Failed Colossus: Strategic Error at the Pope Manufacturing Company, 1878-1900

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Failed Colossus

Strategic Error at the Pope Manufacturing Company, 1878–1900

BRUCE EPPERSON

In business, failure is normal. The shuttered storefront, the vacant lot, the empty factory bear silent witness to the difficulty of succeeding in any capitalistic venture. This is particularly true of firms trying to master an emerging technology. To succeed, the right innovation must be combined with the means to profitably produce, sell, and service it. When success proves elusive, it is often hard to determine whether technological design or management strategy failed. Thus, examining entrepreneurial failure in the face of rapid technological change often requires a blurring of the distinction between business and technological history.

This article examines such a failure in a once successful enterprise. The Pope Manufacturing Company of Hartford, Connecticut, was founded in 1876 by Albert A. Pope. After briefly importing English bicycles, Pope began manufacturing his own, with spectacular results. By 1895 his empire encompassed two bicycle firms, a rubber-tire works, a steel-tube mill, and an automobile factory. In 1899 Pope broke up this empire and incorporated its bicycle factories into a new industrial combination, the American Bicycle Company, which collapsed less than three years later.

Scholars in recent years have developed models of technological change that interpret innovation as a social phenomenon.[1] New technologies not

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1. Wiebe E. Bijker, *Of Bicycles, Bakelites, and Bulbs: Toward a Theory of Sociotechnical Change* (Cambridge, Mass., 1995), 20–100. For examples of how this model has been

only influence social customs, mores, and attitudes, but are in turn influenced by them. The process is fluid, dynamic, and interactive. This model, most often applied to the sociology of a nation or culture, can also be used to examine the sociology of an individual firm. For the business organization, mastery of a technology is an elusive, three-partner dance. It must mold an innovation into a sellable product. In doing so, its corporate culture affects, and is affected by, the technology it is promoting. But at the same time, various segments of society, themselves agents of social change, interpret the new product. At a minimum, the firm needs to understand and (if possible) manipulate the societal context of its innovation. Master the dance and success is achieved; stumble, and failure is inevitable.

Pope stumbled twice. First, he failed to grasp and respond to the social transition of the bicycle from an expensive, semicustomized luxury item to a relatively undifferentiated consumer good. Second, he failed in the difficult and expensive process of developing and producing automobiles. His failure was a great irony, for the same corporate culture that led the Pope Manufacturing Company to such spectacular success proved incapable of adapting to the changing realities of the bicycle market and the unique requirements of the emerging automobile trade. In classic Greek tragedy, the very virtues that animate the hero result in his downfall. This story suggests that Pope's success in innovation may itself have sown the seeds of his company's later destruction.

Origins of the American Bicycle Industry

A Parisian machinist, Pierre Lallement, developed the first successful bicycle in 1863. Lallement based his velocipede on the *draisienne*, or hobbyhorse, invented by the Baron von Drais de Sauerbrun of Germany in 1817. While the *draisienne* was moved by pushing with the feet directly against the ground, Lallement's machine incorporated cranks and pedals attached to the front wheel. Lallement travelled to America in 1866, patented his velocipede, and entered into a partnership to produce them. Sales were disappointing, and Lallement soon returned to Paris. A Brooklyn carriage maker, Calvin Witty, bought the patent in 1869 and used it to collect royalties during a brief velocipede craze that flared up in 1869 and 1870. Witty, in turn, sold the patent in 1877.[2]

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applied see Thomas P. Hughes, *Networks of Power: Electrification in Western Societies* (Baltimore, 1983), and Matthias Heymann, "Signs of Hubris: The Shaping of Wind Technology Styles in Germany, Denmark, and the United States, 1940–1990," *Technology and Culture* 39 (1998): 641–70.

2. Brandon and Morgan-Brown (a civil engineering firm with offices in Paris and London) to C. E. Pratt, 15 August 1878, Pratt Scrapbook, National Museum of American History, Smithsonian Institution; A. G. Batchelder, "The Story of the Bicycle," *Harpers*

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The top speed of Lallement's machine was limited by the diameter of its carriage-style front driving wheel. The development of wire-spoke wheels allowed an increase in diameter and, therefore, speed. Two Britons, James Starley and William Hillman, invented a method of maintaining uniform spoke tension, facilitating their 1871 introduction of the Ariel, the first high-wheeled, or ordinary, bicycle. The center of bicycle technology shifted west, from Paris to the sewing-machine manufacturing region around Coventry, England.[3]

In 1876 a display of English bicycles at the Philadelphia Centennial Exposition attracted the attention of Colonel Albert Augustus Pope, a visiting city councilman from Newton, Massachusetts. A Union officer during the Civil War, Pope spent the following decade amassing a modest fortune selling shoemaker's findings. Shortly before visiting the exposition he had started a second firm, the Pope Manufacturing Company, to develop and sell small patented articles such as an air pistol and a cigarette rolling machine. In September 1877, Pope began importing English bicycles for resale, a strategy that allowed him to inexpensively evaluate a wide range of available models. He selected the Duplex Excelsior, made by Bayliss, Thomas and Company, as the model for his own production. Lacking a factory, Pope contracted with the Weed Sewing Machine Company of Hartford, Connecticut, in the spring of 1878 to build fifty ordinaries. They would carry the name "Columbia" to emphasize their domestic origin.[4]

The Weed Sewing Machine Company, founded in 1863, had moved to Hartford in July 1865. The firm was particularly adept at manufacturing

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Weekly, 11 April 1896, 359. Some historians believe that the bicycle was invented by the Parisian father-and-son team of Pierre and Ernest Michaux in 1861. However, recent work by David Herlihy has established that the Michaux's efforts began under the direction of the brothers Réné and Aimé Olivier in 1864. Aimé Olivier later stated that they originally got the idea from a workingman, presumably Lallement. See David Herlihy, "Who Invented the Bicycle?" in *Proceedings of the Fourth International Cycle History Conference*, ed. Rob van der Plas (San Francisco, 1994), 11–25; correspondence (electronic mail) with the author, 28 April, 8 May, and 13 May 1997.

3. Geoffrey Williamson, *Wheels within Wheels: The Story of the Starleys of Coventry* (London, 1966), 49–50. The Franco-Prussian war also debilitated the French velocipede industry.

