

ARTICLE

SPEEDY FRED TAYLOR AND THE IRONIES OF ENTERPRISE LIABILITY

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Neither the academic literature nor the tort reform lobby has observed a deep irony in the American law of enterprise liability. The intellectual roots of enterprise liability lie in a late nineteenth-century movement to reengineer the workplace, a movement whose best known exponent was scientific manager Frederick Winslow Taylor. Along with a generation of managerial engineers, Taylor popularized broad ideas about managerial responsibility for the operations of enterprise—ideas that when loosed on the decentralized institutions of American tort law ultimately found one of their strongest expressions in the law of enterprise liability. Enterprise liability thus stands as one of the great twentieth-century examples of the unanticipated consequences of social action.

This Article is a modest study in what sociologist Robert Merton famously labeled “the unanticipated consequences of purposive social action.”¹ Half a century ago, scholarship relating to this phenomenon was closely associated with intellectual skepticism of the totalizing aspirations of twentieth-century bureaucratic nation-states.² The common theme in the unanticipated consequences literature was the notion that the interactions of millions of individuals in a modern society were simply too complex to model for purposes of centralized social planning. Classic examples thus included (in sociology) the unanticipated results of the Tennessee Valley Authority, whose commitment to working through local organizations seemingly hindered its pioneering conservation efforts,³ or

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1. Robert Merton, *The Unanticipated Consequences of Purposive Social Action*, 1 *Am. Soc. Rev.* 894, 894 (1936).

2. For examples of this skeptical approach, see Karl Popper, *The Poverty of Historicism* 89–91 (Harper & Row 1964) (1957); 1 F.A. Hayek, *Law, Legislation and Liberty: Rules and Order* 11–15 (1973).

3. See Philip Selznick, *TVA and the Grass Roots: A Study in the Sociology of Formal Organization* 209–10, 257 (1949). For a recent account with similar themes, see generally James C. Scott, *Seeing Like a State: How Certain Schemes to Improve the Human Condition Have Failed* (1997).

(in economics) rent control legislation that was said to harm the very people it was intended to assist.⁴ In each of these cases, and in many more, a dizzying array of social interactions made central planning an apparently quixotic, even foolhardy project.⁵ Attempts by the state to reengineer social life, in short, inevitably tripped over what Milton Friedman (apparently following professor-turned-congressman Dick Arney) called government's "invisible foot."⁶

This article inverts the state-to-society trajectory typical of the heyday of unanticipated consequences studies. The mid-twentieth-century unanticipated consequences literature focused on the complex and unpredictable effects of state action in civil society. I am interested instead in the unforeseen consequences of rationalized planning in civil society—and in particular in the nature of the firm—when filtered through the sheer complexity of the decentralized institutions that make up the American legal system. More specifically, my aim is to focus on late nineteenth- and early twentieth-century scientific management of the firm, which was among the United States's leading contributions to twentieth-century totalizing institutions.⁷ I want to suggest that the rise of scientific management is linked to a later development familiar to today's tort lawyers, and bitterly opposed by the managers who carry on Frederick Winslow Taylor's legacy: the emergence and expansion of "enterprise liability" during the second half of the twentieth century.

By "enterprise liability," I mean the theory that business enterprises should pay for injuries they cause because they are in the best position to avoid causing such injuries, and because they are better able to spread the costs associated with them. Scholars disagree, to be sure, over the precise contours of the rise of enterprise liability.⁸ Moreover, it seems

4. See Richard A. Posner, *Economic Analysis of Law* 167–72 (1st ed. 1972); see also Cass R. Sunstein, *Free Markets and Social Justice* 282–83 (1997) (listing rent control and an array of other regulatory measures that are said to have self-defeating consequences).

5. See Richard Vernon, *Unintended Consequences*, 7 *Pol. Theory* 57, 57 (1979); Richard M. Weiss, *Weber on Bureaucracy: Management Consultant or Political Theorist?*, 8 *Acad. of Mgmt. Rev.* 242, 243 (1983).

6. David Maraniss, *Arney Arsenal: Plain Talk and Dramatic Tales*, *Wash. Post*, Feb. 21, 1995, at A1; Steven M. Gillon, "That's Not What We Meant to Do": Reform and Its Unintended Consequences in Twentieth-Century America 26 (2000). The story has it that Arney, then a professor at North Texas State University, won a contest held by Friedman in the latter's *Newsweek* column for the best phrase to describe the harms caused by government intervention.

7. The penitentiary was among the United States's leading nineteenth-century rationalizing institutions; its subsequent morbid progress places it among the U.S.'s leading contributions in the twentieth century as well. See David J. Rothman, *Behavior Modification in Total Institutions*, in *American Law and the Constitutional Order* 293, 293 (Lawrence M. Friedman & Harry N. Scheiber eds., enlarged ed. 1988) (1978).

8. Some argue that the rise of enterprise liability represented a shift toward absolute or strict liability. E.g., Guido Calabresi & Jon T. Hirschoff, *Toward a Test for Strict Liability in Torts*, 81 *Yale L.J.* 1055, 1056–61 (1972); John G. Fleming, *The Role of Negligence in Modern Tort Law*, 53 *Va. L. Rev.* 815, 837–40 (1967); Charles O. Gregory, *Trespass to Negligence to Absolute Liability*, 37 *Va. L. Rev.* 359, 382–97 (1951); George L. Priest, *Can*

clear that the enterprise liability “revolution” has stopped short of the successes once envisioned for it. Yet virtually everyone agrees that tort liability expanded dramatically after 1960 in fields such as products liability, medical malpractice, and landowner and occupier liability.⁹ This expansion of liability has made enterprise liability among the most significant developments in tort doctrine over the past half century.

The central ideas of enterprise liability found their first significant expression not in the decisions of mid-century torts judges, nor in the programs of Progressive Era reformers (let alone in the advocacy of the plaintiffs’ bar), but rather in the efforts of late nineteenth- and early twentieth-century engineers to remake the firm. The postmodern view of the firm sees it not as a hierarchical planned institution but as a nexus of contracts, a kind of horizontal marketplace in which labor and capital come together for productive ends.¹⁰ But it is no coincidence that this current interpretation of the firm vies with an older, high-modernist conception of the firm as a hierarchical, authoritarian alternative to contracting in the market.¹¹ The older tradition found its pure type in the idea of scientific management, a notion that was exceptionally vigorous in the United States, and indeed has long been identified as an American phenomenon. As formulated by early managerial engineers such as Taylor, scientific management’s basic aim was to establish breathtaking new powers over the management of the firm, and indeed over workers themselves, and to persuade employees and the public that managers were properly responsible for even the most minute details of the production process.

Absolute Manufacturer Liability Be Defended?, 9 *Yale J. Reg.* 237, 253–54 (1992) [hereinafter Priest, *Absolute Manufacturer Liability*]; George L. Priest, *Modern Tort Law and Its Reform*, 22 *Val. U. L. Rev.* 1, 7, 10 (1987). Other appraisals contend that the transformation of tort law stopped short of becoming a regime of strict liability, but eliminated many of the doctrinal obstacles to plaintiff recovery from negligent defendants. See James A. Henderson, Jr. & Aaron D. Twerski, *Closing the American Products Liability Frontier: The Rejection of Liability Without Defect*, 66 *N.Y.U. L. Rev.* 1263, 1329–30 (1991); Robert L. Rabin, *Some Thoughts on the Ideology of Enterprise Liability*, 55 *Md. L. Rev.* 1190, 1208–09 (1996); Robert L. Rabin, *Tort Law in Transition: Tracing the Patterns of Sociolegal Change*, 23 *Val. U. L. Rev.* 1, 24 (1988) [hereinafter Rabin, *Tort Law in Transition*]; Gary T. Schwartz, *The Beginning and the Possible End of the Rise of Modern American Tort Law*, 26 *Ga. L. Rev.* 601, 605–09 (1992) [hereinafter Schwartz, *Beginning and Possible End*]; Gary T. Schwartz, *The Vitality of Negligence and the Ethics of Strict Liability*, 15 *Ga. L. Rev.* 963, 968 (1981).

9. See Peter H. Schuck, *The New Judicial Ideology of Tort Law*, in *New Directions in Liability Law* 4, 4–5 (Walter Olson ed., 1988). The expansion of tort liability slowed and perhaps even reverted itself in the 1980s. See Theodore Eisenberg & James A. Henderson, Jr., *Inside the Quiet Revolution in Products Liability*, 39 *UCLA L. Rev.* 731, 741–44 (1992); James A. Henderson, Jr. & Theodore Eisenberg, *The Quiet Revolution in Products Liability: An Empirical Study of Legal Change*, 37 *UCLA L. Rev.* 479, 488–98 (1990).

10. Michael L. Jensen & William H. Meckling, *Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure*, 3 *J. Fin. Econ.* 305, 310–12 (1976).

11. See R.H. Coase, *The Nature of the Firm*, 4 *Economica* (n.s.) 386, 388 (1937).

Most significant for my interests here, Taylorism's beginnings were closely bound up in efforts to systematize the way in which firms dealt with industrial accidents. Beginning in the 1880s, a number of sophisticated firms established accident insurance benefit programs for their employees. In the same years, an early generation of managerial engineers developed new ideas about reengineering workplace safety. By the early decades of the twentieth century, these developments in firms' treatment of industrial accidents had achieved some remarkable successes. After 1910, workmen's compensation statutes (as they were known in gender-specific terms¹²) formalized the accident insurance benefits with which certain leading firms had experimented in the preceding decades. And in the second and third decades of the twentieth century, many American employers implemented earlier engineers' pioneering ideas about safety in the workplace. Yet the largely successful campaign to remake the nature of work and to expand the scope of managerial prerogatives in the American economy gave rise (or so I shall argue here) to a conception of enterprise responsibility—also exceptionally vigorous in the United States—that turned out to be far broader than any of scientific management's early twentieth-century proponents had anticipated. Once loosed, the rationalizing ideas underlying scientific management took on a life of their own in the labyrinthine, highly decentralized, and nonrationalized structures of American tort law.

I should clarify that this article is not a study of the possible unanticipated consequences of enterprise liability itself.¹³ Nor is it a study of the wide array of unanticipated consequences that followed from the systemic planning aspirations of Taylorite engineers. Taylorism produced unintended results such as bitter strikes by resistant workers,¹⁴ as well as results both unintended and unanticipated, such as Louis Brandeis's well-known appropriation of scientific management theories in 1911 to oppose proposed railroad rate increases.¹⁵ This article singles out a particular unanticipated consequence (or set of unanticipated consequences) from among many arising out of the transformation of labor management in the early twentieth-century firm. In the resonances between scientific management and enterprise liability lie some interesting lessons

12. I argue elsewhere that the gender specificity of the workmen's compensation statutes is important in understanding a movement aimed in large part at supporting the family wage structure of male wage earners and dependent wives and children. See John Fabian Witt, *The Accidental Republic* (forthcoming fall 2003) (on file with the *Columbia Law Review*) [hereinafter Witt, *Accidental Republic*].

13. For such studies, see Richard A. Epstein, *The Unintended Revolution in Product Liability Law*, 10 *Cardozo L. Rev.* 2193, 2213–20 (1989); George L. Priest, *The Current Insurance Crisis and Modern Tort Law*, 96 *Yale L.J.* 1521, 1585–86 (1987) [hereinafter Priest, *Current Insurance Crisis*].

14. See Hugh G.J. Aitken, *Taylorism at Watertown Arsenal: Scientific Management in Action, 1908–1915*, at 5–10 (1960).

15. See Louis D. Brandeis, *Scientific Management and Railroads, Being Part of a Brief Submitted to the Interstate Commerce Commission 91–92* (1911).

for lawyers and historians—lessons about the origins of one of the great legal transformations of our time, and lessons about the dialectic of resistance and accommodation that characterizes the response of many of our far-flung legal institutions to systemic efforts to rationalize social institutions.

In what follows, Part I describes the managerial engineering movement that began in the United States in the 1880s. Part II turns to the encounter of managerial engineers with the turn-of-the-century American industrial accident crisis. Part III focuses on one strand of that encounter, namely the accident insurance benefit programs that certain sophisticated employers instituted for their employees. Part IV then details the first generation of managerial engineering efforts to improve American workplace safety, out of which arose a novel theory of managerial causation in work injuries. Part V traces ideas pioneered in scientific management—including what may have been the first use of the term “enterprise liability”—into the mid-twentieth-century liability explosion.

I.

Forerunners to scientific management arose out of a late nineteenth-century crisis of confidence in competition and markets. The political economy of Jacksonian America had replaced entrenched monopoly with markets as the leading mechanism for economic development; equal rights for all market actors replaced special incentives for a few as the dominant approach to economic development.¹⁶ In the North, this shift was especially pronounced in the field of labor, where the incentives of a system of contracting came to be thought by many as superior in efficiency terms to coercion. Markets in free labor put the “silent compulsion of economic relations,” to use Marx’s phrase, to work in the extraction of labor power from the worker.¹⁷ In Marx’s critical account, the market mechanism for labor control “surpass[e]d all earlier systems of production, which were based on directly compulsory labour, in its energy and its quality of unbounded and ruthless activity.”¹⁸ And indeed, many early advocates of free labor were remarkably frank about their reliance on the motivating force of hunger and poverty to spur on a labor force.¹⁹ But in more affirmative accounts that began to emerge as early as the late eighteenth century and culminated in the United States in the decade leading up to the Civil War, free labor was the key to the progressive development of human societies away from anachronistic regimes of feudal authority, status hierarchies, and slavery. From Adam Smith to

16. See Howard Gillman, *The Constitution Besieged: The Rise and Demise of Lochner Era Police Powers Jurisprudence* 33–45 (1993); Stanley I. Kutler, *Privilege and Creative Destruction: The Charles River Bridge Case* 15–17, 51–53 (1971).

17. 1 Karl Marx, *Capital* 899 (Ben Fowkes trans., Penguin 1976) (1867).

18. *Id.* at 425.

19. For examples, see David Brion Davis, *The Problem of Slavery in the Age of Revolution: 1770–1823*, at 358–59 (1975).

Benjamin Franklin to William Lloyd Garrison, leading thinkers in the Anglo American tradition viewed the incentives provided by free labor as vastly more efficient than the compulsions and coercions of unfree labor alternatives.²⁰

By the 1880s, however, observers of the American economy had begun to question the efficiency of competitive markets in the spheres of both exchange and production. Competition among firms seemed to be causing harmful price cutting and overproduction. Railroads found themselves having built hundreds, even thousands of miles of duplicative track in competition with one another.²¹ Shippers in St. Louis and Atlanta, for example, as Gabriel Kolko pointed out in his controversial 1965 book on railroad regulation, “had the option of twenty competitive routes between the two cities.”²² Charles Francis Adams, president of the Union Pacific Railroad and former chairman of the Massachusetts Board of Railroad Commissioners, argued that “unhealthy railroad competition” and the “present competitive chaos” needed to give way to “some healthy control” or an “orderly, confederated whole.”²³ Similarly, in steel and iron production and in the Pennsylvania anthracite coal fields, wasteful overproduction by newly mechanized firms with unprecedented production capacities forced industry-wide price cutting and appeared to be driving firms to the brink of bankruptcy.²⁴ “As prices fall and profits shrink,” observed economist David Ames Wells in 1889, competitors engaged in ever-downward cycles of further price slashing in order to retain markets and customers “until gradually the industrial system becomes depressed

20. See 3 Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* 365 (Edwin Cannan ed., The Modern Library 1937) (1776); Benjamin Franklin, *Observations Concerning the Increase of Mankind, 1751*, in 4 *The Papers of Benjamin Franklin* 225, 229–30 (Leonard W. Labaree ed., 1961); Amy Dru Stanley, *From Bondage to Contract* 21 (1998) (quoting Garrison); David Brion Davis, *Slavery and Human Progress* 113 (1984) [hereinafter Davis, *Slavery and Human Progress*].

21. See Thomas K. McCraw, *Prophets of Regulation* 38–40, 60–61 (1984); Gabriel Kolko, *Railroads and Regulation 1877–1916*, at 7–29 (1965) [hereinafter Kolko, *Railroads and Regulation*]; Gabriel Kolko, *The Triumph of Conservatism: A Reinterpretation of American History, 1900–1916*, at 26–56 (1963) [hereinafter Kolko, *Triumph of Conservatism*].

22. Kolko, *Railroads and Regulation*, *supra* note 21, at 7.

23. Charles Francis Adams, Jr., *Railroads: Their Origin and Problems 186–90* (New York, G.P. Putnam’s Sons 1878).

24. See Kolko, *Triumph of Conservatism*, *supra* note 21, at 30–39; Naomi R. Lamoreaux, *The Great Merger Movement in American Business, 1895–1904*, at 14–86 (1985); Charles M. Schwab, *Competition—Its Uses and Abuses, 1912 Year Book of the American Iron and Steel Institute*, 47, 47–48 (1912) [hereinafter Iron & Steel Institute] (“We must avoid destructive competition.”); Martin J. Sklar, *The Corporate Reconstruction of American Capitalism, 1890–1916: The Market, the Law, and Politics* 55–57 (1988); T.S. Bentley, *Neglected Factors in Machine-Shop Economics*, 22 *Eng’g Mag.* 514, 514 (1902) (excoriating “rapid increase in the pressure of competition” in machine production).

and demoralized, and the weaker succumb (fail), with a greater or less destruction of capital and waste of product."²⁵

Yet in important respects, market mechanisms reached into mid-nineteenth-century firms. Many mid-nineteenth-century firms adopted management practices that relied on the preservation of a skilled workforce.²⁶ Such firms did not engage in the de-skilling and hierarchical rule making that characterized industrial work in places such as the New England textile mills. At the Baldwin Locomotive Works in Philadelphia, for example, management espoused a producerist ethic that linked managers and workers together in a roughly, though of course not wholly, egalitarian partnership in the skilled work of producing custom-built railroad locomotives.²⁷ Nearby textile mills in Philadelphia adopted a similar strategy of reliance on skilled operatives in whom the mills vested significant discretion.²⁸ Moreover, even as some employers sought to impose new forms of discipline in the industrial workplace, many workers actively resisted their attempts and were often able to retain considerable discretion in the direction of their own labor. Practices such as the inside contract system, under which manufacturers contracted with skilled workers inside the firm on a task basis, permitted skilled workers to take charge of particular production projects.²⁹ In iron rolling mills, for example, workers collectively contracted with their employer on only a tonnage rate and controlled among themselves the division of labor and the allocation of pay.³⁰ For other skilled craftsmen such as coal miners, steel workers, and machinists, specialized skills and knowledge often

25. David A. Wells, *Recent Economic Changes and Their Effect on the Production and Distribution of Wealth and the Well-Being of Society* 80 (1889).

