. 5.

22. On the Grangers' hostility to Singer, see Hal Barron, *Mixed Harvest: The Second Great Transformation in the Rural North, 1870–1930* (Chapel Hill, 1997), 172. The Grangers also supported state legislation to bar Singer agents from individual states. When the Supreme Court declared this legislation unconstitutional, it greatly hastened the emergence of national marketing networks. McCurdy, "American Law and the Marketing Structure."

23. *Arguments,* 438. The Senate bill, according to one newspaper account, should have been enacted in March 1877, but it was "pushed over." *New York Times,* 14 July 1878, 6.

24. *Scientific American* closely monitored legislative and judicial actions pertaining to the patent system, while its editors frequently commented on major policy changes. For the editors' shifting analysis of the patent bill, see *Scientific American:* 17 March 1877, 36: 161, 15 December 1877, 37: 368, and 13 April 1878, 38: 224.

25. Innocent purchaser bills often found their way to the House; their deliberations can be followed in the patent committee's annual reports. On the bond cases, see Charles Fairman, *Reconstruction and Reunion, 1864–1888: History of the Supreme Court of the United States, Part One* (New York, 1971), chaps. 17, 18.

26. John G. Sproat, *'The Best Men': Liberal Reformers in the Gilded Age* (New York, 1968). On the liberals, see, in addition to Sproat, David Montgomery, *Beyond Equality: Labor and the Radical Republicans, 1862–1872* (New York, 1967); William Gillette, *Retreat from Reconstruction, 1869–1879* (Baton Rouge, 1979); Michael McGerr, *The Decline of Popular Politics* (New York, 1986); Eric Foner, *Reconstruction* (New York, 1988), chap. 10–12; and Nancy Cohen *The Reconstruction of American Liberalism, 1865–1914* (Chapel Hill, 2002). On the enthusiasm of liberals for administrative expertise, see Thomas L. Haskell, *The Emergence of Professional Social Science: The American Social Science Association and the Nineteenth-Century Crisis of Authority,* rev. ed. (Baltimore, 2000 [1977]), and Stephen Skowronek, *Building a New American State: The Expansion of National Administrative Capacities, 1877–1920* (New York, 1982), esp. 132–38.

27. *Arguments,* 45.

28. Ibid., 110.

29. Ibid., 128.

30. Ibid., 32, 38.

31. Ibid., 114–15.

32. Ibid., 439.

33. Alfred R. Conkling, *The Life and Letters of Roscoe Conkling, Orator, Statesman, Advocate* (New York, 1889), 491–93, 571–73.

34. *Cong. Rec.,* 45th Cong., 3d sess., 15 January 1879, 8: 460.

35. *Cong. Rec.,* 45th Cong., 3d sess., 17 January 1879, 8: 523.

36. *Cong. Rec.,* 45th Cong., 3d sess., 19 December 1878, 8: 305.

37. For a survey of the tension between proprietary and corporate (or "capitalistic") values, see Tony A. Freyer, *Producers versus Capitalists: Constitutional Conflict in Antebellum America* (Charlottesville, 1994).

38. The propensity of historians to exaggerate the corruption of post–Civil War public figures such as Conkling is a recurrent theme of Mark Wahlgren Summers's *Era of Good Stealings* (New York, 1993). Conkling, Summers concluded, was as "personally honest" as William H. Seward, though no less willing to "close an eye" to whatever "dirty deals" his lieutenants back in New York might be orchestrating (28).

39. So long as Conkling remained in Congress, railroad magnate Collis Huntington confided to his partners, he "would take nothing from us." David J. Rothman, *Politics and Power: The United States Senate, 1869–1901* (Cambridge, Mass., 1966), 196–97. The extent to which Conkling was *less* solicitous than Republican rivals to the railroads and other organized economic interests was noted half a century ago by political historian Lee Benson. For example, Conkling gave New York Central Railroad lobbyist Chauncey Depew a "sharp going over" at the hearings of the Windom Committee in 1873—the first hearings at which Congress considered the subject of railroad regulation in any detail. Conkling remained antagonistic to the New York Central and other "corporate monopolies" until his resignation from Congress in 1881. Lee Benson, *Merchants, Farmers, and Railroads: Railroad Regulation and New York Politics, 1850–1887* (Cambridge, Mass., 1955), 156–60. For a more skeptical view of Conkling's relationship with corporations, see Charles J. McClain, "From the Huntington Papers: The Huntington-Conkling Connection," *Pacific Historian* 29 (Winter 1985): 30–46, and Richard White, "Information, Markets, and Corruption: Transcontinental Railroads in the Gilded Age," *Journal of American History* 90 (June 2003): 19–43.