4. In 1903, Charles Gross, Pope's Hartford lawyer, recalled preparing incorporation papers for Pope in 1877 ("Horseshoe for Col. Pope," *Bicycling World*, 17 October 1903, 61), but the Boston City Directory of 1876 contains a listing for the firm, although at the same address as Albert A. Pope and Co., the shoe findings company. Early bicycle sales: Albert A. Pope, "The Bicycle Industry," in *One Hundred Years of American Commerce*, ed. Chauncey M. DePew (New York, 1895), 550; "Col. Pope's Response to the Toast, 'The Wheel' at the L.O.W. Banquet," *Wheelman*, October 1882, 70; Karl Kron [Lyman H. Bagg], *Ten Thousand Miles on a Bicycle* (1887; facsimile ed., Croton-on-Hudson, N.Y., 1982), 32; "Col. Pope Interviewed," *Bicycle World*, 18 June 1897, 20–21, Pope Scrapbook Microfilms, Connecticut Historical Society (hereafter "Pope Scrapbooks, CHS"). The clipped articles in the Pope Scrapbooks do not give page or volume numbers.

parts using the techniques of armory practice—hammering a heated piece of metal into rough shape in a drop forge, using one or more dies to mold its shape, then machining it cold to its final dimensions. Weed's reputation was based on three skills vital to armory practice: an ability to forge the part as closely as possible to its final form; the expert application of machine tools to allow the removal of unwanted metal in the least time and with a minimum of manpower; and rigid quality control over finished parts to reduce or eliminate the necessity for hand fitting at assembly. Much of Weed's expertise came from the Colt armory, located across town. The armory served as a training ground for many of Hartford's foremen and supervisors, including George Fairfield, Weed's superintendent at the time.[5]

Pope's job proved formidable. The bicycle's head, connecting the forks, handlebars, and backbone, required five separate forging dies. The finishing die broke on its eleventh stroke and had to be rebuilt. It proved impossible to roll wheel rims into the required U-shaped profile, so early bicycles had V-shaped rims made of angle iron scrounged in the nearby town of Windsor Locks. A special glue had to be developed to hold the solid rubber tires to the odd-shaped rims.[6] In spite of these travails, the bicycles were finished by Labor Day, 1878.

Later that year, Pope turned his shoemaker's findings company over to his junior partner and brother, Arthur Wallace Pope, and moved the Pope Manufacturing Company into its own quarters. The offices remained in Boston, while production was carried on in Hartford. The firm sold ninety-two bicycles in 1878, fifty built by Weed and forty-two imported. Thereafter production increased rapidly. Journalist Karl Kron bought number 234 in early May 1879, and the last of the exact copies of the Duplex Excelsior, serial number 1091, was finished late that year. By the following spring Weed had built twelve hundred units. In 1882 annual production reached about twenty-three hundred.[7]

5. Henry P. Woodward, "Manufacturers in Hartford," in *Hartford in History* (Hartford, 1899), 112–15; "The Manufacture of Sewing Machines," *Scientific American*, 20 March 1880, 181; David A. Hounshell, "The Bicycle and Technology in Late Nineteenth Century America," *Tekniska Museet Symposia: "Transport Technology and Social Change,"* ed. Per Sörbom (Stockholm, 1979), 181; Ellsworth S. Grant, *Yankee Dreamers and Doers: The Story of Connecticut Manufacturing* (Hartford, n.d. [1996?]), 249–50.

6. "The Manufacture of Sewing Machines," 42; "The Bicycle Industry," *Hartford Courant*, 2 April 1899, Pope Scrapbooks, CHS; "Bicycle Making," *Frank Leslie's Illustrated Monthly*, November 1882, 641–42; "Bicycle Manufacture," *Iron Age*, 23 June 1881, 1.

7. "Bicycle Making," 643; *An Industrial Achievement* (Hartford, 1907), 14; Kron, 34; "A Plea for Fair Trade: Speech of Colonel Pope Before the Tariff Commission," *Wheelman*, October 1882, 61. The Duplex Excelsior clones are identifiable because of their odd, off-center head adjustment nut; G. Donald Adams, *Collecting and Restoring Antique Bicycles* (Orchard Park, N.Y., 2nd ed., 1996), 61–70. The figure of twenty-three hundred bicycles produced is my estimate; different sources give conflicting estimates, ranging from two thousand to three thousand.

The Pope Manufacturing Company

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As early as 1881, only three years after entering the bicycle business, the Pope Manufacturing Company exhibited four characteristics broadly defining its corporate culture: an aggressive patent acquisition and sophisticated patent-management system; a rapidly evolving product line and a high-quality production system; heavy reliance on mass advertising; and a rudimentary marketing system. All bear individual attention.

The firm was particularly aggressive and sophisticated in its acquisition and management of patents. These it used to impose technical standards on a nascent industry, to discourage competition, and as profit-making commodities in their own right. In the early years of the industry Pope clearly used patents to pursue oligopolistic objectives. Among the first rights his company acquired was Lallement's 1866 basic patent on the front-wheel-driven bicycle, which Pope soon used to collect a ten-dollar license fee on every bicycle made in, or imported into, America. Soon the firm had bought so many proprietary rights that it could boast that "All bicycles, tricycles, and other velocipedes now in common use, are constructed so as embody some or all of the inventions covered by [our] patents."[8] One Pope manager summarized corporate policy this way: "The Pope Company had a rapidly mounting investment in development with a profitable market in some years to come, public to be educated, and many uncertain factors. Protection for that 'in the red' period with the hazard of successful models being copied, lay in patent protection—insurance for the costly pioneering."[9]

By 1890 the firm had to modify this strategy. Many of the basic velocipede patents of the 1860s and early 1870s had expired, and the introduction of the safety bicycle rendered others obsolete almost overnight. A more technologically sophisticated machine, the safety's relative complexity allowed a diversity of design that made patent bottlenecks almost impossible. Pope tried to claim that it held a basic patent on the safety's crank hanger, but its claim was denied after a long, hugely expensive legal battle.[10]

8. Pope Manufacturing Company advertising leaflet, dated January 1881, "Bicycles," box 1, file 23, Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution; "Col. Pope's Response to the Toast," 70; Pope Manufacturing Company, *Columbia Bicycle Catalog, October 1881*, 2–3; "Letter From Pope Manufacturing Company," *Bicycling World*, 20 May 1881, 18.

9. Hermann F. Cuntz, "Story of the Selden Case and Hartford," manuscript, dated August 1940, Henry Cave Collection, National Automotive History Collection, Detroit Public Library.

10. "Gormully and Jeffery Mfg. Co.," *Bearings*, 22 December 1893, 16; "Thomas B. Jeffery Dead," *Horseless Age*, 16 April 1910, 521; "Bicycle Engineering," *American Machinist*, 4 September 1886, 8–9; J. F. Cox, bicycle department manager, Pope Manufacturing Company, to F. S. Cate, 12 June 1890, reproduced in James Zordich, "The A.B.C.'s of the Pope Manufacturing Company," *Horseless Carriage Gazette*, July–August 1984, 38.