26. See Charles Sabel & Jonathan Zeitlin, *Historical Alternatives to Mass Production: Politics, Markets and Technology in Nineteenth-Century Industrialization, Past & Present* No. 108, Aug. 1985, at 133, 150–56; Philip Scranton, *Proprietary Capitalism: The Textile Manufacture at Philadelphia, 1800–1885*, at 314–52 (1983).

27. See John K. Brown, *The Baldwin Locomotive Works, 1831–1915*, at 95 (1995); Walter Licht, *Studying Work: Personnel Policies in Philadelphia Firms, 1850–1950*, in *Masters to Managers* 43, 65–66 (Sanford M. Jacoby ed., 1991) [hereinafter Licht, *Studying Work*].

28. Philip Scranton, "Have a Heart for the Manufacturers!": Production, Distribution, and the Decline of American Textile Manufacturing, in *World of Possibilities: Flexibility and Mass Production in Western Industrialization* 310, 313 (Charles F. Sabel & Jonathan Zeitlin eds., 1997).

29. See Brown, *supra* note 27, at 115–19; Dan Clawson, *Bureaucracy and the Labor Process: The Transformation of U.S. Industry, 1860–1920*, at 71–125 (1980); Walter Licht, *Industrializing America* 129 (1995); Daniel Nelson, *Managers and Workers: Origins of the New Factory System in the United States, 1880–1920*, at 36–37 (1975) [hereinafter Nelson, *Managers and Workers*]; John Buttrick, *The Inside Contract System*, 12 *J. Econ. Hist.* 205 *passim* (1952); Ernest J. Englander, *The Inside Contract System of Production and Organization: A Neglected Aspect of the History of the Firm*, 28 *Lab. Hist.* 429 *passim* (1987).

30. David Montgomery, *The Fall of the House of Labor: The Workplace, the State, and American Labor Activism, 1865–1925*, at 9–21 (1987) [hereinafter Montgomery, *Fall of the House of Labor*].

made it possible to remain relatively self-directing in the details of industrial work processes.³¹ Thus, late into the nineteenth century, skilled workers were able to make and implement union work rules to maintain a modicum of autonomy in the production process.³² Even among unskilled workers, piece-work payment systems (though often exploitative in their own way) had the similar effect of contracting particular labor arrangements out of the hierarchical master-servant relation.³³

Many observers began to rethink the value of free labor in the employment relation, as well. It bears noting here that the “freedom” of the free labor employment relation has always been ambiguous.³⁴ Mid-nineteenth-century approaches to labor management, for example, presented a curious mix of market mechanisms and employer-employee hierarchy. Business historians have labeled mid-nineteenth-century workshops and factories the “foreman’s empire.”³⁵ Although there was considerable variation among industries, foremen—usually skilled workers with little formal training who had risen through the ranks—generally utilized the “driving” method of labor management, a method that combined “authoritarian rule and physical compulsion.”³⁶ Foremen “pushe[d] the gang” of workers using an array of gestures and profanity known as “Rolling-mill English” to get the work done.³⁷ At the same time, the emerging law of employment contracts made employees’ subjection to their employers’ control the core feature of the employment relation.³⁸

In those firms that sought to replace worker discretion with command-and-control hierarchies, employer control of the production process was often crude and imprecise by twentieth-century standards.³⁹ Foremen dominated the shop floor, with little accountability and few standards of conduct to guide the exercise of their authority.⁴⁰ Ineffec-

31. See David Brody, *Workers in Industrial America: Essays on the Twentieth Century Struggle* 3–4 (1980); David Montgomery, *Workers’ Control in America: Studies in the History of Work, Technology, and Labor Struggles* 4–7, 9–27 (1979) [hereinafter Montgomery, *Workers’ Control in America*]; James Whiteside, *Regulating Danger: The Struggle for Mine Safety in the Rocky Mountain Coal Industry* 43–44 (1990).

32. Montgomery, *Workers’ Control in America*, supra note 31, at 15–18.

33. Alice Kessler-Harris, *Out to Work: A History of Wage-Earning Women in the United States* 55 (1982).

34. See Robert J. Steinfeld, *Coercion, Contract, and Free Labor in the Nineteenth Century* 8 (2001).

35. Nelson, *Managers and Workers*, supra note 29, at 34–54.

36. *Id.* at 43.

37. *Id.*

38. See Karen Orren, *Belated Feudalism: Labor, the Law, and Liberal Development in the United States* 68–117 (1991); Christopher L. Tomlins, *Law, Labor, and Ideology in the Early American Republic* 284–92 (1993); Arthur F. McEvoy, *Freedom of Contract, Labor, and the Administrative State*, in *The State and Freedom of Contract* 198, 209–10 (Harry N. Scheiber ed., 1998).

39. See Sanford M. Jacoby, *Employing Bureaucracy: Managers, Unions, and the Transformation of Work in American Industry, 1900–1945*, at 13–37 (1985) [hereinafter Jacoby, *Employing Bureaucracy*].

40. See Nelson, *Managers and Workers*, supra note 29, at 34–54.

tive cost accounting mechanisms obscured the relative costs and merits of various approaches to employee management.⁴¹ And while the often arbitrary power of the foreman system was antithetical to the culture of skilled industrial craftsmen, the foreman system of labor management was frequently ineffective and sloppy.⁴² As a matter of practice, then, workers frequently retained considerable discretion over work processes.

The crisis of confidence in markets of the 1880s, however, called into question this mix of market mechanisms and often haphazard employer control. To be sure, there had been earlier challenges to the idea that free labor was efficient labor. The experience of emancipation in Jamaica after 1838, for example, seemed to many English and American entrepreneurs to cast into doubt whether former slaves would work for wages as productively as they had worked under the compulsion of slavery.⁴³ Reconstruction in the United States seemed to hold a similar lesson for many northern whites who sought to take over southern plantations after the Civil War.⁴⁴ But with the great railroad strikes of 1877, the nationwide strikes inspired by the Knights of Labor in 1886, and the Homestead strike of 1892 (which featured the famous pitched battle between steel workers and Pinkerton detectives hired by Henry Clay Frick), employment relations came to appear especially susceptible to the waste and friction that many had begun to identify in competitive markets more generally.⁴⁵ Relations between labor and management, on this view, presented another example of the ways in which markets led to inefficient and wasteful systems of production. The “foreman’s empire,”⁴⁶ it seemed, lacked the systematic precision that modern conditions appeared to require.

Influential leaders in American business responded to the late nineteenth-century crises of overcompetition and labor conflict by moving to replace markets with hierarchies. Some of the nation’s leading firms sought to establish a new corporatist political economy that would eliminate ruinous competition and reduce labor-management conflict by removing both of these aspects of economic life from the market. Firms in

41. See Jacoby, *Employing Bureaucracy*, supra note 39, at 43; Nelson, *Managers and Workers*, supra note 29, at 50.

42. See Jacoby, *Employing Bureaucracy*, supra note 39, at 14–15; Nelson, *Managers and Workers*, supra note 29, at 42–48.

43. See Thomas C. Holt, *The Problem of Freedom: Race, Labor, and Politics in Jamaica and Britain, 1832–1938*, at 42–53 (1992); Davis, *Slavery and Human Progress*, supra note 20, at 220.

44. See, e.g., Gerald David Jaynes, *Branches Without Roots: Genesis of the Black Working Class in the American South, 1862–1882*, at 13 (1986).

45. See Philip S. Foner, *The Great Labor Uprising of 1877 passim* (1977); Montgomery, *Fall of the House of Labor*, supra note 30, at 129; Nell Irvin Painter, *Standing at Armageddon: The United States 1877–1919*, at 110–14, 370 (1987); Heather Cox Richardson, *The Death of Reconstruction: Race, Labor, and Politics in the Post-Civil War North, 1865–1901*, at xiii–xiv, 211 (2001); Kenneth Warren, *Triumphant Capitalism: Henry Clay Frick and the Industrial Transformation of America* 84–97 (1996).

46. Nelson, *Managers and Workers*, supra note 29, at 34–54.

industries such as steel sought repeatedly, but with little success, to form “gentlemen’s agreements and pools . . . in an effort to control . . . production.”⁴⁷ When enforcement problems caused most such initiatives to collapse,⁴⁸ American industrialists turned to the business trust and the corporate merger to police against competitive pressures.⁴⁹ Large scale enterprise, argued industrialists such as S.C.T. Dodd of Standard Oil, James Hill of the Great Northern Railway, and Charles Schwab of U.S. Steel, offered the benefit of substantial economies of scale.⁵⁰ Moreover, men such as Charles Francis Adams of the Union Pacific Railroad argued in the 1880s that the advancement of civilization led inevitably toward big business. “[T]he principle of consolidation . . . is a necessity—a natural law of growth,” Adams argued; “[y]ou may not like it: you will have to reconcile yourselves to it.”⁵¹ In the “modern world” business necessarily “does its work through vast aggregations of men and capital. . . . This is a sort of latter-day manifest destiny.”⁵²

A second strand of the hierarchical reorganization of economic production focused not on cooperation and consolidation among firms, but rather on the reorganization of production within the firm. American labor management practices in the mid-nineteenth century had given little indication of the strength of the managerial movement that was to come. Into the middle of the nineteenth century, American enterprise exhibited little systematic organization of the production process. So long as the scale of production remained relatively small, Alfred Chandler has argued, there was little call for systemic attention to the rational organization of the workplace itself.⁵³ And yet by the turn of the twentieth century, American firms laid claim to managerial control of the production process with a vigor unmatched in Western economies.⁵⁴ In Chandler’s magisterial interpretation, the coming of the railroad brought with it new opportunities for rational managerial approaches to running

47. Walter Adams, *The Steel Industry*, in *The Structure of American Industry: Some Case Studies* 145, 147 (Walter Adams ed., 1950).

48. *Id.* at 147–48; Lamoreaux, *supra* note 24, at 14–16.

49. See Adams, *supra* note 47, at 148–49; Lamoreaux, *supra* note 24, at 1–2; McCraw, *supra* note 21, at 48–49; Warren, *supra* note 45, at 118–40; James Weinstein, *The Corporate Ideal in the Liberal State: 1900–1918*, at 63 (1968).

50. See Kolko, *Triumph of Conservatism*, *supra* note 21, at 12–13.

51. *Id.* at 14.

52. *Id.*

53. See Alfred D. Chandler, Jr., *The Visible Hand: The Managerial Revolution in American Business* 14 (1977).

54. See Sanford M. Jacoby, *Modern Manors: Welfare Capitalism Since the New Deal* 12–13 (1997); Sanford M. Jacoby, *American Exceptionalism Revisited: The Importance of Management*, in *Masters to Managers: Historical and Comparative Perspectives on American Employers* 173, 173–200 (Sanford M. Jacoby ed., 1991); Joel Rogers, *In the Shadow of the Law: Institutional Aspects of Postwar U.S. Union Decline*, in *Labor Law in America: Historical and Critical Essays* 283, 287 (Christopher L. Tomlins & Andrew J. King eds., 1992).

business enterprises.⁵⁵ Railroads themselves posed significant challenges of organization, management, and coordination. Time zones had to be standardized so as to establish consistent and reliable scheduling, track gauges had to be integrated and standardized, bridges and overpasses had to be built according to industry standards for car sizes and weights, large and widely dispersed workforces had to be managed, and goods in transit had to be coordinated with schedules and railroad cars.⁵⁶ Moreover, the railroads created for the first time the possibility of taking advantage of economies of scale in mass production. Before the railroad, raw material could not be amassed in sufficient quantities, and finished goods could not be shipped quickly enough, to support mass expansion of the production process. But with railroad shipping bringing new speed and capacity to the movement of materials and goods, firms were suddenly able to expand production dramatically. And with expansion came a new need for, as well as new economies of scale to facilitate, the rationalization of the production process to coordinate materials, labor, and distribution.⁵⁷ By the early 1880s, a new generation of managerial engineers began to advocate administered, hierarchical, and rationalized modes of labor management.⁵⁸ Railroad managers established professional and semiprofessional associations such as the American Society for Railroad Superintendents and the Society of Railroad Comptrollers, Accountants and Auditors.⁵⁹ Mechanical engineers formed the American Society of Mechanical Engineers (ASME) in 1880, which was followed quickly by the establishment of the American Institute of Electrical Engineers in 1884.⁶⁰ New journals and magazines designed for engineers and railroad officials such as *Engineer and Surveyor* (1874), *Engineering News* (1875), *Engineering Magazine* (1890), and *Cassier's Magazine* (1891) facilitated the dissemination and rationalization of professional knowledge.

By the turn of the century, managers in steel production turned with new interest to the rationalization of labor management.⁶¹ Leading management engineer O.M. Becker argued that under modern production methods “human machinery” was the “most important part” of the firm, and indeed accounted for a substantial portion of most firms’ variable costs.⁶² The foreman system and the crude approach to production with

55. See Chandler, *supra* note 53, at 107.

56. *Id.* at 122–33; C. Vann Woodward, *Origins of the New South 1877–1913*, at 123–24 (1951).

57. See Chandler, *supra* note 53, at 207–84.

58. See Nelson, *Managers and Workers*, *supra* note 29, at 48–54.

59. Chandler, *supra* note 53, at 130–131.

60. See David F. Noble, *America By Design: Science, Technology, and the Rise of Corporate Capitalism* 36 (1977).

61. See Brody, *supra* note 31, at 28.

62. O.M. Becker, *The Square Deal in Works Management* (pt. 1), 30 *Eng'g Mag.* 536, 542 (1906). For another example, see William B. Dickson, *Betterment of Labor Conditions in the Steel Industry*, in *1910 Proceedings of the American Iron and Steel Institute* 56, 56 (1910).

which it was associated, however, were wholly unable to cope with the complex new demands of labor management in the age of large scale mechanization.⁶³ A rational and "scientific" approach to labor management, on the other hand, promised to provide new ways to accommodate workers to managerial incursions on traditionally worker-controlled aspects of the production process.⁶⁴ Organizations such as the American Society of Mechanical Engineers thus began to emphasize labor management questions rather than mechanical or purely engineering matters.⁶⁵ The new problem in the organization of production, it seemed, was the adoption of "new shop methods" as "a corollary of modern machinery."⁶⁶ As engineer John Patterson put it in 1900, "the problems of to-day in factory management are not so much problems of machinery as of men; not so much of organization as of personal relations."⁶⁷

Frederick Winslow Taylor stood at the forefront of the movement to rationalize the American workplace.⁶⁸ Born in 1856 to a wealthy Philadelphia Quaker family, Taylor became a journeyman machinist after a mysterious (and apparently stress related) eye ailment ended his preparations for the Harvard College entrance exam. Within a few short years he had become a foreman at the important Philadelphia steel company, Midvale Steel, and a close advisor to its owner. In 1885, he joined the American Society of Mechanical Engineers.⁶⁹

The Quaker community in which Taylor grew up had played an important role in developing and popularizing the ideas underlying the ideal of free labor. The "Quaker ethic," as David Brion Davis has called it, held that God resided in the soul of every individual.⁷⁰ It followed for Quakers that the compulsion and forcible hierarchies of Southern slavery were anathema, and in the years around Taylor's birth, antebellum

63. Becker, *supra* note 62, at 542.

64. See Jacoby, *Employing Bureaucracy*, *supra* note 39, at 99-100.

65. See, e.g., *The Premium Plan for Paying Labor*, 26 *Eng'g News* 63, 63 (1891) (reporting on meeting of AMSE at which "the paper which elicited the longest and hottest discussion" was about wages, rather than a technical engineering issue).

66. *New Shop Methods a Corollary of Modern Machinery*, 19 *Eng'g Mag.* 369, 369 (1900); see also *The Maintenance of Machine Shop Personnel*, 25 *Eng'g Mag.* 750, 750 (1903) (arguing that the modern era of machine shops under the "maximum development of mechanical . . . function" required a new system of personnel management); *The Promotion of Industrial Efficiency and National Prosperity*, 25 *Eng'g Mag.* 329, 329 (1903) (reporting on speech by John B.C. Kershaw, arguing that now that engineers had made machines more efficient, the next step in industrial organization was to "increase the capacity of the worker and make him willing to use it to the utmost").

67. John H. Patterson, *Altruism and Sympathy as Factors in Works Administration*, 20 *Eng'g Mag.* 577, 577 (1901).

68. The best book on the relationship between Taylor and the management engineering movement generally is Daniel Nelson, *Frederick W. Taylor and the Rise of Scientific Management* (1980).