40. *Cong. Rec.,* 45th Cong., 3d sess., 24 January 1879, 8: 717, 723; 6 February 1879, 8:1069; 8 February 1879, 8: 1146; and 1 March 1879, 8: 2257–59. Conkling resigned from the Senate shortly after the inauguration of President James K. Garfield in 1881 in a dispute over patronage appointments in the New York Custom House. Conkling's departure has often been interpreted as the last gasp of a machine politician. Rothman, *Politics and Power,* 32–35. Yet Conkling's position on patent law suggests that his quarrel with the Garfield administration might have extended to the "great commercial and industrial questions" that Garfield considered the real business of the day. Thompson, *Spider's Web,* 113.

41. Robert P. Merges and Richard R. Nelson, "The Complex Economics of Patent Scope," *Columbia Law Review* 90 (1990): 839–916.

42. On Bradley's tenure on the Supreme Court, see Charles Fairman, *Reconstruction and Reunion,* whose analysis we follow closely here. See also Edward G. White, *The American Judicial Tradition: Profiles of Leading American Judges* (New York, 1976), chap. 4.

43. *Railroad Company v. Lockwood,* 17 Wallace 357 (1873), and *Railway Co. v. Stevens,* 95 U.S. 655 (1878).

44. An analogous argument informed Bradley's majority opinion in an influential 1879 copyright case, *Baker v. Selden,* 101 U.S. 99 (1879). Selden claimed that a book he had copyrighted in 1859 covered the essential principles of the bookkeeping method it described, and that subsequent books on the subject violated his copyright. Bradley ruled that Selden's book covered only the particular expression of his accounting method and not the idea itself. By firmly upholding the dichotomy between an idea and its expression, and by stressing the importance of empirically verifying the author's claims, Bradley extended to copyright law principles long central to patent litigation. "To give to the

author of the book an exclusive property in the art described therein," Bradley declared, "when no examination of its novelty has ever been officially made, would be a surprise and a fraud upon the public." Quoted in Siva Vaidhyanathan, *Copyrights and Copywrongs: The Rise of Intellectual Property and How It Threatens Creativity* (New York, 2001), 29–30.

45. *Mitchell v. Tilghman,* 19 Wallace 287 (1874).

46. *Tilghman v. Proctor,* 102 U.S. 707 (1881).

47. *Brown v. Selby,* 21 Wallace 181 (1874).

48. Fairman, *Reconstruction and Reunion,* 122–23.

49. *Atlantic Works v. Brady,* 107 U.S. 192 (1883), 199–200.

50. *Annual Report of the Executive Committee of the Eastern Railroad Association* 19 (1885): 16.

51. For a more extended discussion, see Usselman, *Regulating Railroad Innovation,* chap. 5–7, 9.

52. On the rise of corporate industrial research, and the concomitant changes in legal doctrine, see David F. Noble, *America by Design: Science, Technology, and the Rise of Corporate Capitalism* (New York, 1977), esp. chap. 6, and David A. Hounshell, "Industrial Research and Manufacturing Technology," in *Encyclopedia of the United States in the Twentieth Century,* ed. Stanley I. Kutler (New York, 1996), 2:831–57.

53. Martin J. Sklar, *The Corporate Reconstruction of American Capitalism, 1890–1916: The Market, the Law, and Politics* (New York, 1988).

54. For a variety of perspectives on early twentieth-century state-building, see Skowronek, *Building a New American State;* Morton Keller, *Regulating a New Economy: Public Policy and Economic Change in America, 1900–1933* (Cambridge, Mass., 1990); and Daniel P. Carpenter, *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862–1928* (Princeton, 2001).

55. For a related conclusion, see Allan G. Bogue, *The Earnest Men: Republicans of the Civil War Senate* (Ithaca, 1981), 296. No one who has studied closely the public pronouncements of mid-nineteenth-century senators, Bogue observed, can argue that they "took their tasks and obligations lightly": "Obviously, too, they attached considerable importance to showing themselves to be consistent in their approach to specific issues."

56. To emphasize the adversarial character of government-business relations in the 1870s calls into question the long-standing consensus of business historians that the so-called "adversarial relationship" between government and business originated in the period after 1880, and reached its peak in the period after 1900. For a convenient statement of this thesis—which has long been associated with Alfred D. Chandler Jr.—see Thomas K. McCraw, "Business and Government: The Origins of the Adversary Relationship," *California Management Review* 26 (Winter 1984): 33–52, esp. 39–41.

57. On the continuing involvement in patent issues of the Eastern Railroad Association, see Usselman, *Regulating Railroad Innovation,* chap. 4. On the growing legitimacy of organized groups in the framing of public policy, see Elisabeth S. Clemens, *The People's Lobby: Organizational Innovation and the Rise of Interest Group Politics in the United States, 1890–1925* (Chicago, 1997).