The firm gradually shifted from a strategy of using patents to obtain temporary oligopolies to relying on innovation to create a unique, identifiable product and generate brand loyalty. However, it continued to scout out and purchase promising patents. As the number and sophistication of its patents grew, the company increasingly relied on specialist engineers and scientists to manage them. Hermann F. Cuntz, for example, who combined a engineering degree from the Massachusetts Institute of Technology with a law degree, started work in December 1893 as one of America's first full-time corporate patent managers.[11]

Early cyclists were overwhelmingly young, affluent, and male. Organized along military lines, cycling clubs offered members a chance to escape sedentary lives and participate in an activity hearkening back to the rigors and romance of the recent Civil War with only a modicum of its lethal potential.[12] Cyclists wanted to be seen on the best machines, and Pope gave them what they demanded. To guarantee quality, every part of the Columbia except the tires was made in-house. Many of the first batch of ordinaries were still in use a decade later, and were retired only when rendered obsolete by the safety bicycle. As early as 1882 the company established a separate inspection and quality-control department.[13]

Brazing the frame tubes was a particularly crucial step. The finished joints, vital to the frame's durability, could not be completely inspected except by cutting open a finished frame, so meticulous attention was paid to making the joints. The brazing department was located in a separate building, and braziers were paid by the day, not by the piece, to emphasize quality over quantity. In describing the brazing operation, correspondent Horace L. Arnold observed: "I give this very full illustration of the Columbia because I believe that it is in many points superior to any other I have seen, and I am certain that I have seen no other brazing room so clean and cool, and have nowhere else seen brazing done with so little fire and so great an appearance of uniformity. . . . Clement, of Paris, the most extensive cycle manufacturer in France, told me the Pope brazing was the cleanest and neatest and, he believed, the best he had ever seen anywhere."[14]

11. Hermann F. Cuntz to Charles B. King, 11 August 1936, King Collection, National Automotive History Collection, Detroit Public Library; Hermann F. Cuntz, "Hartford the Birthplace of the Automobile Industry," *Hartford Times*, 16–18 September 1947.

12. When the Boston Bicycle Club, the nation's oldest, formed in February 1878, the twenty-five charter members broke down by occupation as follows: 6 merchants, 4 salesman, 4 students, 3 lawyers, 3 clerks, 3 corporate officers, 1 architect, 1 litterateur, and 1 physician. All were male, the oldest was fifty years old, the youngest seventeen, and the average age was thirty. Charles Pratt, "Our First Bicycle Club," *Wheelman*, March 1883, 401–12.

13. "The Bicycle Industry" (n. 6 above); "Bicycle Making" (n. 6 above): 642.

14. Hugh Dolnar [Horace L. Arnold], "Bicycle Brazing," *American Machinist*, 19 November 1896, 1077–81.

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Pope borrowed the technique of using of small, very precise gas brazing flames from the Colt armory, where it was used in making double-barreled sporting guns. Both shotgun barrels and bicycle tubes were exceptionally thin for the amount of stress they were expected to routinely bear, and even moderate overheating degraded tempering and reduced vital strength.

Pope zealously guarded the name and reputation of the Columbia. When an arch rival introduced a moderately priced bicycle, he countered with not just a second line of bicycles, but an entire second firm, the Hartford Cycle Company. Albert recruited cousin George Pope as president and dispatched nephew Harry Pope, an engineer, from the main factory to be superintendent. While the Hartford Cycle Company was ostensibly a separate and independent firm, executives of the Pope Manufacturing Company frequently involved themselves in its management, at times placing their interests ahead of the upstart progeny. "The Colonel rules," rued George after one such decision, "we shall have to do the best we can."[15] On the other hand, George and Harry were not shy about appealing to the big plant down the street for help, even when things were running tight there.

The pace of technological change in the bicycle industry was astounding. Advances in bicycle design and construction were featured not just in cycling magazines but in such technical journals as *Scientific American*, *Engineering*, *Iron Age*, and *American Machinist*. Manufacturers discovered that mastering technology and stimulating innovation were vital to creating a unique product, maintaining brand loyalty, and generating demand.

To stimulate innovation, the firm established a testing department, and in 1892 hired a graduate engineer from the Massachusetts Institute of Technology, Henry Souther, to run it. Souther immersed himself in mechanical and chemical evaluations of many types of raw and semifinished material and completed components. By 1895 his laboratory had moved into its own building on the grassy lawn in front of the factory, just below Albert Pope's office window. It was equipped with an arsenal of testing devices, including an Emory hydraulic drawing machine capable of measuring failure limits in materials ranging from a single human hair to components that would break only under loads of 100,000 pounds.[16]

Because of the pace of technical development within it, the bicycle industry has often been interpreted as a missing link connecting early continuous flow industries (such as petroleum refining and meatpacking)

15. Albert A. Pope to David J. Post, 24 July 1890, papers of the Pope Manufacturing Company and Hartford Cycle Company, Connecticut State Library, Hartford (hereafter Pope/Hartford Papers, CSL); George Pope to David J. Post, 9 January 1892 and 18 January 1892, Pope/Hartford Papers, CSL.

16. "Testing the Parts of the Modern Bicycle," *Scientific American*, 11 July 1896, 23; "The Manufacture of Bicycle Tubing," part 2, *Iron Age*, 14 January 1897, 1–5; "Death Comes to Henry Souther," *Hartford Courant*, 17 August 1917; Hermann F. Cuntz to Charles B. King, 11 August 1936 (n. 11 above).

with the automobile industry's development of mass production on a previously unimaginable scale. However, there was little reason for bicycle makers to adopt mass-production methods. In an environment in which the state of the art advanced constantly, batch building made a superior strategy. It allowed manufacturers to be more responsive to customer wants, to substitute flexible human skill for inflexible and expensive single-purpose tools, and to discourage price competition by stressing quality and craftsmanship over price.[17] Both the Hartford and Pope firms relied on batch building through the 1890s. Managers decided on the size of a production run in the fall, and starting about Thanksgiving both firms began machining components such as cranks, hubs, and chains. Cutting and brazing frames started in January, and from then until about May both firms raced to ship orders received from salesmen and the winter trade shows.[18]

Much has been made of Pope's use of annual model changes, and it has sometimes been upheld as a prescient example of Sloanist flexible-response mass-production techniques.[19] This is probably not an accurate interpretation. Sloanist production, as introduced by General Motors in the 1920s, incorporated a predetermined series of highly visible but often functionally meaningless changes into a product to create the appearance of obsolescence. On the other hand, batch builders such as Pope were responding to rapid technological changes and customer desire for products on the cutting edge of development. Once bicycle technology stabilized, the company did produce identical products in successive years.[20] What have been depicted as "model years" were actually large batches scheduled around an intensely seasonal demand cycle.

Pope enthusiastically embraced mass advertising. S. S. McClure, a Pope employee who later became a noted editor and publisher, recalled that "It was a maxim of Colonel Pope's that 'some advertising was better than others, but all advertising was good.'" Another longtime employee described

17. Philip Scranton, *Endless Novelty: Specialty Production and American Industrialization 1865–1925* (Princeton, N.J., 1997), 1–24, 193–219. The author is indebted to Philip Scranton for reviewing an earlier draft of this paper and pointing this out. See also John K. Brown, *The Baldwin Locomotive Works, 1831–1915* (Baltimore, 1997), for an analysis of the strategic applications of batch building.