69. See Robert Kanigel, *The One Best Way: Frederick Winslow Taylor and the Enigma of Efficiency* 233-34 (1997).

70. See David Brion Davis, *The Problem of Slavery in Western Culture* 291-332 (1966).

Quakers had played an important role in galvanizing Northern support for antislavery ideas.⁷¹ Taylor, however, had little use for Quaker notions of human perfectibility or for the consensual approach to social relations that followed from such notions.⁷² In his view, the free labor system of the postwar years, which relied on “initiative and incentive” to induce labor, had led to systematic shirking—“soldiering,” he called it—by obstructionist workers.⁷³

In Taylor’s view, labor markets that relied on initiative and incentive were hopelessly wasteful. In combination with clumsy, ill-trained foremen, incentive based systems of labor management necessarily meant that “each workman shall be left with the final responsibility for doing his job practically as he thinks best, with comparatively little help and advice from the management.”⁷⁴ As a result, instead of a standard practice for a given step in the production process, there were “fifty or a hundred different ways of doing each element of the work,” ways that had been “handed down from man to man by word of mouth.”⁷⁵ “[T]here was,” however, “but a remote chance” in such a system “that [any one worker] should hit upon the one best method of doing each piece of work out of the hundreds of possible methods which lay before him.”⁷⁶ Theodore Roosevelt and Gifford Pinchot had begun to teach the nation to recognize waste in the exploitation of natural resources such as forests, water, topsoil, and minerals.⁷⁷ “But our larger wastes of human effort,” Taylor complained, “which go on every day through such of our acts as are blundering, ill-directed, or inefficient . . . are less visible, less tangible, and are but vaguely appreciated.”⁷⁸

The answer was to reengineer work and to put into place precisely calibrated methods for even the most routine tasks in the production process. Scientific reorganization of the processes of work would allow management to “substitut[e] . . . science for the individual judgment of the workman.”⁷⁹ Through time and motion study, managers could determine by ostensibly scientific methods the “one best method”⁸⁰ to carry out even the simplest of tasks, and then require minute compliance with prescribed methods by workers.⁸¹

71. *Id.*

72. Cf. R. Keith Aufhauser, *Slavery and Scientific Management*, 33 *J. Econ. Hist.* 811, 823 (1973) (“[T]he master-slave relationship is quite similar to the capitalist-wage-labor relationship in scientifically managed enterprises.”).

73. Frederick Winslow Taylor, *The Principles of Scientific Management*, in *Scientific Management* 1, 19–21, 34 (1947) [hereinafter *Scientific Management*] (works in collection separately paginated).

74. *Id.* at 25.

75. *Id.* at 31–32.

76. *Id.* at 112.

77. See *infra* note 100 and accompanying text.

78. *Id.* at 5.

79. *Id.* at 114.

80. *Id.* at 112.

81. Testifying before a congressional committee in 1912, Taylor claimed:

Most important for our purposes is an often overlooked facet of Taylor's project. In advocating the importance of managerial control, Taylor also announced a new principle of managerial responsibility. Firms could be, and indeed, properly ought to be responsible for managing wide swaths of American social life. "[I]n its essence," Taylor explained to a congressional committee in 1912, "scientific management involves a complete mental revolution"⁸² To be sure, workers needed to re-think "their duties toward their work, toward their fellow men, and toward their employers."⁸³ But scientific management also involved

[an] equally complete mental revolution on the part of those on the management's side—the foreman, the superintendent, the owner of the business, the board of directors—a complete mental revolution on their part as to their duties toward their fellow workers in the management, toward their workmen, and toward all of their daily problems.⁸⁴

Worker discipline, in Taylor's view, went hand in hand with managerial responsibility.

In the case of work accidents, for example, Taylor favored employer-provided accident insurance benefits, financed through fines paid by the workers for disciplinary infractions.⁸⁵ By 1900, Taylor's Midvale Steel had set up precisely such an accident insurance plan. Employees contributed five cents per week to the insurance fund in return for injury and death benefits.⁸⁶ And therein lay the seeds of a transformation in the ways in which American firms handled industrial injuries.

II.

Taylor was hardly the only manager seeking to design new ways of dealing with workplace accidents. By the 1890s the industrial accident had come to symbolize the crises of wasteful competition and clumsy labor management that seemed to beset the economy more generally. I

[I]n practically all of the mechanic arts the science which underlies each workman's act is so great and amounts to so much that the workman who is best suited to actually doing the work is incapable, either through lack of education or through insufficient mental capacity, of understanding this science.

3 The Taylor and Other Systems of Shop Management: Hearings Before Special Committee of the House of Representatives to Investigate the Taylor and Other Systems of Shop Management Under Authority of H.R. 90, 62d Cong. 1416 (1912) (testimony of Frederick Winslow Taylor), reprinted in *Scientific Management*, supra note 73, at 1, 89 [hereinafter Taylor, Testimony (further citations to reprint)].

82. *Id.* at 27.

83. *Id.*

84. *Id.*

85. See Frederick Winslow Taylor, *Shop Management*, in *Scientific Management*, supra note 73, at 1, 119–20, 198.

86. *Indus. Comm'n on the Relations and Conditions of Capital and Labor*, 14 Report on the Relations of Capital and Labor Employed in Manufactures and General Business 349, 352 (1901) (testimony of Charles J. Harrah, President of Midvale Steel Co., Dec. 22, 1900).

have described the acute late nineteenth- and early twentieth-century American industrial accident problem elsewhere.⁸⁷ Suffice it to say that the United States witnessed industrial accident rates far in excess of those in comparable developing economies in western Europe. Fatality rates in coal mining, as measured per employee, ranged between two and three times as high in the United States as in Great Britain between 1880 and 1930.⁸⁸ As measured by employee hour, railroad fatality rates were fifty percent higher in the United States than in Great Britain.⁸⁹ Contemporary estimates of comparative accident rates were even more exaggerated, suggesting, for example, that accident rates among railroad employees in the United States were three and one-half times higher than in Great Britain for fatal injuries, and five times higher for nonfatal injuries.⁹⁰

The avalanche of industrial accidents in the United States was itself, at least in part, a result of mid-century ideals of free labor and worker discretion in the Northern states in which industrial development began. Left to their own devices, individual workers often underestimated the risks they faced.⁹¹ In many occupations, risk taking even became part of the ethic of manly workingmen's culture.⁹² In turn, the accidents for which free labor ideas were partly responsible came to pose dilemmas for each of several widely held interpretations of the significance of free labor. Liberals, who sought to distinguish the boundaries of individuals' respective spheres of free action, found it increasingly difficult to allocate responsibility (even for relatively common two-party accidents) to one party or the other.⁹³ Labor organization members prized the much vaunted independence that mid-century free labor had promised. But industrial accidents seemed to reduce to dependency tens of thousands of families each year.⁹⁴

The school of free labor thought that held free markets in labor to be more efficient than mechanisms of hierarchical labor control was no exception to this pattern of disillusionment. The "industrial slaughter" of modern industry called further into doubt whether market mechanisms within the firm were indeed the most efficient way to organize labor. In response, the fledgling American engineering profession adopted acci-

87. Witt, *Accidental Republic*, supra note 12, at ch. 2; John Fabian Witt, *Toward a New History of American Accident Law*, 114 *Harv. L. Rev.* 692, 694–95, 717–21 (2001) [hereinafter Witt, *American Accident Law*].

88. Mark Aldrich, *Safety First: Technology, Labor, and Business in the Building of American Work Safety, 1870–1939*, at 17, 23, 42 (1997).

89. *Id.*

90. Gilbert Lewis Campbell, *Industrial Accidents and Their Compensation* 16–17 (1911).

91. Henry R. Seager, *Outline of a Program of Social Reform*, in *Labor and Other Economic Essays* 79, 83 (Charles A. Gulick, Jr. ed., 1931) (“[E]ach individual thinks of himself as having a charmed life.”).

92. See Crystal Eastman, *Work-Accidents and the Law* 93–94 (1910).

93. Witt, *Accidental Republic*, supra note 12, at ch. 2.

94. Witt, *American Accident Law*, supra note 87, at 723–33; Witt, *Accidental Republic*, supra note 12, at ch. 3.

dents and safety as central metaphors for what it saw as the excessive, unnecessary, and preventable waste pervading the national economy.

It may be useful at this moment to step back and define more precisely the engineers' conceptions of efficiency and waste. Modern economists generally define efficiency as the allocation of resources to their highest value users. But turn-of-the-twentieth-century engineers had an altogether different conception of efficiency as an economy of inputs to outputs. On this view, engineers understood processes as efficient if they conserved resources, measured not in dollars but in sheer amount of natural resources, raw materials, and muscle power required.⁹⁵ Conversely, engineers viewed processes that exhausted excess resources as inefficient and wasteful. As one engineer put it in 1901, "the most conspicuous tendency of human activity is to get a maximum result by a minimum of expenditure. Minimum cost of fuel, of transportation, of brain and muscle, must hereafter be considered in the mighty competition that characterizes the commerce of the world."⁹⁶

The inputs to outputs conception of efficiency was quite common at the close of the nineteenth century and into the first decade of the twentieth. As historians since Frederick Jackson Turner have recognized, the closing of the frontier generated a new sense of scarcity among many elites and middle-class Americans, a new sense that American resources—like those of European nations—might be bounded.⁹⁷ This sense of limited resources, in turn, gave rise to the new natural resources conservationism to which Taylor compared his scientific management efforts.⁹⁸ In 1908, President Roosevelt created a National Conservation Commission, which issued a report in 1909 on the condition of the nation's forests, waterways, lands, and mineral resources.⁹⁹ A year later, Pinchot—who served as Roosevelt's Chief of the United States Bureau of Forestry and later as governor of Pennsylvania—published his influential book, *The Fight for Conservation*, in which he asked in Malthusian tones whether or not the current generation of Americans would, like its predecessors,

95. On the engineering theory of efficiency, see Lewis A. Kornhauser, *A Guide to the Perplexed Claims of Efficiency in the Law*, 8 Hofstra L. Rev. 591, 592–97 (1980).

96. Leicester Allen, *Economy of Heating and Ventilating the Machine Shop*, 21 Eng'g Mag. 75, 80 (1901).

97. See Rereading Frederick Jackson Turner: "The Significance of the Frontier in American History" and Other Essays 183 (John Mack Faragher ed., 1994).

98. See generally Samuel P. Hays, *Conservation and the Gospel of Efficiency*, 122–27 (1959) (describing the relationship between natural resources conservationism and the engineering profession). For Taylor's comparison, see *supra* text accompanying note 78.

99. See Executive Comm., Nat'l Conservation Comm'n, 1 Special Message from the President of the United States Transmitting a Report of the National Conservation Commission, with Accompanying Papers, S. Doc. No. 676, at 39–110 (Henry Gannett ed., 2d Sess. 1909).

be able to conserve the nation's resources and "transmit them, still unexhausted, to our descendants?"¹⁰⁰

Engineers turned to the problem of the waste in industrial accidents with the same spirit of conservation that Roosevelt and Pinchot brought to natural resources. Only a few years earlier, observed one electrical engineer, the United States had been a "young nation with vast natural resources. . . . [B]ut suddenly we find that our resources have been squandered and are approaching exhaustion."¹⁰¹ In his view, the greatest waste was not in natural resources but rather in human resources. Inefficiency was responsible for the terrible "harvest of death, disaster and misery" embodied in the United States's disgraceful accident record.¹⁰² In the words of another engineer, the problem of "conserving the Nation's resources" was deeply bound up in "the prevention of accidents."¹⁰³ Indeed, even those who focused on natural resources such as water, forests, minerals, and lands saw in the accident problem a pressing problem of conservation. "[I]f the conservation of the natural resources is for man, it is an obvious suggestion that man himself should be conserved," observed Wisconsin conservationist Charles Richard Van Hise.¹⁰⁴ By Van Hise's lights, "losses of life by accidents are appalling in this country," and "by proper precautionary measures . . . the accidents may be reduced to one tenth their present number."¹⁰⁵

As early as the 1880s, American engineers began to focus on the prevention of accidents in industry as central to the project of rationalizing labor management,¹⁰⁶ and by 1890, engineering trade journals devoted substantial coverage to the occurrence and prevention of railroad and other accidents.¹⁰⁷ "[T]he life and health of every skilled workman," argued the efficiency-minded engineers, "represent an asset that a factory

100. Gifford Pinchot, *The Fight for Conservation* 3 (1910); see also Charles Richard Van Hise, *The Conservation of Natural Resources in the United States* 13–14 (1910) (surveying the conservation movement).

101. Frank Koester, *The Price of Inefficiency* xiii (1913); see also Day Allen Willey, *Mining Accidents*, 39 *Cassier's Mag.* 232, 240 (1911) (urging that the benefits of increased attention to safety in mines "will be increasingly important as American resources become scarcer and less equal to the larger and larger demands of a growing nation and its expanding commerce").

102. Koester, *supra* note 101, at 46.

103. H.H. Stock, *First-Aid Movement in the Anthracite Region of Pennsylvania*, 37 *Eng'g Mag.* 321, 321 (1909).

104. Van Hise, *supra* note 100, at 364.

105. *Id.* at 369–70.

106. See, e.g., S.W. Robinson, *Railroad Economics, or Notes and Observations from the Ohio State Railway Inspection Service*, 2 *Transactions of the Am. Soc'y Mech. Eng'rs* 524, 524–25 (1881).

107. See, for example, the tables of contents of the *Engineering News* for the period 1874–1890. The 1874 opening issue (published as *Engineer and Surveyor*) included no reference to accidents as a subject for the journal. Only in 1877 and 1878 did the *News* include index entries for accidents—one in the New York Post Office, another arising out of the building of a caisson, and another on a railroad bridge. By 1890, however, recounting the details of accidents on railroads and railroad bridges had become a major

cannot afford to ignore.”¹⁰⁸ The “appalling mortality” suggested by railroad and manufacturing accident statistics, however, threatened to undermine and even destroy the efficiency of the American railroad system.¹⁰⁹ Much to the dismay of the engineering professionals, the United States, as one engineer put it,

stand[s] first among all countries in the number of lives lost through accidents. In railroading, in mining, in manufacturing, and in general building operations, the number of accidents in the United States is annually greater in proportion to the population than in any of the civilised countries of the globe.¹¹⁰

Others called the deaths in the United States from railway accidents and fires, among other causes, “a national disgrace,”¹¹¹ and bemoaned the “waste of life in American coal mining.”¹¹² Indeed, the casualties among American railroad workers during 1898 and 1899, reported the editors of *Cassier’s Magazine*, were equivalent to “two and a half times the reported total of killed and wounded in the British Army in South Africa [in the ongoing Boer War].”¹¹³

Worst of all, management engineers argued, “thousands of . . . accidents in mines, in factories, and on railroads” were “needless” and preventable.¹¹⁴ In management engineers’ view, wasteful competition among firms sustained the United States’s comparatively high industrial accident rates; capital was expensive, while accidental injuries to employees were cheap.¹¹⁵ Moreover, most late nineteenth-century economists and firms did not believe that workers charged a premium for dangerous workplaces in the form of higher wages.¹¹⁶ Inattention to expensive work

part of the *News’s* mission. Each issue of the magazine covered the week’s major accidents, and the index for the year includes dozens of entries under the heading “accident.”

108. George Ethelbert Walsh, *Accident-Preventing Devices in America: An American Criticism*, 28 *Cassier’s Mag.* 223, 226 (1905).

109. See Day Allen Willey, *Safety in American Railway Travel*, 28 *Cassier’s Mag.* 55, 55 (1905).

110. Walsh, *supra* note 108, at 223; see also *Review of the Engineering Press*, 12 *Eng’g Mag.* 692, 705–06 (1897) (observing the poor safety record of American railroads in comparison to the railroads of the United Kingdom).

111. Herbert T. Wade, *The American Museum of Safety Devices*, 35 *Eng’g Mag.* 329, 330 (1908).

112. Clarence Hall & Walter O. Snelling, *The Waste of Life in American Coal Mining*, 34 *Eng’g Mag.* 721, 721 (1908).

113. *Current Topics*, 18 *Cassier’s Mag.* 438, 441 (1900).

114. Walsh, *supra* note 108, at 226.

115. See, e.g., J.A. Holmes, *Coal Mining Accidents in the United States and Their Prevention*, 37 *Cassier’s Mag.* 374, 374–75 (1910).

116. Employers like Howell Cheney of Connecticut complained that compensation legislation was an attempt “to artificially raise a class of wages,” the costs of which would inevitably have to be passed through to the consumer, not to the employee. Howell Cheney, *Work, Accidents, and the Law*, 19 *Yale Rev.* 255, 257–58 (1910). Similarly, in legislative hearings on workmen’s compensation, firms fought bitterly for joint employer-employee contributions to workmen’s compensation insurance funds. And both unions and employers struggled to push benefit levels in directions that they believed favored

safety measures thus offered firms in competitive industries the opportunity for substantial savings. Competition among machine shops, for example, had driven many shop owners to limit their investment in expensive safety provisions.¹¹⁷ Similarly, “ruinous competition” among coal mine operators had led them to adopt inefficient mining techniques and to neglect critical safety measures such as training employees in the use of explosives and electricity, in the handling of gases and coal dust, and in proper timbering techniques.¹¹⁸ The result was an “increasing waste of resources and the still more unpardonable increasing waste of human life—the yearly loss of 250,000,000 tons of coal and the killing or injuring yearly of 8,000 to 10,000 men.”¹¹⁹

According to American management engineers, the annual slaughter in the coal mines also provided evidence of the ways in which primitive labor management practices produced wastefully high accident rates. Fatality rates in American bituminous coal mines, for example, doubled between 1880 and 1910, rising from two workers killed out of every thousand per year in 1880 to four in 1910.¹²⁰ At first blush, most mining

them. See Minutes of Evidence Accompanying the First Report to the Legislature of the State of New York by the Commission Appointed Under Chapter 518 of the Laws of 1909 to Inquire Into the Question of Employers' Liability and Other Matters 93–94, 98 (1910) [hereinafter First Report to the Legislature]. If employers had believed that wages adjusted to reflect either the risk of accidents or the value of postaccident compensation benefits, these positions would have made little sense. Progressive reformers also put little stock in the theory of wage premiums. Adna Weber contended in the *Political Science Quarterly* that the notion of wage adjustments was a “legal fiction” with “no basis in fact.” Adna Weber, *Employers' Liability and Accident Insurance*, 17 *Pol. Sci. Q.* 256, 258 (1902). “In theory,” President Roosevelt observed in a 1908 message to Congress on employers' liability, workers would act as “experienced business men” and would exact a wage allowance for the risk of injury just as sophisticated lenders incorporated a risk-premium into rates of interest. “But as a matter of fact,” he argued, “it is not practical to expect that this will be done by the great body of employees.” Theodore Roosevelt, *The Employers' Liability Law: From a Message of the President Read Before Congress, Jan. 31, 1908*, in 2 *The Roosevelt Policy: Speeches, Letters and State Papers, Relating to Corporate Wealth and Closely Allied Topics* 699, 702 (William Griffith ed., 1919). Judge Learned Hand of the Southern District of New York concurred; a “theoretical justice,” he wrote in 1909, “might be accomplished if by a higher wage [the workingman] could insure himself.” But the difficulty was that “even that would not answer the practical objection that actually he does not do it.” Letter from Judge Learned Hand, Federal Court, Southern District of New York, to J.M. Wainwright, Chairman, Met. Life Bldg. (Nov. 17, 1909), in First Report to the Legislature, *supra*, at 74–75. The Wainwright Commission Report summed up this thinking when it concluded simply that the “laissez faire” theory of wages and risk “does not work out.” *Id.* at 7. For an academic's account of the same point, see Seager, *supra* note 91, at 82–83.

