

6-1-2007

The Road to the Model T: Culture, Road Conditions, and Innovation at the Dawn of the American Motor Age

Christopher W. Wells
Macalester College

Follow this and additional works at: <http://digitalcommons.macalester.edu/envifacpub>

Recommended Citation

Wells, Christopher W., "The Road to the Model T: Culture, Road Conditions, and Innovation at the Dawn of the American Motor Age" (2007). *Faculty Publications*. Paper 1.
<http://digitalcommons.macalester.edu/envifacpub/1>

This Article is brought to you for free and open access by the Environmental Studies Department at DigitalCommons@Macalester College. It has been accepted for inclusion in Faculty Publications by an authorized administrator of DigitalCommons@Macalester College. For more information, please contact scholarpub@macalester.edu.

The Road to the Model T

Culture, Road Conditions, and Innovation at the Dawn of the American Motor Age

CHRISTOPHER W. WELLS

In 1920, a single vehicle dominated the American market for automobiles: Ford's famous Model T. Plain, powerful, and utilitarian, its success peaked in 1923 when Model Ts accounted for almost 55 percent of American automobile production.¹ Introduced in 1908 at \$850, by 1923 the efficiencies of mass production had allowed Ford to cut the price of the Model T touring car to just \$298, enabling automobile ownership in the United States to move steadily down the income ladder. Few could have foreseen this result twenty years earlier, however. Then, the first American motor vehicles, owned almost exclusively by wealthy elites, represented a dizzying variety of designs that inspired spirited debate over such basic technological questions as the best type of engine to use, where to locate it in the vehicle, and how best to design the vehicle's body.

In recent years, scholars have generated a host of fresh insights into the shifting contours of the early auto industry, both before and after the advent of the Model T. Much of this work has been inspired by the observation that social context actively shapes definitions of technological merit—and thus the success and failure of different technologies. Why did the internal combustion engine triumph over steam and electric alternatives?

Christopher Wells, assistant professor of environmental studies at Macalester College, is working on a book manuscript titled *Car Country: Automobiles, Roads, and the Origins of the Modern American Landscape*. He thanks all who have provided helpful feedback on earlier drafts of this article, particularly Pamela Walker Laird, the *T&C* referees, and editor John Staudenmaier.

©2007 by the Society for the History of Technology. All rights reserved.
0040-165X/07/4803-0002/\$8.00

1. Based on total industry production of 3,753,945 and total Ford production of 2,055,300 in 1923. See National Automobile Chamber of Commerce, *Facts and Figures of the Automobile Industry, 1930 Edition* (New York, 1931), 5 (industry production numbers); Bruce W. McCalley, *Model T Ford: The Car That Changed the World* (Iola, Wisc., 1994), 502–36 (Model T production numbers).

What should we make of the widespread practice of owners modifying their motor vehicles? Were urban or rural motorists more important? How did gender and class shape the early car culture? How did the development of automotive technology in the United States compare to that in Europe?²

For all the attention devoted to these questions, however, most historians have placed the Model T at the center of the American automotive revolution primarily for its dramatic price cuts and the mass-production techniques that made these possible, rather than for the technological merits of its design. In *Cars and Culture*, for example, Rudi Volti summarizes the prevailing wisdom on this subject when he writes that the Model T “embodied few technological innovations, but was sturdy, reliable, and easy to drive by the standards of the time.”³

This conclusion is called into question when the Model T is viewed in light of recent scholarship, especially when coupled with close attention to the turn-of-the-century social context and the slow development of the American road system. As the early industry struggled to its feet, American automakers grappled with a wide range of mechanical difficulties, the infusion of new design breakthroughs from overseas, steady competition from other domestic manufacturers, and terrible road conditions. They also had to respond to fierce debates about what motor vehicles ought to do and how they ought to fit into domestic life. These disagreements exerted significant pressure on motor-vehicle design, causing the early U.S. market to divide into two distinct segments: one forged in the world of the horse, and the other guided by enthusiasm for machines. In this context, the significance of the Model T’s design is that it created a new type of motor vehicle—the lightweight automobile—that transformed the U.S. market from one of disagreement and division into a broad mass market focused largely (if not