18. George Pope to David J. Post, 12 May 1891, 20 January 1892, 5 January 1895, Pope/Hartford Papers, CSL. The application of mass-production techniques in the bicycle industry was very limited as late as the 1930s; Norman A. Clarke, interview by author, 5 April 1998, transcript. Clarke is a former president of the Westfield Manufacturing Company, the descendant of the Pope Manufacturing Company's bicycle operations.

19. Glen Norcliffe, "Popeism and Fordism: Examining the Roots of Mass Production," *Regional Studies* 31 (1997): 267–80.

20. Ibid., 276. Norcliffe's article contains an excellent table summarizing the Pope company's bicycle models by year of production.

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Pope as having a "master showman's mind."[21] Although he relished notoriety, Pope's extravagant advertising was a calculated part of his patent and manufacturing strategies. In opting for a product based on precise, interchangeable parts, Pope committed himself to much higher start-up costs than if his bicycles had been hand fitted, as was the British practice.[22] His large patent investments added to this front-end expense. To achieve profitability, these costs had to be amortized over a larger number of units than was feasible given the size of the market in the late 1870s. To succeed, Pope had to sell not just Columbias but cycling itself. This he did with remarkable vigor, sponsoring essay and poster contests, paying to defend individual cyclists against legal action, challenging laws prohibiting cyclists in municipal parks, and lobbying incessantly for highway improvement. He endowed a program in highway engineering at his favorite college, the Massachusetts Institute of Technology, and was instrumental in the passage of legislation establishing an early federal highway aid program.[23]

Pope's no-holds-barred patent policy opened him to a surprising level of animosity from the same cyclists he championed. "Throughout his entire career, Pope became a greatly hated man," recalled one cycling journal. In 1881 Pope was rebuked by the cycling press for demanding that cyclists importing bicycles for their own use pay the ten-dollar Lallement patent fee. Piqued, he withdrew his advertising and started his own journal, *Wheelman*, putting McClure, a recent journalism graduate then teaching at one of his cycling rinks, in charge. The lavish, heavily illustrated magazine lost thousands of dollars before Pope unloaded it onto *Outing* magazine two years later.[24]

The tension between Pope, the patron, and Pope, the monopolist, resulted in a curious love/hate relationship with the press. While courting the favor of journalists through frequent interviews, lavish presentations, and carefully stage-managed acts of philanthropy (one wag noted that "following a good work of any kind, there was always an advertisement closely shadowing the act"), he could also snap out: "There is not an industry in the country, large or small, that has as many trade papers as the cycling trade. There are altogether too many. It seems as though when any man or boy, who thinks that he can write, gets out of a job and has no money, he

21. S. S. McClure, *My Autobiography* (New York, 1914), 145; "Harold Hayden Eames," a sketch of Eames's life prepared by Hermann F. Cuntz for Henry Cave, typescript, 12 October 1940, in the Henry Cave Collection, National Automotive History Collection, Detroit Public Library.

22. "A Great American Manufacture," *Bicycling World*, 1 April 1881, 326–27.

23. "Instruction in Road Making," *New York Times*, 16 September 1890; *Engineering*, 11 October 1890, 311; Philip P. Mason, "The League of American Wheelmen and the Good Roads Movement" (Ph.D. diss., University of Michigan, 1957), 125, 143, 183–85.

24. "Albert A. Pope: His Place in History," *Bicycling World*, 18 December 1902, 313; McClure, 145–47; Kron (n. 4 above): 656–59.

feels called on to start a cycling paper. . . . The thing must be stopped. . . . Something will probably be done in the matter."[25]

Given this massive advertising investment, it is surprising that Pope put relatively little effort into developing a centrally controlled distribution and sales network. The company did establish stores in Boston (1878), New York (1882), and Chicago (1884), and by 1898 had added sixteen more "branch houses" in larger cities. However, independent agents made up the vast majority of the firm's two thousand point-of-sale locations. The firm enforced few franchise-style requirements, and the quality and dedication of agents varied greatly. Although it recommended that dealers establish a repair shop, Pope did not mandate even this basic service. The factory enforced a single nationwide retail price schedule, but dealers frequently chafed under margins they felt were inadequate, and enforcement of prices was a constant headache.[26]

Pope's dealer support could also prove spotty. A long-standing requirement that western dealers pay freight west of Chicago without allowing a retail price adjustment contributed to pricing problems. It was often difficult for agents outside the large cities to communicate effectively with the factory. For example, the firm had only one salesman to cover all its agents in Illinois, Missouri, and Kansas. During the spring selling season the Pope and Hartford companies even sent their corporate secretaries out on increasingly long road trips to take orders.[27]

The lack of an effective marketing organization limited Pope's ability to provide a uniform network of services such as installment credit, repairs, accessories, and a market for used bicycles. To be fair, this was an industry-wide shortcoming that would not be addressed until Frank V. Schwinn developed his highly regimented and vigorously supported network of "Schwinn Approved" dealers in the 1950s.[28]

Expansion and Integration, 1890–1897

Until 1889 the American bicycle industry was small, specialized, and insular. In 1882 only seven firms of any size made bicycles, with another seven importing. At most, two thousand individuals made their living in

25. "Albert A. Pope: His Place in History," 319; Cuntz, "Story of the Selden Case and Hartford" (n. 9 above); "Pope on the Trade Association," *Bearings*, 26 January 1894, Pope Scrapbooks, CHS.

26. "Colonel Pope on the Bicycle Trade," *Iron Age*, 29 April 1897, 34; George Pope to David J. Post, 26 January 1891, 23 January 1892, 4 February 1892, 24 January 1893, Pope/Hartford papers, CSL.

27. George Pope to David J. Post, 24 January 1892, Pope/Hartford Papers, CSL; *Columbia* (magazine of the Pope sales department), 15 December 1900, 4–5.

28. Judith Crown and Glenn Coleman, *No Hands: The Rise and Fall of the Schwinn Bicycle Company* (New York, 1996), 54–80.

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the bicycle trade. In that year the Pope Manufacturing Company and Weed together employed 350 people and produced around three thousand bicycles. Pope's total sales ran to about half a million dollars. Seven years later, the situation was little different. Employment at Hartford was about 250, with another fifty or so hands in Boston, New York, and Chicago.[29] However, all this was about to change dramatically.

The safety bicycle, like the ordinary, was developed in England by a Starley, this time John Kemp Starley, nephew of James. Although his first two Rovers were failures, the third version, introduced in late 1885, successfully integrated all the fundamental elements now associated with the modern bicycle: two wheels of about equal size with a crank between the two driving the rear wheel by a chain.[30]

Worried that the safety could be another velocipede, Pope sat on his hands, ignoring the pleading of his agents to develop his own. As Pope's great rival, A. H. Overman, brought out his safety in 1887, some agents grew so desperate that they dropped the Columbia and switched to English imports.[31] Finally, in 1888, Pope introduced his Veloce safety. Two years later Weed made its last ordinary.