117. See Bentley, *supra* note 24, at 514.

118. See Holmes, *supra* note 115, at 374–75. On the effects of competition in the coal mining industry on safety conditions in the mines, see generally William Graebner, *Coal Mining Safety in the Progressive Period 1855–75* (1976).

119. Holmes, *supra* note 115, at 375.

120. See Aldrich, *supra* note 88, at 42 fig. 2.1. Fatality rates in the anthracite mines typical of Eastern Pennsylvania declined dramatically from their heights in the 1850s and 1860s to approximately three workers in every thousand per year by 1890. Beginning in

fatalities appeared to be the fault of the miners themselves. Roof falls were often caused by a miner's careless placement of supporting timbers; cave-ins often resulted from leaving insufficient coal in supporting coal pillars; and blasting mishaps often occurred while a miner carelessly examined an apparently failed fuse, only to have the charge explode unexpectedly.¹²¹ Moreover, roof falls, small cave-ins, and blasting mishaps were much more common than catastrophic mining disasters, accounting for at least three-quarters of all coal mining fatalities.¹²² But from the perspective of sophisticated mining engineers, extraordinarily high mining accident rates were in fact the result of the basic structure of labor management in the mines. Mine operators paid miners according to tonnage rates that rewarded miners who ignored safety measures in return for increased yields.¹²³ In particular, tonnage payments that did not penalize miners for producing undesirably fine coal (known as "slack") encouraged miners to employ dangerously large amounts of powder without first undercutting the coal face.¹²⁴ "Shooting off the solid," as this practice was called, was exceedingly dangerous.¹²⁵

The basic design of the mines also helped to make American mining more dangerous than European mining. In England, "longwall" mine design placed miners along a few long coal faces.¹²⁶ Such workers could easily be supervised by foremen. In addition, longwall mining minimized the danger of roof falls. In the United States, by contrast, the "room-and-pillar" method used a sprawling complex of small rooms propped up by coal and timber pillars.¹²⁷ Miners worked in isolation in a labyrinth of tunnels and cut-outs in the coal seam. As a result, supervision was virtually impossible, and roof falls were exacerbated by the multiplicity of small rooms.

In both setting tonnage rates and adopting dangerous room-and-pillar mining practices, management engineers argued, mine owners had implemented poorly thought-out approaches to designing and managing work in American mines. Careless miners might also be necessary antecedents to many mining accidents. But miners would always be careless. Management systems, on the other hand, could be made more or less effective, and in this sense, ineffective management systems had produced wasteful accident rates.

1900, fatality rates in bituminous and anthracite mines roughly tracked one another. See *id.*; Anthony F.C. Wallace, *St. Clair: A Nineteenth-Century Coal Town's Experience with a Disaster-Prone Industry* 252-253 (1987); Witt, *American Accident Law*, *supra* note 87, at 695.

121. See Aldrich, *supra* note 88, at 49-55.

122. See *id.* at 41-42; Graebner, *supra* note 118, at 8.

123. See Aldrich, *supra* note 88, at 52; *Mining and Metallurgy*, 12 *Eng'g Mag.* 347, 349 (1897).

124. Aldrich, *supra* note 88, at 60.

125. *Id.* at 52-54.

126. See *id.* at 64; Whiteside, *supra* note 31, at 33.

127. Aldrich, *supra* note 88, at 64.

III.

Management engineers' answer to the industrial accident crisis was a twofold rationalization of the internal operations of the firm. Employers experimented with private forms of worker compensation in the form of firm-specific employee accident compensation funds, or "establishment funds" as they were often called. Managers seeking to rationalize the production process also began to advocate and experiment with new methods of making work processes safer.

As the Chandler thesis has it, the railroads pioneered in the field of management engineering.¹²⁸ And it was on the railroads that employee accident relief funds first emerged as an important accident compensation mechanism. The Philadelphia and Reading Railroad endowed a \$20,000 accident fund for its coal mine workers after an 1875 strike in the Pennsylvania anthracite fields, and created an accident plan for its engineers in 1877.¹²⁹ In the latter year—a year of massive railroad strikes—the Chicago, Burlington and Quincy Railroad considered and rejected the adoption of welfare benefits for the elite of its locomotive engineers.¹³⁰ A year later, the Lehigh Valley Railroad of eastern Pennsylvania adopted an assessment-based fund for accident relief, financed by the joint contributions of employees and the railroad corporation itself.¹³¹

It was only in 1880, however, that the nation's largest railroad companies began adopting systematic establishment funds. The Baltimore and Ohio Railroad established an accident relief fund in 1880; the Pennsylvania Railroad Company formed a relief department in 1886; the Philadelphia and Reading in 1888; and the Chicago, Burlington and Quincy followed suit in 1889, as did the Pennsylvania Lines West of Pittsburgh

128. See *supra* notes 53–57 and accompanying text.

129. Robert Asher, *The Limits of Big Business Paternalism: Relief for Injured Workers in the Years Before Workmen's Compensation*, in *Dying for Work* 19, 21 (David Rosner & Gerald Markowitz eds., 1987).

130. See *id.*

131. See William Franklin Willoughby, *Workingmen's Insurance* 307 (New York, Thomas Y. Crowell & Co. 1898); Interstate Commerce Comm'n, *Third Annual Report* 360–61 (1890) [hereinafter ICC Rep.]. Willoughby described the Lehigh system as follows:

The system is briefly this: A fund is accumulated by the voluntary contributions on the part of employes to the amount of one day's wages or less, but in no case to exceed three dollars, as called for by the administration of the fund, to meet demands for the payment of benefits. The company on its part makes a contribution equal in amount to the total contributions of the employes. Benefits are only paid in the case of accidents, and to employes who responded to the last call for contributions. The value of the daily benefit is equal to three-fourths of the amount contributed by the injured member on the last call, during a period not exceeding nine months. In case of death, \$50 is immediately paid for funeral expenses, and subsequently to the family of the deceased, during two years, the accident benefit to which the deceased would have been entitled.

Willoughby, *supra*, at 307.

and Erie.¹³² By 1889, an Interstate Commerce Commission survey found that twelve of eighty-five railroad companies nationwide had organized establishment funds.¹³³ And by the second half of the 1890s, more than one in every five railroad employees in the country was covered by a railroad accident relief association benefit program; indeed, fully one-fifth of American railroad workers were enrolled in one of the six largest relief associations: the Baltimore and Ohio; the Pennsylvania; the Pennsylvania Lines West; the Philadelphia and Reading; the Chicago, Burlington and Quincy; and the Plant System.¹³⁴

Outside the railroads, accident relief funds were less common.¹³⁵ The Cambria Iron Works—an early large scale steel-producing firm based in Johnstown in western Pennsylvania—established an accident fund financed through employee fines shortly after the Civil War.¹³⁶ In the brewing industry, brewers and their employees in New York and Cincinnati—mostly of German extraction—established jointly financed accident relief funds.¹³⁷ And in mining, the Calumet & Hecla Mining Company in Michigan and the Philadelphia and Reading Railroad Coal and Iron Company in Pennsylvania established mutual aid societies for their injured mining employees in 1877.¹³⁸ The prominent organ and piano making firm of Alfred Dolge & Son in upstate New York adopted a Mu-

132. See Emory R. Johnson, *Railway Relief Departments*, 8 Bull. of the Dep't of Lab. 39, 42-43 (1897) [hereinafter Johnson, *Railway Relief Departments*]; Bureau Lab. Stat., *The Baltimore & Ohio Relief Department*, 4 Mass. Lab. Bull. 19, 19-32 (1897).

133. See ICC Rep., supra note 131, at 342-82. The twelve railroads were the Atchison, Topeka and Santa Fé Railroad Company; the Baltimore and Ohio Railroad Company; the Central Vermont Railroad Company; the Chicago, Burlington and Quincy Railroad Company; the Cincinnati, Hamilton and Dayton Railroad Company; the Delaware and Hudson Canal Company; the Lehigh Valley Railroad Company; the Northern Pacific Railroad Company; the Pennsylvania Railroad Company; the Philadelphia and Reading Railroad Company; the Pittsburgh, Cincinnati and St. Louis Railway Company (also known as the Pennsylvania Line West of Pittsburgh); and the Utah Central Railway Company. See id. at 342-83.

134. See Johnson, *Railway Relief Departments*, supra note 132, at 42-43; Charles Richmond Henderson, *Industrial Insurance in the United States* 212-13 (2d. ed. 1911) (1909).

135. See Willoughby, supra note 131, at 284 ("Certain it is that no other industry [than the railroads] has given equal attention to this matter.").

136. See Asher, supra note 129, at 21.

137. Nuala McGann Drescher, *The Workmen's Compensation and Pension Proposal in the Brewing Industry, 1910-1912: A Case Study in Conflicting Self-Interest*, 24 Indus. & Lab. Rel. Rev. 32, 36 (1970).

138. Asher, supra note 129, at 21; 23 Comm'r of Lab. Ann. Rep. 429-39 (1909) [hereinafter Comm'r of Lab. Ann. Rep.] (Report on Workmen's Insurance and Benefit Funds in the U.S.); see also William B. Gates, Jr., *Michigan Copper and Boston Dollars: An Economic History of the Michigan Copper Mining Industry* 109 (1951) (discussing Calumet and Hecla Employees' Aid Fund, financed through equal contributions of employees and the company paying benefits of \$25 per month up to eight months for disability, "\$500 death benefits, and \$300 for permanent disability"; the Fund compensated 435 men for disability in its first ten months of operation and paid out death benefits to four families).

tual Aid Society for its employees in 1881, which by 1890 had expanded into a system of disability, death, and pension benefits.¹³⁹ Similarly, the Buffalo Smelting Works, Steinway & Sons, and Bausch & Lomb Optical Company all established benefit associations before the turn of the century.¹⁴⁰ Nonetheless, few manufacturing firms appear to have established significant, lasting accident relief funds before 1881. Of 461 establishment accident funds surveyed in 1908 by the Department of Labor, only twenty-one had been established between 1871 and 1880, and a mere five had been established before 1871.¹⁴¹

Outside the railroad industry, the creation and systematization of accident funds began to accelerate significantly in the first decade of the twentieth century.¹⁴² Between 1900 and 1910, leading firms such as United Traction and Electric Company (1901), General Electric (1902), Westinghouse Air Brake (1903), New York Edison (1905), and Swift & Company (1907) created systematic injury compensation programs for their employees.¹⁴³ At New York Edison, for example, the company's management announced that "[t]ry as we may, . . . some one will blunder" and an accident would ensue.¹⁴⁴ New York Edison officials believed that under the common law, "discontent, class feeling and an impression [of] . . . injustice" inevitably followed.¹⁴⁵ Thus, the firm undertook to redirect funds it previously had spent on liability insurance premiums toward the establishment of an accident compensation fund. The fund would compensate injured employees without regard to the firm's com-

139. See Paul Monroe, *An American System of Labor Pensions and Insurance*, 2 *Am. J. Soc.* 501, 507 (1897).

140. Henderson, *supra* note 134, at 204–05. There was a slight increase in the establishment of accident relief funds in the 1880s. See Comm'r of Lab. Ann. Rep., *supra* note 138, at 387–88; Stuart D. Brandes, *American Welfare Capitalism: 1880–1940*, at 95–96 (Univ. Chi. Press 1976) (1970); Henderson, *supra* note 134, at 195.

141. Comm'r of Lab. Ann. Rep., *supra* note 138, at 387.

142. See, e.g., Conference of the Representatives of the Several Death and Accident Funds of the Pittsburgh Coal Co., Pittsburgh, Pa. (Feb. 6, 1902) (available in the Columbia University microfilm collection of the Wisconsin Historical Library's holdings on mutual benefit societies) [hereinafter *Wisconsin Benefit Societies holdings*] (on file with the *Columbia Law Review*); Constitution and By-Laws of the Pittsburgh Lamp, Brass and Glass Co. Employees' Beneficial Association (1906) (available in Wisconsin Benefit Societies holdings) (on file with the *Columbia Law Review*); Constitution of the Allis Mutual Aid Society, Milwaukee, Wis. (rev. Mar. 12, 1907) (available in Wisconsin Benefit Societies holdings) (on file with the *Columbia Law Review*).

143. See E.M. Atkin & H.M. Edwards, *Compensation to Injured Employees: Plan of the New York Edison Company, Paper Delivered at the Twenty-Fourth Annual Meeting of the Association of Edison Illuminating Companies, Lenox, Mass. (Sept. 15–17, 1908)* (1910) (on file with the *Columbia Law Review*); Henderson, *supra* note 134, at 190–211, 345–76; Magnus W. Alexander, *Mutual Insurance Plan of the General Electric Company's Employes, at West Lynn, Mass., in Ferd C. Schwedtmann & James Emery, National Association of Manufacturers of the United States of America, Accident Prevention and Relief* 415, 415–26 (1911).

144. Atkin & Edwards, *supra* note 143, at 5.

145. *Id.* at 6.

mon law defenses. Moreover, the accident compensation fund, Edison's management hoped, would encourage the implementation of safety measures and establish "good relations between the [c]ompany and its employees."¹⁴⁶ At the Allis-Chalmers Company of Wisconsin in 1907, the firm replaced the informal circulation among the employees of "subscription rolls" in the event of a fellow employee's disability or death with a mutual aid society financed through employee contributions of twenty-five cents per month.¹⁴⁷

Manufacturing and mining firms established close to three times as many accident relief funds between 1891 and 1908 as during the preceding twenty years.¹⁴⁸ By 1908, close to ten percent of all wage earners in the country fell under the auspices of one sort of industrial welfare policy or another.¹⁴⁹ And in many of the most heavily industrialized regions, membership in an establishment fund was considerably more common. Crystal Eastman found that in Pittsburgh, for example, twenty-three percent of all injured workers were enrolled in employer establishment funds.¹⁵⁰

Most prominently, at the end of the decade two major firms controlled by J.P. Morgan and his associates implemented accident relief policies. In 1908 International Harvester adopted a voluntary accident benefit plan, which seventy-five percent of its employees had joined by the beginning of 1909.¹⁵¹ And in 1910 the U.S. Steel Company announced the establishment of its "Voluntary Accident Relief Plan" for employees of all U.S. Steel-affiliated firms.¹⁵² Many of the subsidiaries of U.S. Steel had less systematic relief policies in place before the announcement of the 1910 plan. In 1901, for example, Andrew Carnegie had donated four

146. *Id.*

147. See Constitution of the Allis Mutual Aid Society, *supra* note 142, at 12. There was, in addition, a fifty cent initiation fee. *Id.* at 4.

148. Comm'r of Lab. Ann. Rep., *supra* note 138, at 387-88.

149. See Don D. Lescohier, Working Conditions, in 3 History of Labor in the United States 320 (Augustus M. Kelley, pub. 1966) (1935). A number of historians have mistakenly interpreted the Department of Labor's 1908 report on 461 establishment funds covering some 640,000 member employees as an estimate of the national total. See Brandes, *supra* note 140, at 96; Asher, *supra* note 129, at 27. In fact, the Department of Labor's report was a self-consciously partial survey of representative firms. See Comm'r of Lab. Ann. Rep., *supra* note 138, at 387.

150. Eastman, *supra* note 92, at 157. A 1910 survey of members of the National Association of Manufacturers showed that seventeen percent of the NAM's membership operated a system of accident relief of one kind or another. See Schwedtman & Emery, Accident Prevention and Relief, *supra* note 143, at 381.

151. See Benefit Plan, Industrial Accident Department of International Harvester Co. and Associated Cos. (1910) (available in Wisconsin Benefit Societies holdings, *supra* note 142) (on file with the *Columbia Law Review*); Robert Ozanne, A Century of Labor-Management Relations at McCormick and International Harvester 71-95 (1967); C.W. Price, Employee Benefit Association of the International Harvester Company, 33 *Annals of the Am. Acad. of Pol. & Soc. Sci.* 246, 252 (1909).

152. See Charles A. Gulick, Labor Policy of the United States Steel Corporation 141 (CXVI Columbia Univ. Studies in History, Economics and Public Law, No. 258, 1924).

million dollars to endow an accident relief fund for the employees of the Carnegie Steel Company. Carnegie's endowment created an accident relief fund that covered 85,000 employees in 1908, paying five hundred dollars to the widows of employees killed by work accidents, plus an additional one hundred for every child, or between seventy-five cents and one dollar a day in disability benefits for disability arising out of injuries suffered while on duty.¹⁵³ The great volume of claims, however, soon forced the Carnegie Fund to suspend all aid in cases of temporary disability lasting less than one year.¹⁵⁴

Although the 1910 U.S. Steel initiative merely collected together and systematized existing programs such as the Carnegie endowment, it was nonetheless a signal moment in the history of American welfare capitalism. For one thing, the sheer size of the U.S. Steel program was unprecedented. Accident relief payments represented roughly two million dollars per year over the program's first five years,¹⁵⁵ constituting twenty-nine percent of U.S. Steel's total employee welfare expenditures between 1912 and 1923.¹⁵⁶ And unlike prior employee accident relief policies, the U.S. Steel plan was financed entirely through employer contributions.¹⁵⁷ Indeed, the central principles of the U.S. Steel relief fund were the ideas that (as one paper given at the 1910 conference of the American Iron and Steel Institute put it) "compensation to injured workmen is a legitimate charge against the cost of manufacture and that the victim of an industrial accident or his dependents should receive compensation, not as an act of grace on the part of his employer but as a right."¹⁵⁸ In the words of the president of the National Tube Company—one of the constituent corporations of the U.S. Steel family—it was not "right or fair to say that a man enters our employ knowing that the work is hazardous, and that therefore the risk is his. I think the industry should bear that burden."¹⁵⁹ The U.S. Steel accident compensation plan thus endorsed the notion—soon to be associated with work accident compensation statutes—that industry properly bore the responsibility for the costs of accidents to its employees.