2. Key monographs include Gijss Mom, *The Electric Vehicle: Technology and Expectations in the Automobile Age* (Baltimore, 2004); David A. Kirsch, *The Electric Vehicle and the Burden of History* (New Brunswick, N.J., 2000); Virginia Scharff, *Taking the Wheel: Women and the Coming of the Motor Age* (Albuquerque, 1991); Michael Brian Schiffer, with Tamara C. Butts and Kimberly K. Grimm, *Taking Charge: The Electric Automobile in America* (Washington, D.C., 1994); Ronald Kline, *Consumers in the Country: Technology and Social Change in Rural America* (Baltimore, 2003); Kathleen Franz, *Tinkering: Consumers Reinvent the Early Automobile* (Philadelphia, 2005); Clay McShane, *Down the Asphalt Path: The Automobile and the American City* (New York, 1994); Donald Finlay Davis, *Conspicuous Production: Automobiles and Elites in Detroit* (Philadelphia, 1988); and Sean O’Connell, *The Car in British Society: Class, Gender and Motoring, 1896–1939* (Manchester, 1998).

3. Rudi Volti, *Cars and Culture: The Life Story of a Technology* (Baltimore, 2004), 27. On the significance of Ford’s production methods, see especially David A. Hounshell, *From the American System to Mass Production, 1800–1932* (Baltimore, 1984); Lindy Biggs, *The Rational Factory: Architecture, Technology, and Work in America’s Age of Mass Production* (Baltimore, 1996); and Allan Nevins, *Ford: The Times, the Man, the Company, 1915–1933*, vol. 1 (New York, 1954). For an exception, see Robert Casey, *A Car for the Great Multitude: A Centennial History of Henry Ford’s Model T* (Baltimore, forthcoming).

“Locomobile”

The best Motor Vehicle.
Has twice climbed Mt. Washington, and has ascended the highest peaks in the Yosemite.



Record of a mile in 1:06 at Inter Ocean Fair, Chicago.
Gold and Bronze Medals at Paris Exposition.

Style No. 2—\$750. F. O. B. Bridgeport, Conn.

THE “Locomobile” COMPANY OF AMERICA
11 BROADWAY, NEW YORK

Send All Communications to Above Address.

FIG. 1 The 1901 Locomobile, a steam-powered horseless carriage (bestseller during 1901–2). (Source: *Motor Age*, 9 January 1901, 791.)

exclusively) on a single technology. In doing so, it reconciled two seemingly irreconcilable worldviews, and in the process transformed the evolution of U.S. motor-vehicle technology.

Competing Visions, Specialized Designs

American inventors tackled the problems of self-propelled road vehicles in the early 1890s largely by modifying and combining technologies pioneered in Europe, and the machines they produced shared little beyond the ability to travel under their own power. By 1899, however, when thirty U.S. manufacturers produced 2,500 vehicles, a large segment of the market had stabilized around “horseless carriages”: small, four-wheeled, tiller-driven, surrey-style, and privately owned (fig. 1). Their price—typically well beyond the reach of average Americans—ensured that early motor-vehicle ownership in the United States had a distinctly elite and primarily urban character.⁴

4. Most histories of the automobile or the automobile industry sketch the development of motor-vehicle technology through the nineteenth century. For more in-depth discussions of the topic, see T. P. Newcomb and R. T. Spurr, *A Technical History of the Motor Car* (Bristol, 1989), 3–22; Stephen W. Sears, *The American Heritage History of the*