The market for bicycles exploded. Once again, the Pope and his competitors had to race to catch up with demand. Inordinate profits could be made—if you could get in. While restrictive patents limited entry into the market in the 1880s, the availability of components and semifinished materials posed the greatest challenge to starting new firms and expanding existing ones after 1890. Few firms made bicycle components, and their products were rarely interchangeable.[32] The very large firms overcame the problem by integrating vertically, producing components and semifinished material in-house or establishing wholly owned subsidiary firms. Starting in 1890, Albert Pope aggressively integrated his empire.

He started by finally purchasing his long-standing supplier, the Weed Sewing Machine Company. Management remained unchanged, but the new structure established an unambiguous line of authority from Boston to Hartford and guaranteed the allegiance of Weed's talented young president, George Day, who became Pope's vice president and general manager

29. "A Plea for Fair Trade" (n. 7 above), 60–63; Woodward, (n. 5 above), 115; *Greer's Hartford Directory*, 1889–1890, 227. The Weed company continued to make sewing machines until the mid-1880s.

30. Adams (n. 7 above), 109–21; Williamson (n. 3 above), 107–8. The traditional view of the diamond-frame safety bicycle as the "modern" bicycle is, of course, an overgeneralization. Viable alternatives have existed continuously since 1895.

31. Carl F. Burgwardt, "A Landscape of Early Bicycle History," in *Cycle History 7: Proceedings of the Seventh International Cycle History Conference*, ed. Rob van der Plas (San Francisco, 1997), 87–93.

32. Axel Josephsson, "Bicycles and Tricycles," in U.S. Census Bureau, *Eleventh Census of the United States* [1900], vol. 10, pt. 3 (Washington, D.C., 1903), 335.

of the Hartford works. A born diplomat, Day was as charming and tactful as the Colonel was bombastic. Even his refusal was reported to be a pleasant experience: "He always dismissed them so courteously that they were invariably glad they had called on him, and were sure that they had at least met a man of sympathy and a gentleman." Day was the first of almost one hundred key men in the automotive, aircraft, and capital goods industries who would pass through the Pope organization in their early careers.[33]

Pope next worked to eliminate supply problems. The situation was particularly acute for cold-drawn steel tubing used to make frames, handlebars, and seat posts. Production was monopolized by two English firms, resulting in periodic shortages; at one point the Hartford Cycle Company was forced to lathe down oversize tubes to produce the early units of a new women's safety bicycle. In response, Pope helped finance the start of a new tube factory in Shelby, Ohio, in 1891. Reportedly, engineers disguised as workmen infiltrated the British tube plants and learned enough secret information to coerce the British firms' cooperation in the establishment of the Ohio facility.[34]

Although Pope remained active in the Shelby Tube Steel Company, he put Souther to work developing his own bicycle tubing. Meanwhile, Day recruited Harold Hayden Eames, a graduate of the U.S. Naval Academy, to supervise the establishment of a new tube plant on Laurel Street, half a mile from the main factory. The tube plant developed drawing and annealing procedures, while Souther's lab evaluated raw materials and finished products.[35] Once in production, the plant sold finished tubing to other bicycle firms while supplying the Columbia and Hartford production needs.

Tires were also a particular problem. Pope was supplied with tires by the Hartford Rubber Works Company, established by John Gray in 1881 to make shoes, belts, and other molded rubber products. The Rubber Works

33. The Weed Sewing Machine Company continued as a wholly owned subsidiary of the Pope Company until about 1895. *Hartford Times*, 9 November 1889, *Buffalo Courier*, 13 November 1889, *Hartford Times*, 20 June 1890, all from Pope Scrapbooks, CHS; Cuntz, "Harold Hayden Eames" (n. 21 above); "The Senator," *Automobile Magazine*, January 1903, 107. Henry Cave, *The Start of the U.S. Automobile Industry in Hartford, Connecticut* (Hartford, 1947), 13.

34. George Pope to David J. Post, 26 January and 2 February 1891, Pope/Hartford Papers, CSL; P. J. Boore, *The Seamless Story* (Los Angeles, 1951), 43; Victor Clark, *History of Manufacturers in the United States*, vol. 2 (Washington, D.C., 1929), 347.

35. Memorandum, "Suggestions for Shelby Tube Company Management," 28 May 1893, Pope Letterbook 1, 22, Pope Scrapbooks, CHS; Cuntz, "Harold Hayden Eames"; "The Manufacture of Bicycle Tubing," parts 1–3, *Iron Age*, 7 January 1897, 1–6, 14 January 1897, 1–5, 4 March 1897, 1–3; "An American Bicycle Manufactory," *Engineering*, 16 July 1897, 65–66; "Testing the Parts of A Modern Bicycle," *Scientific American*, 11 July 1896, 1–23; Cleveland Moffett, "Marvels of Bicycle Making," "Bicycles," box 1, file 23, Warshaw Collection of Business Americana, Archives Center, National Museum of American History, Smithsonian Institution.

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struggled to meet Pope's demand for the unpressurized cushion tires required by the early safeties. Pope often threatened to go to new suppliers, but always found the quality of Gray's competitors wanting. Things got worse in 1892, when Pope decided on short notice to start supplying the Columbia with the new pneumatic tire. When Gray died suddenly in June 1893, Pope purchased the Rubber Works from the family and installed his own management. By the middle of the decade it was producing several lines of bicycle and carriage tires.[36]

Pope's main plant expanded in 1893, 1896, and again in 1898. In 1896 a new and much larger seamless steel tube plant was built adjacent to the Rubber Works. It was one of the most advanced facilities in the country.[37] A steam powerplant drove the twin hydraulic systems that ran its drawing benches. These replaced the inefficient and dangerous chain-draw benches in common use elsewhere. On the old benches, the tubes, gripped at one end by tongs attached to chains, were pulled through a matched die and mandrel. If the tongs slipped or the tube broke, the chains would whip back, sometimes disastrously. In Pope's plant, the tongs were attached to the head of a hydraulic piston running in a long cylinder. The pressure was regulated on both the positive and negative pressure side of the piston. If a tong slipped, the piston could only jerk a few inches before rebounding against the hydraulic fluid (water) on the negative pressure side of the pull. The hydraulic system also cut the power losses normally attributable to belts and shafting in half.

The space freed up at the old tube plant on Laurel Street was turned over to Pope's most ambitious project yet: the Columbia horseless carriage. Day hired Hiram Percy Maxim in the summer of 1895 to establish a motor carriage department. Maxim had been building experimental gasoline motors since 1893, and in late 1894 he mounted one on an old Columbia tricycle. Eames knew Maxim and alerted Day, who in turn sent Souther to examine the tricycle. Souther was duly impressed, and Day made his offer.[38]

Maxim spent two years intensively researching both gasoline and electric vehicles. While other nascent automobile firms occupied themselves with technical details, Pope and Day made it clear to Maxim that they intended to produce a revenue-earning product as quickly as possible. "By

36. *Greer's Hartford Directory*, 1889–1890, 388; Moffett (n.p.); George Pope to David J. Post, 4 March 1891 and 4 February 1892, Pope/Hartford Papers, CSL; "Colonel Pope Controls," *Hartford Courant*, 29 August 1892, Pope Scrapbooks, CHS; *Greer's Hartford City Directory*, 1892–1893, 62; George Pope to David J. Post, 9 January 1892, 12 January 1892, 13 January 1892, 27 January 1892, 21 January 1893, 24 January 1893, 25 January 1893, Pope/Hartford Papers, CSL.