Establishment funds generally paid approximately one-half or two-thirds of an employee's weekly wages for durations ranging from thirty-nine weeks to up to two years during the course of a work-related disability.¹⁶⁰ At large firms, death benefits generally ranged from seventy-five or

153. See Comm'r of Lab. Ann. Rep., *supra* note 138, at 637–38.

154. Eastman, *supra* note 92, at 162.

155. See Raynal C. Bolling, *Rendering Labor Safe in Mine and Mill, Iron & Steel Institute*, *supra* note 24, at 106, 107.

156. See Gulick, *supra* note 152, at 182–83 tbl. XV.

157. See Dickson, *supra* note 62, at 56, 61.

158. *Id.* at 63.

159. William B. Schiller, *Welfare Work in the Steel Industry*, *Iron & Steel Institute*, *supra* note 24, at 119, 120; see also Bolling, *supra* note 155, at 106, 107–09.

160. See Henderson, *supra* note 134, at 192; Comm'r of Lab. Ann. Rep., *supra* note 138, at 409.

one hundred dollars to upwards of five hundred dollars, and sometimes even higher, depending on the fund and the wages of the deceased employee.¹⁶¹ Railroad accident funds tended to be somewhat more generous; in 1908, railroad relief funds found an average payment of five hundred eighty-eight dollars in death cases.¹⁶² At smaller firms, however, death benefits tended to be considerably lower. One study of forty-two New Jersey firms in 1904 found that an establishment fund at the sizeable Gibson Iron Works provided death benefits of between one thousand and two thousand dollars; at the forty-one remaining firms, however, death benefits ranged from twenty-five dollars at Newark's Johnson and Murphy Shoe Company to one hundred fifty at Camden's Farr and Bailey Manufacturing Company.¹⁶³

Virtually all establishment funds required that members sign waivers of the right to sue as a condition of enrollment in the accident compensation plan, and where such waivers were unenforceable funds required injured members to elect between collecting fund benefits and bringing a risky tort claim.¹⁶⁴ Most establishment funds also implemented mechanisms to minimize adverse selection and moral hazard problems. Thus, in some firms, such as the Baltimore and Ohio Railroad, membership in an accident relief fund was a condition of employment, which allowed the firm to avoid the adverse selection problems endemic to elective membership.¹⁶⁵ More frequently, however, firms adopted the approach taken by the Pennsylvania Railroad Company, which left membership in the relief fund optional but implemented maximum age rules and required physical examinations for all employees seeking to join.¹⁶⁶ In addition, relief funds employed "visiting committees" that combined the functions of wishing disabled employees a speedy return to health, on one hand, and checking for possible malingering, on the other.¹⁶⁷

The engineering profession argued that resting accident costs on the firm itself would have the effect of legitimating new claims of managerial

161. See Comm'r of Lab. Ann. Rep., *supra* note 138, at 420-24; Henderson, *supra* note 134, at 193.

162. Comm'r of Lab. Ann. Rep., *supra* note 138, at 274.

163. See Henderson, *supra* note 134, at 199-201 tbl. I (reprinting results of New Jersey study).

164. See Willoughby, *supra* note 131, at 316. In 1898, the Erdman Act made such election requirements illegal among interstate railroad workers. Erdman Act, ch. 370, 30 Stat. 424 (1898).

165. Johnson, *Railway Relief Departments*, *supra* note 132, at 42.

166. In 1908, thirty-three of thirty-six railroad relief funds had optional membership rules combined with age and physical condition requirements for membership. Comm'r of Lab. Ann. Rep., *supra* note 138, at 271-72. Only seventy of the 458 nonrailroad firms' employee accident relief programs surveyed made membership a condition of employment. See *id.* at 394; Willoughby, *supra* note 131, at 286. On physical examinations as a premembership requirement, see Price, *supra* note 151, at 252-53.

167. See ICC Rep., *supra* note 131, at 375 (statement of A.A. McLeod, Vice President and General Manager of the Philadelphia and Reading Railroad Company).

prerogative in the operation and control of the enterprise.¹⁶⁸ The Baltimore and Ohio Railroad's Relief Department, for example, drew praise in the 1890s from management engineers interested in the rationalization of labor management as "an intelligent and well-directed effort in the true line of industrial progress."¹⁶⁹ Indeed, observers suggested that the expansion and systematization of such relief policies as the Baltimore and Ohio's "would do much to bring about a reconciliation [between capital and labor], to say nothing of the relief to the injured from the point of view of humanity."¹⁷⁰ Similarly, in a series of articles that appeared in *Engineering Magazine* in 1905 and 1906, O.M. Becker advocated the adoption of a "square deal" for employee accident relief in order to accommodate the modern factory operative to the status of "merely a more or less mechanical attachment" to the machine tool.¹⁷¹ If the new problem of the production process was the management of men rather than the development of new and better mechanization, employer relief policies offered the opportunity to foster employee loyalty in the increasingly depersonalized world of the large manufacturing enterprise.¹⁷²

In some cases, especially in the 1880s and 1890s and on the railroads, establishing new levels of managerial control of the workplace meant combating the threat posed by labor organizations to managerial domination of the firm. The railway brotherhoods threatened to hinder managerial initiatives ranging from the implementation of new work rules to the adoption of new routes and scheduling. Nationwide railroad strikes in 1877, 1886, and again in 1894 emphasized the disruptive potential of la-

168. Historians of American management practices see the development of welfare capitalism in the 1920s as a response by firms to the need to accommodate workers to the changes ushered in by new scientific management strategies in the 1910s. See, e.g., Brandeis, *supra* note 15, *passim*. Historians generally see scientific management and employee welfare programs before the 1920s as two competing strands in the development of modern managerial techniques. See, e.g., Jacoby, *Employing Bureaucracy*, *supra* note 39, at 40–64; Nelson, *Managers and Workers*, *supra* note 29, at 55–78. Management engineers' ideas about employer accident relief policies, however, suggest that the antinomy of scientific management and welfare work was not especially sharp.

169. *Industrial Sociology*, 11 *Eng'g Mag.* 346, 348 (1896).

170. Thomas L. Green, *Railways*, 6 *Eng'g Mag.* 244, 246 (1893).

171. See O.M. Becker (pts. 1 & 3), *supra* note 62, at 537, 823.

172. See, e.g., *Constitution and By-Laws: Employes' Mutual Benefit Association Pension System of the Minneapolis St. Railway Co.*, art. III, at 2 (1915) (available in Wisconsin Mutual Aid holdings, *supra* note 142) (on file with the *Columbia Law Review*) (listing as an object of the association "to promote a helpful spirit of co-operation among the employees of the Company"); Emory R. Johnson, *Railway Departments for the Relief and Insurance of Employes*, 6 *Annals Am. Acad. Pol. & Soc. Sci.* 424, 424 (1895) ("The relief department is one of the many agencies that have been called into being to assist in the solution of the labor problem."); see also *id.* at 426–27 (arguing that the "chief" motive for the implementation of railway relief departments was "to cultivate a spirit of loyalty strong enough not only to prevent strikes, but also to prompt men to give the highest grade of service of which they are capable").

bor organizations on the railroads.¹⁷³ Undermining worker allegiance to the brotherhoods thus became a central goal of railroad management, and railroad relief funds were frequently employed toward this end.¹⁷⁴ In 1887, for example, after the especially bitter Knights of Labor-led strike on many of the nation's railroads, the Philadelphia and Reading Railroad Company's statistician suggested to the railroad's president that an accident relief fund would be "the most expedient way by which an alienation of the men from orders such as the 'Knights of Labor' may be made effective, thereby establishing a closer relationship [between the road and its workers]."¹⁷⁵

Furthermore, in the eyes of management engineers, employer accident insurance benefits would lead to substantial reductions in waste. The internalization of accident costs to the enterprise, they suggested, would rationalize the relationship between inputs and outputs in the production process. The editors of *Engineering Magazine*, for example, noted that "[i]t should hardly be necessary to observe that the real responsibility [for railroad accidents] is a matter which lies higher up than with the train crew."¹⁷⁶ After all, "no military officer" would endeavor "to shift the responsibility of matters entrusted to his command to the shoulders of his inferiors."¹⁷⁷ Nor, then, should railroad management suffer to allow the responsibility for work accidents to fall on the shoulders of employees. Yet at common law, the engineers argued, employers were able to ignore accidents involving employees because they were generally not liable for the costs of injuries to workers. The common law thus created perverse incentives to waste human labor power. Employer-financed relief funds and expanded employers' liability, by contrast, would encourage firms to reduce accident costs. As one railway management engineer put it, it seemed that "the proper way to prevent accidents on railroads was to lash a director of the company to the front of each locomotive."¹⁷⁸

173. See Walter Licht, *Working for the Railroad: The Organization of Work in the Nineteenth Century* 249–50 (1983). On the railroad strikes of the late nineteenth century, see generally Foner, *supra* note 45 (detailing 1877 strikes); Painter, *supra* note 45; Nick Salvatore, *Eugene V. Debs: Citizen and Socialist* (1982) (profiling prominent labor leader and describing strikes).

174. Willoughby, *supra* note 131, at 317 (suggesting that establishment funds on the railroads were "organized by the roads in order better to control their employés, to prevent their striking, and to undermine the influence of their organizations").

175. Asher, *supra* note 129, at 23 (alteration in original) (citations omitted). On welfare capitalism as a strategy to undermine labor organizations, see Irving Bernstein, *The Lean Years: A History of the American Worker, 1920–1933*, at 185–88 (1960); Brandes, *supra* note 140, at 32; Montgomery, *Fall of the House of Labor*, *supra* note 30, at 242.

176. *Railway Accidents in England and America*, 28 *Eng'g Mag.* 981, 983 (1905).

177. *Id.*

178. *Id.* Managerial engineers' professional aims were often in what economic historian Mark Aldrich has described as a kind of "creative tension" with the profit maximization of the firm. Aldrich, *supra* note 88, at 109.

IV.

What did it mean for managerial engineers to identify the firm as the entity to which accident costs were properly internalized? The mid-nineteenth-century law of work accidents had taken for granted that employees were in the best position to prevent and avoid accidents. In the famous case of *Farwell v. Boston & Worcester Rail Road*, for example, Chief Justice Lemuel Shaw ruled that employers were not liable for employee injuries caused by the negligence of a fellow employee because “[t]hese are perils which the servant is as likely to know, and against which he can as effectively guard, as the master.”¹⁷⁹ In work accidents, he asserted, the safety of employees depended not so much on the care of the employer but rather upon “the care and skill” of the employees themselves.¹⁸⁰ If Shaw had spoken about internalizing the costs of accidents, he presumably would have said they should be internalized to the worker, not to the firm.

The engineering literature of the late nineteenth century described a different kind of workplace, one that reflected both changes in the structure of work and management engineers’ aspirations to the substitution of managerial power for worker control. To be sure, the engineers argued that accidents at work almost always involved employee carelessness, ignorance, and inattention. Boiler operators grew accustomed to—and thus complacent about—startlingly dangerous steam conditions;¹⁸¹ miners held foolish folk ideas about the varying degrees of danger associated with different concentrations of coal damp in mines;¹⁸² blasting workers resisted the implementation of scientifically tested safety devices;¹⁸³ railroad engineers invariably grew accustomed to small but potentially disastrous deviations from prescribed safety procedures;¹⁸⁴ and workers in high technology fields such as electricity could not be trusted to understand the basic principles of safety in novel working environments.¹⁸⁵ In these respects, the engineers shared Shaw’s view of the con-

179. 45 Mass. (4 Met.) 49, 57 (1842).

180. *Id.* at 59.

181. As the Editors of *Cassier’s Magazine* put it, Boiler accidents will probably for a long time continue to afford some of the best examples of dangerous carelessness among engine and boiler attendants. Familiarity . . . breeds contempt, and it is familiarity with the dangers which are always associated with the use of steam apparatus that seems, in numberless cases, to have caused death and destruction around boilers.

Current Topics, 11 *Cassier’s Mag.* 162, 166–67 (1896); see also 2 Transactions of the Am. Soc’y of Mech. Eng’rs 61 (1881) (“[T]here are three principal causes of steam-boiler explosions . . . the first is ignorance, the second is carelessness, and the third is utter recklessness.”).

182. See G. Farmer, Causes and Prevention of Disasters in Mines, 31 *Cassier’s Mag.* 296, 301–303 (1907).

183. R.W. Raymond, Blasting in Large Cities, 30 *Cassier’s Mag.* 561, 561–62 (1906).

184. F.W. Haskell, The Causes of Accidents on American Railways, 28 *Eng’g Mag.* 321, 323–25 (1904).

185. Accidents in Power House Operations, 30 *Cassier’s Mag.* 287, 287–88 (1906).

ditions under which work accidents occurred: They resulted from worker actions and worker negligence. But engineers differed from Shaw on the implications of employee carelessness. According to the engineers, if employee carelessness was inevitable, and if occasional negligence, forgetfulness, and ignorance were endemic to the human condition (and particularly so among workers whom engineers often viewed as uneducated, lazy, and careless), it stood to reason that accident prevention and the efficient rationalization of economic processes necessarily depended on the implementation of scientific approaches to the management of production, not on the workers themselves.¹⁸⁶

What the engineering literature added up to was a new theory of causation for workplace accidents.¹⁸⁷ Causation in accident cases was bilateral at the very least. Both the injured worker and the firm were necessary antecedents to any workplace accident; indeed, accidents inevitably involved any number of additional necessary parties. Yet engineers talked about causation in terms of which party had been best positioned to prevent the accident.¹⁸⁸ And almost inevitably, their answer was that sophisticated firms, not incorrigibly careless workers, were best situated to create engineering solutions to work-accident problems. Accident costs, it followed, were properly internalized to firms rather than employees.

This new theory of enterprise responsibility and causation helped give rise to the second part of engineers' answer to the industrial accident crisis: the beginning of a movement for industrial safety. Two examples—boiler explosions and railroad collisions—will help flesh out this new causal theory in the management literature.

Improvements in boiler safety present one of the few success stories in the otherwise dismal story of late nineteenth-century workplace safety. The first boiler explosions accompanied the early development and introduction of steam power into American industry in the 1830s.¹⁸⁹ A grow-

186. See, e.g., *Railroad Accidents in America*, 28 *Eng'g Mag.* 833, 835 (1905) (reporting on speech by H.D. Emerson at New York Railroad Club, arguing that railroads should move past blaming workers and instead adopt new systems designed to ensure safety without regard to the negligence or carelessness of employees). Historian David Moss and I have both developed this point, comparing Justice Shaw's view of risk in the workplace to the early twentieth-century way of thinking about such risks. See David A. Moss, *When All Else Fails: Government as the Ultimate Risk Manager* 233 (2002); Witt, *Accidental Republic*, *supra* note 12, ch. 4; John Fabian Witt, *The Transformation of Work and the Law of Workplace Accidents, 1842–1910*, 107 *Yale L.J.* 1467, 1469–70 (1998) [hereinafter Witt, *Transformation of Work*].

187. Economic historian Mark Aldrich describes precisely this shift among American businesses from blaming accidents on employee carelessness to blaming accidents on managerial failure in the safety movement of the 1910s. See Aldrich, *supra* note 88, at 116–17. The point here is that safety engineers had been making the same claim for several decades.

188. The leading contemporary account along these lines is Guido Calabresi, *The Costs of Accidents* (1970) [hereinafter Calabresi, *Cost of Accidents*].

189. John G. Burke, *Bursting Boilers and the Federal Power*, 7 *Tech. & Culture* 1, 2 (1966).

ing number of establishments turned to steam power, and as boilers became more and more powerful, boiler explosions wreaked havoc in early American manufacturing. Fatal boiler explosions were reported as early as 1838, and in the 1850s and 1860s disastrous boiler catastrophes made headlines. In New York City, for example, the Hague Street Disaster of 1850 claimed the lives of sixty-seven workers, and in Philadelphia an 1867 explosion killed another twenty-eight people.¹⁹⁰ All in all, boiler insurance firms estimated that over seven thousand people were killed in boiler explosions in the United States between 1883 and 1907.¹⁹¹

Engineers in the 1870s, '80s, and '90s warned frequently of the dangers and accompanying costs associated with haphazard boiler use in steam powered manufacturing enterprises¹⁹² and on steam powered locomotives¹⁹³ and boats.¹⁹⁴ "Among the dangers which menace a boiler," explained one engineer in 1891, "are explosion, corrosion, leakage, burning, and leaky or dilapidated front or setting."¹⁹⁵ And while some of these problems merely meant the waste of fuel or diminished power capacity, others "herald[ed] danger to life and limb as well as wreckage of property."¹⁹⁶ Indeed, J.M. Allen of the Hartford Steam Boiler Inspection and Insurance Company estimated that the roughly one thousand boiler explosions occurring in the United States between 1880 and 1886 caused three million dollars in damages to property, as well as some 1,500 deaths and many more injuries.¹⁹⁷

According to many engineers, however, boiler explosions might virtually be abolished through rational and scientific boiler construction, operation, and inspection. Engineers developed and advocated the use of automated devices that allowed operators to open and shut steam valves from a safe distance, for example,¹⁹⁸ and developed new and

190. See Aldrich, *supra* note 88, at 79–80.

191. *Id.* at 80.