37. Pope Manufacturing Company, *Columbia and Hartford Bicycles Catalog for 1895*, 31, and *Columbia Bicycle Catalog for 1900*, 15–16; "The Manufacture of Bicycle Tubing," 1–6; "An American Bicycle Manufactory", 65; Moffett (n.p.); Boore, 75.

38. Hiram Percy Maxim, *Horseless Carriage Days* (New York, 1936), 6–36.

1897," recalled one employee, "salable types had been tested and a production department was staffed with trained production experts, inspectors, testers and equipped for interchangeable parts manufacture—ready to make marketable motor cars and service them. On May 13, 1897 a regular line of electric cars was shown to the public—and sales booked."[39]

Strategic Miscalculation in Bicycle Production

In June 1897, the Pope company lowered the prices of its flagship men's and women's bicycles from one hundred to seventy-five dollars, setting off a spate of price-cutting within the industry. The move came not during the midwinter cycle shows, when it would have generated maximum publicity and sown confusion among competitors, but at the height of the summer sales season. Tinged with desperation, it signaled the end of large-firm dominance and a new era of bitter price competition.

Once the technology of the safety bicycle had stabilized, about 1894, its identity started to change from a fast, high-technology marvel to a relatively undifferentiated product as familiar to consumers as a tennis racket or baseball bat. Industry executives first recognized the shift and responded by altering their firms' product mix and turning their own attention to newer, more exotic products. Dedicated cyclists, better informed and with more buying power than the general public, also began to seek new alternatives. Noncyclists, now able to afford what they still considered an exotic and prestigious lifestyle statement, purchased them by the millions. In the process the bicycle became demythologized. As market saturation set in, it was abandoned to children, the poor, and other marginalized groups who adopted it as a toy or a plebeian transportation tool.[40]

The Columbia cycle of 1896 was unchanged from the previous year's model, the first time that had occurred in fifteen years. One journal noted that "The Columbia, and nearly all the old wheels [established makers], seem to have approached that finality of pattern and construction so long expected." Technical stabilization quickly led to standardization, allowing firms specializing in wheel rims, spokes, ball bearings, chains, saddles, and frame parts to emerge by the middle of the decade. The Shelby Tube Steel Company, for example, had moved beyond the production of raw tubing to offer precut frame tube sets, handlebars, and seat posts.[41] The increasing

39. Cuntz, "Hartford the Birthplace of the Automobile Industry" (n. 11 above).

40. Norman A. Clarke interview (n. 18 above). By the 1920s the seasonal production cycle had shifted to one based almost completely around Christmas gift purchases. Only "the odd kook" bought an adult bicycle.

41. Norcliffe (n. 19 above), 272. Quote from "Pope's Leadership," *American Wheelman*, 30 January 1896, Pope Scrapbooks, CHS; Boore (n. 34 above), 43; A. E. Harrison, "Competitiveness of the British Cycle Industry, 1890–1914," *Economic History Review* 22

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availability and interchangeability of components allowed smaller, less capital-intensive cycle makers to compete with the large, vertically integrated makers on price and volume.

The market was beginning to favor a type of bicycle firm distinctly different than Pope's. This was similar to the earlier experience of continuous-flow producers. Successful firms reacted to growing overcapacity in one of two ways. Standard Oil built huge refineries incorporating massive economies of scale that allowed it to underprice any possible competitor. In contrast, the National Biscuit Company (Nabisco), faced with insurmountable price competition, captured the point of sale by replacing cracker barrels with distinctive small-unit packages of its heavily advertised Uneeda brand. As soon as customers started asking for Uneedas instead of generic crackers, control passed from the retailer, who previously could seek out the product with the best margin of profit, to Nabisco, with its legally protected monopoly over the Uneeda name.[42] Wedded to a high-quality, batch-building strategy, the Pope Manufacturing Company was unable to dominate through sheer productive capacity, yet the firm failed to grasp the growing importance of the point of sale.

David Hounshell has examined the rise of Chicago's Western Wheel Works, a firm using production processes very different from Pope's.[43] Western used sheet metal stampings to fabricate frame joining lugs, hubs, chainwheels and other parts. As a result, it could use cheaper and more flexible production methods. A loose arbor or mandrel held in the hand of an operator allowed sophisticated shapes to be pressed using simple dies. While Pope's armory practice required skilled machinists, inexpensive semiskilled laborers could operate the punch presses and electric resistance welders used to make stamped parts. Frames joined with sheet metal lugs could be cold-set if slightly misaligned during brazing. Trying to tweak a Columbia frame, with its rigid, forged lugs, often resulted in creased tubes.[44] The dedicated cyclist of 1889 might have shuddered at the way Western did things, but the novice of 1897 never noticed.

Western's techniques were not an adaptation to market exigencies. Western had used stampings as early as 1890, when they offered few competitive advantages. Initially, frame lugs had to be imported from Europe,

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(August 1969): 290–305; Josephsson (n. 32 above), 328; Hugh Dolnar, "Bicycle Tools," *American Machinist*, 3 October 1895, 781–82.

42. Alfred Chandler Jr., *The Visible Hand: The Managerial Revolution in American Business* (Cambridge, Mass., 1977), 334–37.

43. David A. Hounshell, *From the American System to Mass Production: The Development of Manufacturing Technology in the United States, 1800–1932* (Baltimore, 1984), 189–212.

44. Ibid., 210; Hugh Dolnar, "Cycle Stampings," *American Machinist*, 17 December 1896, 1163–67. The Italian custom-frame builder Cino Cinelli encountered similar cold-setting problems when he introduced an investment-cast bottom bracket in the 1960s.

and for one critical part, the crank hanger, production costs remained the same as or higher than for forging. Instead, Western chose stampings for reasons unique to its own corporate culture. The firm originally made toys, not guns or sewing machines. Its management and employees, mostly German immigrants, were more familiar with the stamped sheet-metal techniques developed there than the contemporaneous American armory practice.[45]

Pope was forced to adapt. However, wedded to a physical plant and corporate culture steeped in over thirty years of armory practice, it was limited in its ability to match the cost advantages and productive flexibility of firms such as Western. As a result, profitability deteriorated. George Pope later recalled that "the business had been very profitable up to 1895, and in that and the following years a great number of new people embarked in the business. . . . It is true that the strongest concerns in the trade still made some money every year, but with the constant and increasing cutting of prices a condition was approaching in which it was feared that even the strongest could make no profit."[46]

It was also becoming harder and more expensive to maintain a unique product identity. In 1897 the Pope Manufacturing Company acquired several French, English, and American patents controlling shaft-drive bicycles. Attempting to replicate past successes, Pope formed a New Jersey corporation to pool licensing and enforce pricing. However, the new bicycle's cost (the 1898 Columbia shaft-drive bicycle cost $125, fifty dollars more than the best chain-drive Columbia) and need for frequent adjustment doomed it.[47]

Pope's inability to produce a unique, identifiable product compounded its lack of control at the point of sale. As bicycles flooded the market, agents, who had long seen themselves as the pawns of the large manufacturers, became more aggressive. One Indiana dealer spat out: "I must confess that I take particular pleasure in the woes of the bicycle builders this season in his efforts to place his products. . . . The manufacturers, and they alone, are to blame for the present demoralization—and it is not the smaller concerns, as some of the largest manufacturers claim, who are to blame. . . . 'The mills of the gods grind slowly,' but they have made fairly good time with the bicycle manufacturer."[48] Many dealers played makers against each other, shifting allegiance to the factory offering the best margin, bonus or incentive.

45. Dolnar, "Bicycle Tools," 52, and "Cycle Stampings," 1165.

46. "Affidavit of Mr. George Pope," *Report of the Industrial Commission on Trusts and Combinations, 1900* (Washington, D.C., 1900), 13:689–90.

47. "The Combine Story," *Bearings*, 4 November 1897; "The Chainless Wheel," *Dayton Times*, 27 October 1897; "Cycle Men Going Abroad," *New York Journal*, 19 July 1897; and "Won Prizes in Germany," *Hartford Courant*, 30 August 1897, all from Pope Scrapbooks, CHS. On adjustment difficulties of the shaft drive, see Norman A. Clarke (n. 18 above).

48. "Wild-Cat Agencies for Bicycles," *Iron Age*, 25 March 1897, 37.

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Few found George Pope's argument that "we put more money into the experimenting departments and into the care of inspection etc. than any other concern in the business" relevant any longer.[49]

Contrast Pope with the earlier experience of the Singer Sewing Machine Company, which found independent agencies inadequate and replaced them, starting in 1876, with company-owned stores staffed by its own employees. Likewise the McCormick Harvesting Machine Company, which replaced independent agents with franchised dealers who signed contracts forbidding them to carry competing products.[50] In return, McCormick established a network of regional offices to monitor dealer activities, prepare local advertising, and provide some 140 field agents to assist in assembly, repair, and troubleshooting.

Realizing the importance of the point of sale, sporting goods magnate A. G. Spaulding developed a system whereby Spaulding employees staffed fully stocked sporting goods outlets in existing department stores, a useful adjunct to his sophisticated mail-order catalog operation. Spaulding's story is a microcosm of the changes sweeping the bicycle industry. Having contracted with A. H. Overman in 1890 to produce private-label bicycles, Spaulding bought the Lamb Knitting Machine Company and converted it to bicycle production after a dispute over deliveries and financing turned bitter. Soon Spalding was president of the Cycling Board of Trade, and Overman was bankrupt. The ability to control sales, not manufacturing, was becoming the key to success in the bicycle industry.[51]

Strategic Miscalculation in Automobile Production

Unwillingness to integrate forward also contributed to Pope's failure to capitalize on his early lead in the development of automobiles. Traditionally, this failure has been attributed to Pope's decision to concentrate on electric automobiles. Supposedly horrified by the noise, smoke, and oily grime of a gasoline prototype Hiram Maxim demonstrated in the fall of 1895, Pope ordered all work on gas models suspended.[52] However, Maxim himself contradicts this. In his memoirs, he relates that he was summoned in late 1896 to the front office and directed to design "A small tricycle package carrier that would be suitable for merchant's use in making deliveries

49. George Pope to David J. Post, 24 January 1893, Pope/Hartford Papers, CSL.

50. Chandler, *The Visible Hand* (n. 42 above), 205–10; Hounshell, *From the American System to Mass Production* (n. 43 above), 89, 186.

51. Peter A. Levine, *A. G. Spalding and the Rise of Baseball* (New York, 1985), 71–95; Vera Shlakman, *Economic History of a Small Town* (New York, 1969), 199–202; "Overman-Spalding War," *Bearings*, 16 March 1894, 23–24.

52. See, for example, John B. Rae, *American Automobile Manufacturers* (Philadelphia, 1959), 10–13.

. . . something simple, light, not an elegant carriage—just the place for a gasoline engine. He [Pope] dwelt upon . . . how it should be a cycle and not a wagon or carriage; and how the gasoline motor should make it possible to carry greater loads and run at higher speeds than a boy could on a foot-pedaled tricycle."[53] Maxim completed a prototype in February 1897 and tested it extensively through the spring and summer. The resulting Mark VII tricycle was simple, rugged, reliable, and easy to recognize as a bicycle derivative: "A single front wheel, two rear wheels; a sturdy bicycle-type frame connecting the two; package carrying boxes on either side of this central frame; a saddle over the rear axle for the driver; a single-cylinder air-cooled four-cycle engine; the engine, clutch and driving gear in a unit and mounted upon the rear axle . . . [it had] pedals, so the driver could help the engine on grades. The pedals would also crank the engine for starting."[54]

The Mark VII was manufactured not at the motor carriage division but up the street at the Hartford Cycle Company. Unlike Pope's electric automobile, which used bodies and motors supplied by outside vendors, the Mark VII relied on existing bicycle-making resources. This type of integration was similar to the experience of British cycle firms, which typically produced microcars, motorcycles, and other bicycle-motor vehicle hybrids before venturing into full-size automobiles.[55]

Although a package delivery service purchased a fleet of the motorized tricycles, the hoped-for sales to individual merchants never materialized. In response, Pope organized his own package delivery company in and around Boston, which proved moderately successful.[56] However, the experience convinced Pope and Day that selling commercial vehicles would be a long and costly process requiring forward integration into fleet management. They perceived a situation similar to that later faced by American aircraft manufacturers, who were forced to start their own airlines to establish a viable market for air travel. Given Pope's traditional reluctance to integrate forward, it should not be surprising that the initiative was dropped. The focus of the motor division was narrowed to a target audience already familiar to and comfortable for Pope and Day: affluent urbanites. Assuming that selling to the urban wealthy meant selling electrics, gasoline vehicle development was shelved.

53. Maxim (n. 38 above), 74.

54. Ibid., 76. In fact, much of Maxim's book recounts his adventures and misadventures field testing the Mark VII. Surprisingly little of the book is concerned with the electric, which he dismisses as largely an exercise in body styling.

55. Ibid., 60, 62. The Electric Vehicle Company purchased its supplies of bodies and motors until after it was split off from Pope. Harrison (n. 41 above); James Foreman-Peck, "Diversification and the Growth of the Firm: The Rover Company to 1914," *Business History* 25 (July 1983): 188–94. The Hartford Cycle Company closed in late 1899 or 1900.