192. See, e.g., William Barnet Le Van, *The Lifetime or Age of Steam Boilers*, 2 *Transactions of the Am. Soc'y of Mech. Eng'rs* 503, 503–25 (1881) (describing boiler explosions at Wood & Bros. of Conshohocken, Pennsylvania); Fred H. Daniels, *A Peculiar Explosion of a Boiler*, 3 *Cassier's Mag.* 123, 123 (1892) (describing boiler explosion at Washburn & Moen Manufacturing Company in Worcester, Massachusetts); *Current Topics*, 11 *Cassier's Mag.* 332, 334 (1897) (describing close call involving weakened cast iron steam piping at a large manufacturing establishment); *Mechanics*, 2 *Eng'g Mag.* 547, 548 (1892) (describing a "singular" boiler explosion at an English plant).

193. See, e.g., *Current Topics*, 27 *Cassier's Mag.* 336, 337–38 (1905) (describing explosions arising out of careless use of boiler tube cleaners on steam powered railroad engines); *Current Topics*, 9 *Cassier's Mag.* 76, 78 (1895) (describing boiler and steam pipe explosions on railroad engines).

194. See, e.g., *Current Topics*, 16 *Cassier's Mag.* 703, 704 (1899).

195. Robert Grimshaw, *Danger Signals About the Boiler*, 1 *Eng'g Mag.* 158, 158–59 (1891).

196. *Id.* at 159.

197. J.M. Allen, *Steam Boiler Explosions*, 1 *Cassier's Mag.* 191, 191 (1891).

198. See Arthur Herschmann, *The Protection of Steam Pipes from Accident*, 34 *Eng'g Mag.* 456, 459 (1907).

stronger designs for boiler construction.¹⁹⁹ Most of all, engineers pointed to the extraordinary success of expert inspection of boilers as evidenced by the record of boiler insurance companies. Defective boilers, it was estimated, accounted for as many as seventy-five percent of all boiler explosions.²⁰⁰ It was “the special province of boiler inspection to discover” such defects.²⁰¹ Boiler insurance firms such as the Hartford Steam Boiler Inspection and Insurance Company, founded in 1867, collected comprehensive statistics on boiler accidents, which made it possible for the first time to make scientific investigations into the relative merits of alternate boiler design.²⁰² And by all accounts, boiler insurance and the accompanying inspections by trained engineers sharply reduced the incidence of boiler explosions.²⁰³ Indeed, although the engineering profession conceded that “such accidents can never be wholly got rid of,” engineers believed that expert inspection had made “a long step . . . in that direction.”²⁰⁴ Boiler engineering, then, stood as a shining example of what rational engineering could do for workplace safety.

Railroad collisions formed a second great preoccupation of accident prevention engineers in the 1890s, but here the results were ambiguous. Train collisions, in the words of one engineer, represented the “most disgraceful, because entirely avoidable, class of accidents.”²⁰⁵ In the 1880s and early 1890s, engineers had focused on improvements in the physical infrastructure of the railroad industry as the most productive way to reduce the accident rate, developing and implementing improvements in bridge construction, track gauges, roadway and car design, automatic couplers, and air brakes.²⁰⁶ But by the middle and late 1890s and the first decade of the twentieth century, management engineers on the railroads had come to believe that employee negligence was far and away the greatest cause of railroad collisions.²⁰⁷ Nearly seventy percent of accidents on the railroads, according to one engineering estimate, were “due

199. See R.S. Hale, *Boiler Design and Boiler Explosions*, 27 *Eng'g Mag.* 232, 232–46 (1904).

200. F.B. Allen, *The Protective Value of Boiler Inspection*, 4 *Transactions of the Am. Soc'y Mech. Eng'rs* 142, 143–44 (1883).

201. *Id.* at 144.

202. See *id.* at 144–45, 148.

203. See *id.* at 148 (citing two explosions in 1881 out of 15,000 boilers insured with the Hartford company); W.A. Carlile, *Boiler Insurance and Inspection*, 11 *Cassier's Mag.* 65, 65 (1896) (citing one explosion for every 11,000 boilers insured in the United Kingdom); see also *Current Topics*, 1 *Cassier's Mag.* 115, 115 (1891) (citing the success of the Steamboat Inspection Service's boiler inspections).

204. Carlile, *supra* note 203, at 73.

205. Haskell, *supra* note 184, at 322.

206. See, e.g., Gen. Horace Porter, *Safety Devices on Railroad Cars*, 4 *Cassier's Mag.* 239, 239–40 (1893); Robinson, *supra* note 106, at 525–60; *Letters to the Editor, Air Brake Pump Performances*, Letter from New York Air Brake Co., 5 *Cassier's Mag.* 151, 152–53 (1893).

207. See, e.g., *The Prevention of Railway Accidents*, 34 *Eng'g Mag.* 817, 817 (1908) (“Accidents are the result of the breakdown of the man, not of the machine.”).

entirely to the mental or physical state of the human agent.”²⁰⁸ “[A]dmirable rules for the government of employes,” observed another railway engineer, “are habitually disregarded.”²⁰⁹ At grade crossings, junctions, drawbridges, and passing tracks, engineers persistently and inevitably violated state and company rules requiring them to stop, either out of concern to meet scheduling deadlines, or out of becoming accustomed to taking risks.²¹⁰ As a result, it was futile to leave safety to the workers themselves.²¹¹ Indeed, in the engineers’ view, “[m]en will be careless” inevitably, “and the railroad company should provide for this trait in human nature” by implementing automated safety devices that took the discretion and human agency out of railroad safety.²¹²

In particular, engineers advocated automated block and automated train stop systems as alternatives to the signaling system typically used by American railroads in the 1890s. Under the signaling system, railroad employees whose duty it was to give signals stood at critical junctures in the railroad line and used flags to give signals to oncoming traffic indicating the presence of trains ahead. The difficulty with this approach, as the engineering press was quick to point out after railroad disasters, was that it left “a single employee to judge whether to protect the lives of half a hundred passengers the precautions laid down by the rules shall be observed.”²¹³ Poor judgment or carelessness by a signal man, or the decision by an engineer to override the signal, could lead to catastrophe. The automated block system, by contrast, employed electricity-powered signaling systems that did not rely on individual signal men. Automatic train stops, in turn, employed automatic braking devices to stop trains whether or not the engineer applied the brakes.²¹⁴

Engineers experienced little success in introducing automated block systems or automated train stops. Both remained exceedingly rare on

208. Current Topics, 27 *Cassier's Mag.* 255, 260 (1905).

209. Haskell, *supra* note 184, at 323. ‘Employee’ was a common nineteenth-century spelling of employee.

210. See, e.g., Julien A. Hall, *The Causes of Railroad Accidents*, 9 *Eng'g Mag.* 720, 726 (1895); Charles Hansel, *The Evolution of Safety in Railway Travel*, 16 *Eng'g Mag.* 599, 604 (1899).

211. See, e.g., Editorial, 28 *Eng'g News* 12, 12 (1892) (observing “[t]he lesson that it is not only human to err but human to be forgetful and careless” in the context of railroad accidents); Franklin L. Pope, *Electricity*, 4 *Eng'g Mag.* 285, 286 (1892) (“[I]t will no longer answer to depend, as is now done, solely upon the vigilance and promptness of the engine-driver, to avert accidents.”).

212. Hall, *supra* note 210, at 725.

213. Editorial, 26 *Eng'g News* 34, 34 (1891).

214. See *id.*; Editorial, *supra* note 211, at 12; *Railroad Accidents in America*, *supra* note 186, at 834–35; Thomas L. Greene, *Railways*, 6 *Eng'g Mag.* 897, 897 (1893–1894); Hansel, *supra* note 210, at 605; Charles A. Howard, *Safety in American Railway Transport*, 34 *Cassier's Mag.* 3, 3–9 (1908); *Prevention of Railway Accidents*, *supra* note 207, at 819; see also Aldrich, *supra* note 88, at 169–71 (observing that railroad journals advocated the use of devices that could apply the brake “in spite of the engineman”).

American railroads.²¹⁵ A larger, but still relatively small, portion of American railroads implemented manual block signals. The manual block signal system divided the track into sections (or “blocks”), and trains were prohibited from entering a block of track unless it was empty. The manual block system, however, still relied on enginemen to follow the signals and on railroad workers to follow the progress of trains through the blocks and to set signals accordingly.²¹⁶ Moreover, only twenty-two percent of American railroad mileage was in the manual block system by 1906.²¹⁷ And between 1897 and 1907, passenger and employee fatalities from railroad collisions skyrocketed, increasing by almost four hundred percent.²¹⁸ Only between 1922 and 1928 did the Interstate Commerce Commission briefly adopt new automated train stop rules. But by then the combination of more effective manual block systems and declining traffic density on the nation’s railroads had already led to sharp declines in the collision rate.²¹⁹

Despite their differing levels of success, the common trend in the boiler and the railroad examples was the idea that the best way to prevent accidents and catastrophes in the modern industrial workplace was to remove discretionary authority from the hands of the worker. “[H]uman nature is fallible,” observed the editors of *Cassier’s Magazine* in 1905.²²⁰ It was therefore “incumbent upon transportation experts to adopt every possible method and device to secure safety.”²²¹ “[I]f there is blame anywhere,” noted another engineering journal with reference to an 1892 train disaster, “it rests with the company rather than with the operator, for the simple reason that human nature is not equal to the strain” of the constant vigilance required in railroading.²²² Signaling systems and safety measures, observed still another engineer, were “a part of the duty of officials in charge of the conduct of transportation.”²²³ Likewise, in boiler operations, rampant employee carelessness required expert inspection.

Engineers applied their scientific approach to rationalized and efficient production to any number of other dangerous conditions in indus-

215. See Aldrich, *supra* note 88, at 174–75.

216. See *id.* at 20–21.

217. See *id.* at 178.

218. See *id.* at 169. A chief cause of the increase, ironically, appears to have been the introduction of air brakes, which encouraged faster speeds. See *id.* at 177–78.

219. See *id.* at 178.

220. Current Topics, 28 *Cassier’s Mag.* 326, 327 (1905).

221. *Id.*

222. Editorial, *supra* note 211, at 12.

223. Railway Accidents in England and America, *supra* note 176, at 983.

trial life. Bursting fly wheels and engine room explosions,²²⁴ blasting,²²⁵ work under compressed air,²²⁶ mining,²²⁷ and railroad and electrical work²²⁸ all seemed to present similar problems of hazardous production processes in which proper engineering could effectively reduce the risk of accidents. In all of these areas, managers might reduce the “unnecessary slaughter and maiming” incident to modern industry to “a theoretical minimum.”²²⁹

As with accident compensation benefits, a generation of engineering ideas about industrial safety came together at the U.S. Steel Company, where in 1906 and 1907 managers consolidated its decentralized, plant-by-plant safety departments into a single Central Committee on Safety.²³⁰ As the historian of the Steel Corporation’s labor relations has observed, the safety movement at U.S. Steel was the “real center” of the corporation’s subsequent labor relations policy, “the source from which practically everything else has sprung.”²³¹ The Committee inspected safety conditions and acted as a clearinghouse for safety information in all U.S. Steel subsidiary plants. It developed and tested safety devices; disseminated among employees “full details, photographs, diagrams and complete information of all matters dealing with . . . safety”;²³² and implemented such basic safety provisions as railings along high walkways, tunnels allowing for safe travel across railyards, enclosed gears, safer crane hooks, and belt and shaft guards, to name only a few.²³³

There were obvious connections between new ideas about work safety and the roughly contemporaneous accident insurance benefit programs. Firms that took on extra accident costs through accident benefit plans had increased reason to make their workplaces safe. The Dodge

224. See, e.g., William Wallace Christie, *Safety Appliances in the Engine Room*, 32 *Cassier’s Mag.* 333, 333–49 (1907); *Current Topics*, 33 *Cassier’s Mag.* 300, 304–06 (1907) (describing causes of disastrous fly wheel explosion at the Chicago Coated Board Company and arguing that it was “most important to exercise every caution in installing safety appliances for protection against explosions of fly-wheels”).

225. See, e.g., Raymond, *supra* note 183, at 561–62.

226. See, e.g., *The Physiological Effects of Working Under Compressed Air*, 30 *Cassier’s Mag.* 285, 285–86 (1906).

227. See, e.g., C.M. Percy, *Colliery Ventilating Machinery*, 22 *Cassier’s Mag.* 394, 394 (1902); *The Handling of High Explosives*, 17 *Eng’g Mag.* 841, 841–42 (1899); *Mining and Metallurgy*, 11 *Eng’g Mag.* 583, 583–84 (1896) (describing methods for preventing explosions); *Mining and Metallurgy*, 2 *Eng’g Mag.* 264, 265–66 (1891) (describing methods of testing safety lamps); *Mining and Metallurgy*, 1 *Eng’g Mag.* 264, 264–65 (1891) (describing the relative inferiority of American safety lamps).

228. See, e.g., W.M. Mitchell, *The Safety Car-Coupler Problem*, 5 *Eng’g Mag.* 519, 519–23 (1893); Robinson, *supra* note 106, at 524–59.

229. Harold Vinton Coes, *Can Railroad Collisions Be Reduced to a Theoretical Minimum?*, 34 *Eng’g Mag.* 632, 632 (1908).

230. See, e.g., Aldrich, *supra* note 88, at 91–93; Leschohier, *supra* note 149, at 367–68.

231. Gulick, *supra* note 152, at 138.

232. *Id.* at 139.

233. Aldrich, *supra* note 88, at 127.

Manufacturing Company of Indiana, for example, implemented a set of accident relief benefits through the Dodge Mutual Relief Association,²³⁴ while at the same time its management adopted the engineering view of work safety, placing “the blame for 75 per cent of factory accidents to the . . . indifferent attitude of the employer toward employe.”²³⁵ Midvale Steel adopted a system of employer sponsored accident benefits in the same years in which Taylor had begun to reengineer its employment practices.²³⁶ And leading firms such as U.S. Steel set up both safety programs and an accident benefits plan.²³⁷

Notwithstanding prominent cases such as U.S. Steel, however, implementation of new engineering ideas about work safety and accident relief in actual workplaces was a slow process. As the engineers’ mock proposal to “lash” directors of railroad companies to the front of locomotives suggested,²³⁸ managerial engineers and those who controlled the firm often failed to see eye to eye. Indeed, outside of boiler explosions, railroad collisions, and other kinds of catastrophes that threatened to inflict considerable property damage or to generate considerable bad publicity, many late nineteenth-century firms exhibited relatively little interest in adopting many of the safety measures and accident programs advocated by the management engineering experts.

A chief obstacle to such schemes was their cost. The American Manufacturing Company of New York City, for example, estimated that its private accident relief fund increased its accident costs five-fold over the common law liability rules.²³⁹ U.S. Steel estimated that private accident programs cost millions of dollars each year over and above its employers’ liability costs.²⁴⁰ Unsurprisingly, then, such accident programs were initiated most frequently in firms that were protected in some way from competitive pressures, either by dominant market positions as in the case of U.S. Steel, or by a combination of natural monopoly and cost-plus rate regulation as in the case of the railroads. Outside such industries, it was the rare firm that could say with Edward O’Toole of the United States Coal and Coke Company that it would “gladly pay the [additional costs]

234. Memorandum from W.L. Chandler to the members of the Dodge Mutual Relief Association and Dodge Club, Misawaka, Ind. (July 31, 1914) (suggesting revised bylaws for the Dodge Mutual Relief Association) available at the Am. Ass’n for Lab. Legis. Papers, Kheel Center for Labor Management Documentation and Archives, M.P. Catherwood Library, Cornell Univ. [hereinafter Kheel Center collection] (on file with the *Columbia Law Review*).

235. Blame for Accidents is Laid to Employers, Lab. Advocate (Birmingham, Ala.), Oct. 30, 1914 at 1.

236. See 14 Report of the Industrial Commission 352 (1901).

237. See *supra* notes 152–159 and accompanying text.

238. *Supra* note 178 and accompanying text.

239. Commission Appointed under Chapter 518 of the Laws of 1909 to Inquire into the Question of Employers’ Liability and Other Matters, Report to the Legislature of the State of New York 160 (Mar. 19, 1910) (conventionally known as the “Wainwright Report”).

240. See Bolling, *supra* note 155, at 107–09 (estimating a cost of two million dollars per year in 1912).

necessary to permit the business to be conducted in a more safe and humane manner.”²⁴¹

Beginning around 1910, many of the nation’s most sophisticated firms joined a complex coalition of progressive reformers and labor unions to support work accident compensation legislation.²⁴² In supporting compensation statutes, such firms were led by their management engineers, who had cautiously supported broader employer liability in work accident cases since the early 1890s.²⁴³ Workmen’s compensation would impose the costs of accident relief benefits across entire industries and would at the same time reward safe workplaces through reduced compensation costs. With the enactment of workmen’s compensation statutes between 1910 and 1920 in all but a few states from the deep South, the ideas of managerial engineers were widely implemented in American workplaces. Safety engineers in the 1910s established minutely detailed sets of work rules for

safe ways to pile materials, safe places to stand while dressing drive belts, safe methods of placing ladders and of climbing down them, safe methods of lifting, safe ways to sharpen a knife, safe ways to attach a lifting hook, open a fire door, feed a saw, tighten a nut, rig a gangway, lift a load, and move a cart . . .

and even “safe ways to dress,” including safety shoes, special gloves, safety goggles, and hair nets.²⁴⁴ And as it turned out, the reengineering of workplace safety after 1910 helped cause fatal employee accident rates to fall off sharply in manufacturing industries and on railroads.²⁴⁵

241. Luther Anderson, *Workmen’s Compensation: An Address Before the West Virginia Bar Association* 19, White Sulphur Springs, W. Va. (July 14, 1910), available at Workmen’s Compensation 1908–1910 folder, Kheel Center collection, *supra* note 234 (on file with the *Columbia Law Review*).

242. John Fabian Witt, *Workmen’s Compensation and the Logics of Social Insurance* 52–64 (Columbia Law Sch. Pub. Law Research, Paper No. 02-41, 2002), at http://papers.ssrn.com/SOL3/papers.cfm?abstract_id=311582 (on file with the *Columbia Law Review*) [hereinafter Witt, *Logics of Social Insurance*].

243. As early as 1892, for example, an article in *The Engineering Magazine* endorsed the German compensation approach to the problem of workplace accidents as most likely to reduce the number of accidents in the United States. See Leicester Allen, *Mechanics*, 4 *Eng’g Mag.* 605, 605 (1893). Three years later, the *News’s* editors positively reviewed—though with somewhat more skepticism this time—the English debate over industrial accident compensation reform. See *Liability of Employers for Injuries to Workmen*, 10 *Eng’g Mag.* 134, 134–35 (1895). And by the first decade of the twentieth century, support for some kind of European-style social insurance mechanism in work accident cases was widespread among management engineers. See, e.g., Miles M. Dawson, *Labor Insurance in the United States*, 39 *Eng’g Mag.* 411, 411–13 (1910); Wm. Mayo Venable, *Industrial Accidents and Liability of Employers*, 41 *Eng’g Mag.* 721, 728–30 (1911); *Insurance of Labour in Germany*, 33 *Eng’g Mag.* 625, 625 (1907); *Insurance of Labour in Italy*, 33 *Eng’g Mag.* 105, 105 (1907).

244. See Aldrich, *supra* note 88, at 133.

245. *Id.*

V.

What can it mean to identify enterprise liability in the middle and late twentieth century as a consequence—unintended, unforeseen, or otherwise—of the efforts of scientific managers at the turn of the twentieth century? Surely there were any number of causal factors involved in a phenomenon as vast as the growth of tort liability across fields as diverse as products liability, medical malpractice, and landowners' and occupiers' liability, to name only a few of the most prominent. No account of these developments could possibly hope to leave out such features of the American tort system (many of them peculiar to the United States) as jury trials, the common law method of incremental policymaking by politically insulated judges, contingency fees, the absence of loser-pays legal fees, and relatively less well developed public insurance mechanisms such as national health insurance. Each of these factors no doubt contributed to the middle to late twentieth-century expansion of tort liability in the United States.

When I describe scientific management ideas as a cause of the enterprise liability revolution that followed some number of decades thereafter, I mean to single out these ideas as one necessary cause among others. Ideas about the nature of the firm were preconditions to the enterprise liability phenomenon. Consider, for example, the argument that advances Warren Court era judicial activism as a critical factor in the development of enterprise liability notions in the law.²⁴⁶ A judicial willingness to make bold doctrinal moves may well have been necessary to the transformations in tort doctrine, but the mere willingness to depart from existing legal rules says little about the direction any such departure will take. Judicial activism might, after all, have produced rollbacks in enterprises' exposure to liability, just as tort judges in the 1980s and 1990s have drawn back from some of the most far reaching implications of the enterprise liability revolution. None of the various institutional factors advanced in the literature are sufficient to explain enterprise liability absent a set of ideas upon which the decisions making up the law of enterprise liability can rest. And in the United States, these ideas were first brought into the public eye by those early generations of managerial engineers who sought to rationalize the nature of the firm.

In this last Part, I sketch some lines of influence between scientific management in the firm and enterprise liability in tort, tracing the intellectual premises of the former as they spread into the latter. Accounts of the origins of enterprise liability have pointed toward the enactment of workmen's compensation statutes in the 1910s as a foundational moment for the subsequent expansion of enterprise liability.²⁴⁷ Scholars such as

246. See Schuck, *supra* note 9, at 12–14; Schwartz, *Beginning and Possible End*, *supra* note 8, at 609–10.

247. See George L. Priest, *The Invention of Enterprise Liability: A Critical History of the Intellectual Foundations of Modern Tort Law*, 14 *J. Legal Stud.* 461, 465–67 (1985)

George Priest, for example, argue that three interrelated premises, each embodied in the workmen's compensation statutes, supported the development of enterprise liability doctrines. The principle of *cost internalization* holds that firms should pay for the costs characteristic of their enterprises, including the costs of their employees' injuries arising out of and in the course of employment.²⁴⁸ The principle of *cost spreading* holds that the cost of workplace accidents is properly shifted to the party best able to bear and spread the costs.²⁴⁹ Finally, the principle of *enterprise power and individual powerlessness* holds that contract or market mechanisms are ineffective and even pernicious in allocating the costs of injuries either between employers and employees, or between sellers and consumers.²⁵⁰ Together, these ideas formed what mid-century torts scholar Wex Malone called the "contagious principle of workmen's compensation."²⁵¹ According to Priest and others, realist and postrealist legal scholars in the middle of the twentieth century drew these ideas from workmen's compensation and applied them to a broad array of torts cases, ranging from automobile accidents to products liability to medical malpractice.²⁵²

The workmen's compensation account of enterprise liability is largely persuasive, as far as it goes. We find in the workmen's compensation debates, for example, what may be the first use of the phrase "enterprise liability" in the literature, in a paper given by Charles Herbert Swan at an American Academy of Political and Social Science meeting in

[hereinafter Priest, *Invention of Enterprise Liability*]. Other accounts tracing enterprise liability to workmen's compensation include Virginia E. Nolan & Edmund Ursin, *Understanding Enterprise Liability: Rethinking Tort Reform for the Twenty-First Century* 21–37, 78–79 (1995); Mark C. Rahdert, *Covering Accident Costs: Insurance, Liability, and Tort Reform* 16–21, 23 (1995); Gregory C. Keating, *The Theory of Enterprise Liability and Common Law Strict Liability*, 54 *Vand. L. Rev.* 1285, 1287 (2001); Rabin, *Tort Law in Transition*, supra note 8, at 5–6. More proximate explanatory factors cited in the literature include: 1960s era distrust of institutions and markets, e.g., Schuck, supra note 9, at 6–8; Rabin, *Tort Law in Transition*, supra note 8, at 5 n.19; Schwartz, *Beginning and Possible End*, supra note 8, at 615–17; the depersonalization of medical care services, e.g., Rabin, *Tort Law in Transition*, supra note 8, at 5; "rising expectations" for the quality of life and for personal health, e.g., Rabin, *Tort Law in Transition*, supra note 8, at 7; the judicial adoption of new probabilistic approaches to causation questions, e.g., Schuck, supra note 9, at 8–9; a newly generalized social expectation of what legal historian Lawrence Friedman calls "total justice," Lawrence M. Friedman, *Total Justice* 59–63 (1985); and changing conceptions of the proper role for the judiciary in American government during the 1960s as a necessary precondition for the judge-made transformation of torts, e.g., Schuck, supra note 9, at 12–14; Schwartz, *Beginning and Possible End*, supra note 8, at 609–10.

248. See Priest, *Invention of Enterprise Liability*, supra note 247, at 478, 481.

249. See *id.* at 470–83.

250. See *id.* at 483–96; Schuck, supra note 9, at 6–8; Schwartz, *Beginning and Possible End*, supra note 8, at 615–17.

251. Wex S. Malone, *Damage Suits and the Contagious Principle of Workmen's Compensation*, *Nat'l Ass'n of Claimants' Compensation Att'ys L.J.*, May 1952, at 20 & Nov. 1952, at 44.

252. See Nolan & Ursin, supra note 247, at 21–68; Rahdert, supra note 247, at 23–35; Priest, *Invention of Enterprise Liability*, supra note 247, at 465–505; Rabin, *Tort Law in Transition*, supra note 8, at 5–6.

1911.²⁵³ Swan advocated an approach to strict liability in work accidents, “what we may call,” he suggested, “the principle of enterprise liability for industrial injuries.”²⁵⁴

The question left open by the workmen’s compensation theory of enterprise liability, however, is whence derived the principles of workmen’s compensation? How and why did American law come to the core principles—cost internalization, cost spreading, and worker (or consumer) powerlessness—that underlay the workmen’s compensation statutes and the subsequent enterprise liability revolution? It is here that we see the importance of the scientific management movement. Charles Herbert Swan, interestingly, was not a lawyer, but rather an engineer.²⁵⁵ It was no coincidence that engineers helped to develop the phrase “enterprise liability.” The movement to expand enterprise liability that characterized the dramatic changes in American tort law in the second half of the twentieth century rested on the same core elements that undergirded the management engineers’ claims to increased managerial control of the firm. Management engineers, as we have seen, argued that management was in the best position to establish and monitor efficient work processes and to minimize the frequency and severity of accidents, and that workers themselves were unequipped to prevent workplace accidents effectively because of their inferior institutional position, their lack of training and education, and their ostensibly habitual carelessness and ignorance.²⁵⁶ These same managerial engineers, in turn, provided important support to workmen’s compensation statutes at the time of their enactment.²⁵⁷ It was but a short step from these ideas to the theory that enterprises themselves were properly responsible for the costs of injuries incident to their operations more generally.

Ultimately, the three premises of the ideology of enterprise liability may be reduced to a single proposition—what we might call *the idea of managerial domination*—and its inverse. The proposition holds that with respect to managing risk, well managed enterprises are in a superior structural and informational position than individuals such as workers and consumers. The inverse to the proposition, naturally, is that individuals—whether workers or consumers—are not in a position to evaluate, prevent, or provide for the dangers inhering in modern enterprise. These two closely related propositions lead ineluctably to each of the three claims of the ideology of enterprise liability. First, they solve the

253. Charles Herbert Swan, Enterprise Liability for Industrial Injuries, 38 *Annals Am. Acad. Pol. & Soc. Sci.* 257 (1911).

254. *Id.* at 259.

255. See Charles A. Allen & Charles H. Swan, Report of Engineers Charles A. Allen and Charles H. Swan to the Special Committee of Salem City Council Relating to Salem and Peabody Sewerage (Boston, Fish & Libby 1898); Theodore Horton & Charles H. Swan, *Hydraulic Diagrams for the Discharge of Conduits and Canals* (3d ed. 1922) (identifying Swan as a member of the American Society of Civil Engineers).

256. See *supra* Part IV.

257. See *supra* note 243 and accompanying text.

difficult causation problem posed by all bilateral accidents: Who caused the accident? Both parties to a two party accident, after all, are necessarily its causal antecedents. The claim that enterprises and their managers are in the better position to prevent such accidents, however, allows the pragmatic conclusion that the enterprise (rather than the worker) can usefully be identified as the cause of the accident.²⁵⁸ Second, the proposition of managerial and enterprise superiority purports to solve the equally difficult problem of determining which of two parties is the best spreader of accident costs.²⁵⁹ Both enterprises and individuals, of course, are able to buy insurance to spread the cost of accidents. But it follows from the idea of the enterprise's structural superiority that enterprises stand in a better position to buy insurance, both with respect to information about the nature of the risks involved in the enterprise and with respect to power in the insurance market. Third, and relatedly, the proposition of managerial superiority and individuals' relative incapacity leads to the conclusion that the simple contract mechanism of compensating wage differentials to pay employees for the risks they take cannot adequately allocate the costs of accidents.²⁶⁰

The ostensible superiority of managers as administrators of risk, for which management engineers and employers advocated at the turn of the twentieth century, animated torts thinking in the decades following the enactment of workmen's compensation laws. Early twentieth-century legal scholars argued that in those areas of employers' liability not governed by workmen's compensation, such as maritime and railroading cases, the treatment of the "constant toll of injuries" as "an overhead item" for industry would best encourage "better ship construction . . . [and] increased operating efficiency."²⁶¹ It was no great leap in logic to apply the rationales supporting enterprise liability for workplace injuries to a wide array of the injuries characteristic of modern economic life. Before the first wave of states had finished enacting workmen's compensation, law reviews were publishing calls for the adoption of strict enterprise liability principles in railroad passenger accidents²⁶² and automo-

258. See Guido Calabresi, *Concerning Cause and the Law of Torts: An Essay for Harry Kalven, Jr.*, 43 *U. Chi. L. Rev.* 69, 84-91 (1975).

259. See Fleming James, *Accident Liability Reconsidered: The Impact of Liability Insurance*, 57 *Yale L.J.* 549, 551-52 (1948).

260. For an updated account along these lines, see Steven P. Croley & Jon D. Hanson, *Rescuing the Revolution: The Revived Case for Enterprise Liability*, 91 *Mich. L. Rev.* 683, 716-21 (1993).

261. Gustavus H. Robinson, *Legal Adjustments of Personal Injury in the Maritime Industry*, 44 *Harv. L. Rev.* 223, 223 (1930); see also Francis H. Bohlen, *Casual Employment and Employment Outside of Business*, 11 *Cal. L. Rev.* 221, 240-41 (1923) (arguing for application of workmen's compensation statutes to excepted casual employees on ground that the cost of injuries to casual employees should be "as much a part of the cost of production as those operations habitually done by the employer's regular . . . force").

262. See Nolan & Ursin, *supra* note 247, at 25; Arthur A. Ballantine, *A Compensation Plan for Railway Accident Claims*, 29 *Harv. L. Rev.* 705, 708-09 (1916).

bile injury cases.²⁶³ And by the 1920s and 1930s, American legal academics sought to generalize the premises of the management engineer initiatives that had begun in the final decades of the nineteenth century. Realists such as Leon Green argued that liability was generally best placed on parties “in charge of the operation of complex and dangerous machinery,” who could best take “preventive or prophylactic” steps.²⁶⁴ The trend was especially apparent in the field of consumer injuries. Commentators urged expanded manufacturers’ liability to third parties for defective products and unsafe food on the ground that such liability would internalize the costs of injuries such that “[t]he loss consequently will be borne by those who are interested in . . . safe production and preparation,”²⁶⁵ or such that “losses . . . will most effectively induce preventive measures.”²⁶⁶ Individuals, by contrast, whether consumers or workers, were understood to be powerless and at the mercy of manufacturers and employers.²⁶⁷ Even the aging Joseph Beale, dean of the formalist scholarship of the early twentieth century, believed that “[o]ccupational injury is a necessary part of industry” and that “the cost of insuring against such injury is as much part of the cost of a yard of cloth as the cost of the labor of the weaver or of the night watchman.”²⁶⁸

The scholarly literature in torts signaled the beginning of a sea change in the basic premises of tort scholars toward thinking about risk management in scientific terms, and in particular toward reallocating accident costs so that they would be borne by firms rather than individual consumers or employees. In 1929, William O. Douglas (then of the Yale

263. See Ernest C. Carman, *Is a Motor Vehicle Accident Compensation Act Advisable?*, 4 *Minn. L. Rev.* 1, 2 (1919); Wayland H. Elsbree & Harold Cooper Roberts, *Compulsory Insurance Against Motor Vehicle Accidents*, 76 *U. Pa. L. Rev.* 690, 691, 699–703 (1928); Robert S. Marx, *Compulsory Compensation Insurance*, 25 *Colum. L. Rev.* 164, 179–87 (1925); Weld A. Rollins, *A Proposal to Extend the Compensation Principle to Accidents in the Streets*, *Sat. Evening Rec.*, May 31, 1919, reprinted in 4 *Mass. L.Q.* 392, 395–96 (1919); *Comm. to Study Comp. for Auto. Accidents*, Report to the Columbia Univ. Council for Research in the Social Sciences 18–20, 132 (1932).

264. Leon Green, *The Palsgraf Case*, 30 *Colum. L. Rev.* 789, 799 (1930); see also Leon Green, *The Duty Problem in Negligence Cases* (pt. 2), 29 *Colum. L. Rev.* 255, 276 (1929) (advocating expanded liability in railroad crossing accidents on the theory that railroad managers are best able to design preventative safeguards).

265. Jacob Lutsky, *Notes and Comment, Developments in the Application of the Buick Doctrine*, 18 *Cornell L.Q.* 128, 133 (1932).

266. Note, *The Marketing Structure and Judicial Protection of the Consumer*, 37 *Colum. L. Rev.* 77, 77 (1937) (citing, *inter alia*, Karl N. Llewellyn, *Cases and Materials on the Law of Sales* 341 (E.M. Morgan ed., 1930)).

267. Thus, as early as the 1930s, commentators saw and applauded in the law a drift in manufacturers’ liability away from contract principles that limited liability to immediate purchasers in privity with the manufacturer, toward tort principles that at once expanded the range of potential downstream plaintiffs and limited manufacturers’ rights to limit their liability by contract. See, e.g., Charles Keating Rice, *Notes and Comment, Liability of a Manufacturer to a Sub-Vendee*, 18 *Cornell L.Q.* 445, 446–47 (1933).

268. Joseph H. Beale, *Social Justice and Business Costs—A Study in the Legal History of Today*, 49 *Harv. L. Rev.* 593, 608 (1936).

Law School, having just left Columbia in protest of the appointment of Young B. Smith as dean²⁶⁹) argued in the *Yale Law Journal* that tort doctrine ought to be reoriented around what he called “administration[] of risk concepts,” under which accident costs would be allocated to the party best able to prevent and distribute the costs in question.²⁷⁰ Accident costs, he argued, were often best allocated to the party who has “more of that ‘control’ which an effective, efficient risk preventer needs.”²⁷¹

If employers were in a better position than employees to prevent work injuries, perhaps firms were likely to be in a better position than any number of other actors (consumers, third parties, etc.) to prevent a wide range of accidents. Workmen’s compensation statutes, noted Karl Llewellyn in a 1924 address to the American Economic Association, had placed accident costs on the party “not only best able to distribute, but best able to prevent” industrial accidents.²⁷² In Llewellyn’s view, the law had already begun (slowly) to apply the same principle in other fields. Blasting operations were strictly liable for injuries to bystanders; the “growing common law tendency” was to make product manufacturers insurers of their products.²⁷³ Llewellyn’s conclusion warrants quoting in full: “In one, the producing laborer is the object of concern; in one, the bystander or neighboring owner; in a third, the consumer. But all alike recognize the dependence of laborer, bystander or consumer on an industry with which as an individual he cannot cope”²⁷⁴ Llewellyn’s point was that the principles of workmen’s compensation—and more specifically, the principles of scientific management’s reengineering of the workplace—might be applied much more broadly than merely to work-accident legislation.