56. Maxim, 103; Cuntz, "Hartford the Birthplace of the Automobile Industry" (n. 11 above).

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As bicycles became a staple commodity, Pope's technical staff began to gravitate to what they saw as the more exciting work going on at Laurel Street. Even George Day and Hayden Eames devoted increasing amounts of their time and attention to the project. Incrementally, the firm was bifurcating, with Pope family members and veterans of the Boston sales office taking over bicycle operations and Hartford's engineers and technical personnel assuming control of the motor division.[57] This was likely a factor in the Mark VII's lack of success and the subsequent focus on clean-slate automobile designs rather than some intermediate product. Although more rewarding for Day, Eames, and the others, this was an expensive option: squeezed between a flat bicycle market and fierce cost competition, the firm was having trouble maintaining the revenue necessary to afford it.

Pope resolved the problem in early 1899 by selling the motor carriage division to the Electric Vehicle Company (EVC), a part of William Whitney's Metropolitan Traction Company. The EVC operated electric taxicabs in New York and owned the Exide battery company, holder of the basic patent on the lead-acid storage battery. Whitney planned to take the taxi operations nationwide through a network of local franchisees. The motor division was spun off into a new firm, the Columbia Automobile Company, with ownership split between Pope and Whitney. Bolstered by funds from Metropolitan Transit, it would provide the thousands of cabs required for Whitney's scheme.[58] Pope could concentrate on manufacturing and let Whitney worry about fleet operations. Most of Pope's senior technical and engineering staff cast their lot with the new company, with Day becoming president and Eames vice president. Even Harry Pope moved to the new company. Less than a year later Pope sold his half interest to Whitney.

The divestment of the motor division ultimately proved devastating. Deprived of his best and brightest technical and managerial staff, Pope thereafter lacked the resources needed to improve efficiency and diversify, thus committing himself to the collusive path he ultimately followed. In

57. "Goes Permanently to Hartford," *Bicycling World*, 27 August 1897, Pope Scrapbooks, CHS; "Horseshoe for Colonel Pope" (n. 4 above); Henry Souther to Charles B. King, 10 December 1915, Charles King Collection, National Automotive History Collection, Detroit Public Library; Henry Cave, "Hartford, the Incubator of the Automobile Industry," *Old Timers News*, April 1944, 24–33, and *The Start of the U.S. Automobile Industry* (n. 33 above).

58. Mark D. Hirsh, *William C. Whitney: Modern Warwick* (New York, 1948), 439–40; Cuntz, "Story of the Selden Case and Hartford" (n. 9 above), and "Hartford the Birthplace of the Automobile Industry" (n. 11 above); "Electric Vehicle Co. Spreads Out," *Horseless Age*, 12 April 1899, 11. The EVC is most famous for its ownership of the Selden patent, which it claimed to be a basic patent covering all gasoline automobiles. Although Albert Pope authorized the purchase of the patent in late 1899, the decision to enforce it by suing the Ford Motor Company for royalties was made after he sold his interest. Ford prevailed in 1911 after a massive eleven-year court fight: William Greenleaf, *Monopoly on Wheels: Henry Ford and the Selden Patent Suit* (Detroit, 1961), 59–60, 87.

September 1899 Pope sold his remaining factories to the American Bicycle Company, the long-rumored "bicycle trust" assembled under the direction of A. G. Spaulding. Although originally intended to control the industry through sheer size (the Standard Oil model), Spaulding was forced to cancel the initial stock offering when the owners of the forty-five recruited firms refused to buy a share of the new securities. A reconfigured offering, requiring no subscription, reflected the desire of most owners to use the trust as a vehicle to liquidate their bicycle investments without bankruptcy. However, the restructuring also deprived the new trust of working capital and forced the early sale of valuable assets.[59] Crippled from the start, the trust could do little to address slumping bicycle sales and entered receivership in September 1902.

The Pope family bought the remnants of the trust a year later. Although it retained the original Hartford factory and office building, this second Pope Manufacturing Company kept little of the swashbuckling exuberance of its namesake. Dogged by inadequate financing and an uncoordinated and dispersed physical plant, it was forced to reorganize in 1907. Floundering under inadequate leadership after Albert Pope's death in 1909, the company failed for good in 1913.

Had it simply been the victim of bad business decisions, the story of the Pope Manufacturing Company would be of little relevance to the history of technology. However, Pope's critical mistakes all involved errors in the perception and appraisal of technology. Having achieved success by selling the bicycle as a technological wonder, his firm failed to adapt as it evolved into a standardized product. At the same time, the decision to pursue the development of the motor vehicle as a unique, clean-slate innovation unrelated to the bicycle underestimated both the extent of the automobile market's sociotechnical flux and the financial resources required to weather it. The British cycle maker Humber, for example, spent a decade pursuing automobile development before making money. On the other hand, competitor Triumph passed the break-even point relatively quickly after venturing into motorcycles.[60]

Why such catastrophic errors, one piling quickly atop another? Ultimately, the Pope organization was a reflection of one man, Albert Pope, and his strengths and weaknesses shaped the firm. An affluent and adven-

59. Arthur Dewing, "The American Bicycle Company," chap. 10 of *Corporate Promotions and Reorganizations* (Cambridge, Mass., 1914), 254–61. *Hartford Post*, 9 June 1899; *New York Morning Sun*, 11 June 1899; "The New Bicycle Trust Acquires the Hartford Company's Plant," *New York Times*, 11 June 1899; "Pope in the Deal," *Boston Post*, 11 June 1899, all from Pope Scrapbooks, CHS. *Bicycling World*, 10 July 1899, 1; "Bicycle Trust Formed," *New York Times*, 19 July 1899; "The Plan in Detail," *Cycle Age*, 20 July 1899, 1; "Affidavit of Mr. George Pope" (n. 46 above), 690; "Bicycle Trust in Organized," *New York Times*, 1 September 1899.

60. Harrison (n. 41 above), 303; Foreman-Peck, 184.

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turous young man in 1876, he seized upon that uniquely technological symbol of masculinity and privilege, the high-wheeled bicycle. He created a myth, and in the process built an industry. But when the bicycle became an unexciting product made in unexciting factories for unexciting customers, he turned to new challenges. Now a wealthy middle-aged man, he chose to develop an automobile that mirrored the gentility of men like himself. Unfortunately, the automobile was not merely a bigger and more expensive high-wheeler, but a unique innovation with its own complex sociotechnical trajectory. In the final analysis, Pope built his wonderful machines for just one person: himself.[61] He and his bicycles were the products of the Victorian era, and both proved to be as out of place in the coming industrial society as a penny-farthing cycle would have been on the rutted farm roads of Dearborn.

61. Donald Davis, *Conspicuous Production: Automobiles and Elites in Detroit, 1899–1933* (Philadelphia, 1988), 5–10. Davis notes of the early Detroit automotive entrepreneurs that "As prosperity came their way [they] thought that the whole world grew more prosperous with them. . . . They built cars for themselves instead of for the public." Many thanks to John Staudenmaier for pointing out parallels with this earlier work.