By the 1940s and 1950s, the idea that American manufacturers and their engineers were in a strong position to design products so as to minimize the risk of injury to fallible consumers was widely held among legal academics.²⁷⁵ It was “large units, such as transportation companies, government, and insurance companies,” argued Fleming James and John

269. Laura Kalman, *Legal Realism at Yale 1927–1960*, at 74 (The Lawbook Exchange 2001) (1986); Julius Goebel, Jr., *A History of the School of Law, Columbia University* 304–05 (1955).

270. William O. Douglas, *Vicarious Liability and Administration of Risk* (pt. 1), 38 *Yale L.J.* 584, 587–88 (1929); see also Moss, *supra* note 186, at 231.

271. Douglas, *supra* note 270, at 601. For an earlier, less systematic application of some of the same risk management notions to the same doctrinal problem of vicarious liability, see the article by Douglas’s nemesis at Columbia, Young B. Smith, Frolic and Detour, 23 *Colum. L. Rev.* 444, 716–31 (1923).

272. Karl N. Llewellyn, *The Effect of Legal Institutions Upon Economics*, 15 *Am. Econ. Rev.* 665, 680 (1925).

273. *Id.*

274. *Id.*

275. See, e.g., Harold A. Katz, Comment, *Liability of Automobile Manufacturers for Unsafe Design of Passenger Cars*, 69 *Harv. L. Rev.* 863, 867–71 (1956) (arguing for expanded manufacturer liability in light of manufacturer ability to design safer automobiles).

Dickinson in 1950, not individuals, that were “in a strategic position to reduce accidents.”²⁷⁶ In subsequent decades, this congerie of closely related ideas reached perhaps its fullest articulation in the work of James’s student, Guido Calabresi, who put into sophisticated economic terms the intuitions that had percolated in the literature going back to Douglas and even earlier, to the theorists of workmen’s compensation legislation.²⁷⁷

The proposition of managerial domination in the products context was not a necessary or inevitable perspective. To be sure, it is widely agreed that manufacturers are in a better position than consumers to know about the risks of their products.²⁷⁸ Yet as students of accidents and insurance regularly point out, individual consumer behavior is also a critically important factor in products cases, and here consumers often have dramatic advantages over firms as avoiders of accidents.²⁷⁹ Moreover, individuals often have private information about their own risk profiles that firms do not.²⁸⁰

Nonetheless, in what is now a familiar story, judges in the nation’s state courts broadened the reach of these risk management ideas into an array of new fields.²⁸¹ New products liability cases held manufacturers and sellers liable for manufacturing²⁸² and design defects,²⁸³ as well as for failures to warn.²⁸⁴ Courts also recognized new tort actions for the intentional and negligent infliction of emotional distress.²⁸⁵ Moreover, courts abolished traditional common law immunities that had protected

276. Fleming James, Jr. & John J. Dickinson, *Accident Proneness and Accident Law*, 63 *Harv. L. Rev.* 769, 780 (1950) (“[A] system of absolute liability tends to increase the pressure towards accident prevention on large groups and enterprises, where we have seen it will do the most good, rather than on the individual, where it will do relatively little good.”). Priest emphasizes the important role of Fleming James, perhaps to excess given the array of scholars from the 1910s onward, on whom I touched in the preceding paragraphs. See Priest, *Invention of Enterprise Liability*, *supra* note 247, at 470–83.

277. See Guido Calabresi, *Costs of Accidents*, *supra* note 188; Guido Calabresi, *Some Thoughts on Risk Distribution and the Law of Torts*, 70 *Yale L.J.* 499 (1961). On Calabresi and the history of enterprise liability, see Keating, *supra* note 247, at 1308–17.

278. E.g., William M. Landes & Richard A. Posner, *A Positive Economic Analysis of Products Liability*, 14 *J. Legal Stud.* 535, 544–47 (1985).

279. James A. Henderson Jr. & Jeffrey J. Rachlinski, *Product-Related Risk and Cognitive Biases: The Shortcomings of Enterprise Liability*, 6 *Roger Williams U. L. Rev.* 213, 226 (2000); Alan Schwartz, *Proposals for Products Liability Reform: A Theoretical Synthesis*, 97 *Yale L.J.* 353, 356, 392–98 (1988).

280. Kenneth S. Abraham, *Distributing Risk: Insurance, Legal Theory, and Public Policy* 35 (1986).

281. For accounts of the line of cases recounted in the next several paragraphs, see Schuck, *supra* note 9, at 8–14; Keating, *supra* note 247, at 1297–99; Moss, *supra* note 186, at 216–52; Priest, *Invention of Enterprise Liability*, *supra* note 247, at 496–519; Rabin, *Tort Law in Transition*, *supra* note 8, at 7–14; Schwartz, *Beginning and Possible End*, *supra* note 8, at 605–20.

282. E.g., *Pouncey v. Ford Motor Co.*, 464 F.2d 957, 961–62 (5th Cir. 1972).

283. E.g., *Larsen v. General Motors Corp.*, 391 F.2d 495, 504–06 (8th Cir. 1968); *Volkswagen of America, Inc. v. Young*, 321 A.2d 737, 745 (Md. 1974).

284. E.g., *MacDonald v. Ortho Pharm. Corp.*, 475 N.E.2d 65, 68 (Mass. 1985).

285. See, e.g., *Dillon v. Legg*, 441 P.2d 912, 920–21 (Cal. 1968).

charities from tort liability,²⁸⁶ and dismantled the rules that insulated the owners and occupiers of land from liability for injuries to trespassers and licensees.²⁸⁷ In these and any number of other areas, the liability exposure of business enterprises in American tort law expanded dramatically.²⁸⁸

The language of the now-famous twentieth-century cases shared the basic premises of the management engineers' turn-of-the-century campaign to establish and legitimate ideas about the proper scope of managerial prerogatives and responsibilities. Beginning with Cardozo's 1916 opinion in *MacPherson v. Buick Motor Co.*,²⁸⁹ courts extended the liability of manufacturers for manufacturing defects beyond those to whom the manufacturer sold the defective product.²⁹⁰ In doing so, the famous Cardozo opinion implied a new and broader view of the capacity of management to guard against manufacturing defects, and thus of the obligations of management in the manufacturing process. The manufacturer's duty of vigilance made sense precisely because that vigilance could be effective.²⁹¹ In *Escola v. Coca Cola Bottling Co. of Fresno* (1944), the California Supreme Court held a bottling company liable for damages to a waitress caused by an exploding bottle.²⁹² The case is less famous for the majority holding itself than for the concurring opinion, in which Judge Roger Traynor argued for the extension of *MacPherson* to incorporate a strict liability standard for manufacturers in products liability cases on the grounds that "the manufacturer can anticipate some hazards and guard against the recurrence of others, as the public cannot."²⁹³ Adopting the managerial failure theory of causation pioneered by the management engineers of 1900, Traynor contended that the public interest required "plac[ing] the responsibility for whatever injury [defective products] may cause upon the manufacturer."²⁹⁴

286. See, e.g., *Darling v. Charleston Cmty. Mem'l Hosp.*, 211 N.E.2d 253, 260 (Ill. 1965).

287. See, e.g., *Rowland v. Christian*, 443 P.2d 561, 568 (Cal. 1968).

288. Consider, for example, the judicial approval of new theories of causation. See *Sindell v. Abbott Labs.*, 607 P.2d 924, 936-38 (Cal. 1980) (substituting market share liability for the traditional requirement that plaintiffs establish that defendant more likely than not caused plaintiffs' injuries).

289. 111 N.E. 1050 (N.Y. 1916).

290. The actual holding was that automobiles were within the category of imminently dangerous products for which privity of contract was not necessary to establish manufacturer liability. See *id.* at 1053. Its expansion of the imminently dangerous category promised to bring the substantial run of products liability cases within the exception to the privity rule.

291. *Id.* ("[T]he presence of a known danger, attendant upon a known use, makes vigilance a duty.")

292. 150 P.2d 436, 440 (Cal. 1944).

293. *Id.* at 440-41.

294. *Id.* at 441.

Almost twenty years later, Traynor wrote into law precisely this principle in *Greenman v. Yuba Power Products, Inc.* (1963),²⁹⁵ which held manufacturers strictly liable for personal injuries caused by defective products on the theory that “such liability is to insure that the costs of injuries resulting from defective products are borne by the manufacturers that put such products on the market rather than by the injured persons who are powerless to protect themselves.”²⁹⁶ And in *Henningsen v. Bloomfield Motors, Inc.* (1960),²⁹⁷ the Supreme Court of New Jersey signaled the judicial acceptance of another element of the management engineers’ claim—that individuals were unable to grasp the nature of the risks posed by modern economic life. In the *Henningsen* court’s view, individuals thus could not be allowed to contract away their right to recover for personal injuries under an implied warranty of merchantability.²⁹⁸

This is not to say that the mid-century greats of the American law of torts—Fleming James, William Prosser, Roger Traynor, and others—are usefully thought of as having been ongoing participants in a campaign to establish and legitimate managerial control by private enterprise. Nor is it even to say that the mid-century torts decisions were somehow complicit in the construction of regimes of managerial control. To be sure, the earlier workmen’s compensation statutes were importantly involved in the reconstruction of the firm around the managerial model. Jonathan Simon, for example, has described the disciplining effects that new liability rule incentives had on firms to systematize their managerial apparatus.²⁹⁹ Elsewhere, I have described what might be called the legitimation effects of workmen’s compensation, which subtly inscribed into law a norm of managerial control even as it extended new benefits to wage earners.³⁰⁰ But by the time of the mid-century liability revolution, American firms had for the most part already been transformed along the lines that turn-of-the-twentieth-century engineers had envisioned. Indeed, in some respects the liability explosion represented the beginnings of a culture of suspicion and distrust toward the hierarchical institutions that had come by the 1950s and 1960s to dominate large swaths of American life.³⁰¹

295. 377 P.2d 897 (Cal. 1963).

296. *Id.* at 901.

297. 161 A.2d 69 (N.J. 1960).

298. *Id.* at 92–93.

299. Jonathan Simon, *For the Government of Its Servants: Law and Disciplinary Power in the Work Place, 1870–1906*, 13 *Stud. L. Pol. & Soc’y* 105, 125–26 (1993).

300. On this point, see John Fabian Witt, *Rethinking the Nineteenth-Century Employment Contract, Again*, 18 *Law & Hist. Rev.* 627, 645–46 & n.59 (2000); Witt, *Transformation of Work*, *supra* note 186, at 1484–86.

301. Schuck, *supra* note 9, at 6–8.

VI.

The expansion of tort liability that began in the middle of the twentieth century continued into the 1980s, though it seems to have abated in subsequent years. Needless to say, the new tort rules in products cases, among others, have caused considerable distress in today's management circles. Consider a recent commentary from the United States Chamber Institute for Legal Reform, an affiliate of the Chamber of Commerce:

The United States' lawsuit-crazy civil justice system seems bent on wrecking our economy through excessive litigation and burdening the court system with thousands of frivolous lawsuits. The cost of the U.S. civil justice system is growing at four times the rate of our economy. The impact of this runaway system can be measured in businesses bankrupt, jobs lost, and shareholder value destroyed.³⁰²

The Chamber of Commerce and other manufacturers' groups have waged a now two-decade old campaign in the name of "tort reform" to roll back the enterprise liability revolution.³⁰³ Taylor's old organization, the American Society of Mechanical Engineers, even plays a role in such efforts as an "active member of the American Tort Reform Association."³⁰⁴ As I have suggested in this article, however, a deep irony pervades managerial tort reform efforts, and nowhere more so than in the ASME, which finds in enterprise liability today ideas it helped to propagate a century ago.

In the same years in which American managerial engineers were getting their campaign underway, Max Weber described the Anglo American common law as deeply resistant to modernist systematization.³⁰⁵ In contrast to the codified rules and professional judges of continental legal systems, the common law represented a kind of irrational khadi justice, Weber contended, its judges and juries latter-day oracles.³⁰⁶ The reappearance in contemporary tort law of managerial engineers' ideas about managerial control in the workplace is emblematic of the resistance to systematic rationalization and reengineering that Weber identified in the institutions of the American legal system. Managers could succeed (at

302. U.S. Chamber Inst. for Legal Reform, *Been Sued Lately?*, at http://www.litigationfairness.org/facts_sued.html (last visited Sept. 7, 2002) (on file with the *Columbia Law Review*).

303. See Robert L. Rabin, *Some Reflections on the Process of Tort Reform*, 25 *San Diego L. Rev.* 13, 37-43 (1988).

304. Am. Soc. of Mech. Eng'rs, *Government Relations: Policies and Issues*, available at <http://www.asme.org/gric/GR/Policies&Issues.html> (last visited Nov. 7, 2002) (on file with the *Columbia Law Review*) (describing the ASME's liaison to the American Tort Reform Association); see also Am. Soc. of Mech. Eng'rs, *ASME International 2001-2002 Public Policy Agenda: State Issues: Tort Reform*, available at <http://www.asme.org/gric/agenda.html> (last visited Nov. 7, 2002) (on file with the *Columbia Law Review*) (describing pro tort-reform position).

305. 2 Max Weber, *Economy and Society* 767-68 (Guenther Roth & Claus Wittich eds., 1978).

306. *Id.* at 767-68, 814.

least partially) in their campaign to control the firm, but control of the dispersed, often unaccountable decisionmakers in American tort law remained largely out of their reach. And so in the jurisdiction of judges and juries, the ideas that men such as Taylor had made popular were turned against the firms that had advocated them. If firms were properly responsible for the operations of the enterprise, the logic went, then they ought to be responsible for the injuries incident to those operations. Moreover, unlike workmen's compensation, which accompanied expanded notions of responsibility with sharp caps on damages awards, there have not generally been caps on damages in the common law courts in which tort decisions are made. In extraordinary cases, punitive damages might even be available.³⁰⁷ For scientific managers, enterprise responsibility would thus become a kind of Frankenstein's monster, an example of hyper-rationalization gone mad, haunting its creators in a new and (to them) hideous form.³⁰⁸

The resistance of judges and juries to the rationalizing impulses of the scientific managers also offers a useful perspective on the well-documented use of workmen's compensation by employers as early as the 1930s to limit their accident litigation costs. A number of historians have identified cost reduction as a goal of the original enactment of workmen's compensation legislation in the 1910s.³⁰⁹ For the most part, especially in important early jurisdictions, workmen's compensation statutes actually increased employers' post-injury costs.³¹⁰ But by the 1930s, tort litigation had developed and liability rules had widened so as to make cost reduction through workmen's compensation a real attraction. Historians David Rosner and Gerald Markowitz, for example, have documented the way in which business interests beginning in the early 1930s sought to have silicosis included within compensation regimes so as to contain the explosion of tort actions being brought by diseased workers, many of them employed in excavating New York City subway lines.³¹¹ The unanticipated consequence story suggests a kind of comeuppance

307. See, e.g., *BMW v. Gore*, 517 U.S. 559, 568 (1996).

308. See Mary Shelley, *Frankenstein* 51 (J.M. Dent & Sons 1818) ("[N]ow that I had finished, the beauty of the dream vanished, and breathless horror and disgust filled my heart."). That enterprise liability is a bane of today's managers is clear enough. Whether application of scientific management ideas in enterprise liability has been a wise course for American tort law is a more difficult question. As Merton's early essay pointed out, "undesired effects are not always undesirable effects." Merton, *supra* note 1, at 895. Views on this question can be found across the map. Compare, e.g., Priest, *Current Insurance Crisis*, *supra* note 13, at 1582-90 (criticizing broadly the modern expansion of enterprise liability), with Croley & Hanson, *supra* note 260, at 767-79 (supporting expansion of manufacturer liability), and Richard L. Abel, *The Real Tort Crisis—Too Few Claims*, 48 *Ohio St. L.J.* 443, 452-61 (1987) (advocating raising number of tort claims).

309. E.g., James Weinstein, *Big Business and the Origins of Workmen's Compensation*, 8 *Lab. Hist.* 156, 167 (1967).

310. Witt, *Logics of Social Insurance*, *supra* note 242, at 6-7.

311. David Rosner & Gerald Markowitz, *Deadly Dust: Silicosis and the Politics of Occupational Disease in Twentieth-Century America* 78-86 (1991).

for firms. In consumer markets, the enterprise responsibility rhetoric of workmen's compensation (even in the self serving version recounted by Rosner and Markowitz) became open ended products liability. And in the employment relation itself, plaintiffs' lawyers began to take advantage of the ability to bring third party tort actions against manufacturers of products used in the workplace. Indeed, by the late twentieth century it was estimated that sixty percent of all products liability actions were brought by plaintiffs injured while at work.³¹² Employers have no doubt footed much of the bill in the form of increased costs for machinery and other equipment.

Weber famously envisioned the rationalization of modern social institutions as an iron cage, imprisoning its subjects in ways they barely perceived.³¹³ Merton and his fellow mid-twentieth-century students of unanticipated consequences reacted against the Weberian suggestion that bureaucratic rationalization might actually be achievable.³¹⁴ Administered rationalization by the state, they contended, was impossible in light of the manifold complexities of modern civil society. Managerial engineers' encounter with enterprise liability suggests one way in which even the authors of one of twentieth-century America's great modernist, rationalized institutions might themselves be caught in Weber's cage. All the more striking, enterprise liability stemmed from unanticipated consequences arising not out of the diffuse institutions of civil society, but out of the manifold complexities and indeed—on Weber's account—persistent irrationalities of the American common law.

312. Priest, *Absolute Manufacturer Liability*, *supra* note 8, at 258.

313. See Max Weber, *The Protestant Ethic and the Spirit of Capitalism* 181 (Talcott Parsons trans., 1930) (1920).

314. Weiss, *supra* note 5, at 243.