JULY
2007
VOL. 48

As horseless carriages appeared more frequently on U.S. streets, turn-of-the-century observers debated the role that such expensive new machines should play in everyday life. This debate, conducted in both the popular and automotive presses, provides evidence crucial to understanding why the early U.S. motor-vehicle market evolved from a diverse range of vehicles into one divided roughly into two halves: the Model T, and everything else. Although the popular media have liabilities as historical evidence, systematic analysis allows them to illustrate popular opinion in ways unequaled by other sources, especially when they are read in conjunction with the trade press and Ford Motor Company records. So approached, they provide valuable evidence of what people were thinking—and what automakers thought they were thinking—as they navigated the diversity of early motor-vehicle options.⁵

Most early commentators on horseless carriages fell into one of two broad groups: the “horse-minded” who compared motor vehicles specifically to horses, and the “mobility-minded” who compared them to all other forms of transportation. Subtle but far-reaching differences divided these two perspectives, and the disagreements they represent are in many ways the key to understanding the shape and evolution of the early U.S. market for automobiles.

Horse-minded observers voiced a variety of opinions about the new machines. The most pessimistic denounced motor vehicles on aesthetic, moral, or philosophical grounds, or because they had a financial stake in the position of horses in American society. More pragmatic onlookers subjected horseless and horse-drawn vehicles to a cost–benefit analysis, adopting motor vehicles when they saw opportunities to save money or boost productivity. More utopian observers predicted that motor vehicles would replace horses in American life, thus banishing horse-related noise, traffic, excrement, and disease from urban America and ushering in a golden “horseless age.” As one writer put it in 1903, “whatever the horse can do, the

Automobile in America (New York, 1977), 9–16; John B. Rae, *The American Automobile: A Brief History* (Chicago, 1965), 1–15; James J. Flink, *America Adopts the Automobile, 1895–1910* (Cambridge, Mass., 1970), 12–25; and Flink, *The Automobile Age* (Cambridge, Mass., 1988), 1–14. The statistics are from National Automobile Chamber of Commerce, *Facts and Figures of the Automobile Industry, 1928 Edition* (New York, 1929), 6. Most of these had electric or steam engines. On the urban character of early automobile ownership, see Eric Monkkonen, *America Becomes Urban: The Development of U.S. Cities and Towns, 1780–1980* (Berkeley, Calif., 1988), 293; and McShane, 103–24.

5. This study draws primarily on articles on automobiles indexed in the *Readers' Guide to Periodical Literature* between 1895 and 1908, heavy random sampling of articles from the trade press, especially *Horseless Age* and *Motor Age*, and archival records of the Ford Motor Company. On turn-of-the-century popular-press sources, see especially Frank Luther Mott, *A History of American Magazines* (Cambridge, Mass., 1957–68), 5 vols. For a systematic study of the period's automotive press, see Flink, *America Adopts the Automobile*.

automobile can do a hundred times better.” Horse-minded observers assumed that in both use and ownership, horseless carriages would occupy roughly the same roles in American life as horses; few predicted that the new machines would radically transform basic daily routines or practices.⁶

The predictions of mobility-minded observers were more varied. Pessimists, who feared the new machines might transform American life for the worse, denounced them as “devil wagons,” condemned their breakneck speeds, and criticized motorists for violating basic standards of decency. “We hear of roads made impossible for anything besides automobiles, of homes rendered uninhabitable because of dust and noise, and of roads destroyed with such rapidity as to put undue burdens upon the local taxpayers,” opined the *Nation*, a New York–based review periodical, in an article on anticar sentiment on Long Island. “Intolerable is the word generally used to describe conditions there.”⁷

Mobility-minded pragmatists were more forgiving, arguing that the machines should not be blamed for whatever problems accompanied their use. They supported campaigns to reform driver behavior and vented anger toward noncompliant motorists. “You of the automobile class are utterly regardless of the danger to pedestrians,” one New York City magistrate lambasted a defendant charged with speeding. “You toot your horns to see the people run, but you never slow up.” Although frustrated by inconsiderate drivers, most pragmatists judged vehicular technology by how usefully it increased existing options for transportation and recreation. So long as horseless carriages improved the efficiency, bottom line, or enjoyment of transportation, most mobility-minded pragmatists were willing to alter their routines to accommodate them.⁸

A small group of mobility-minded utopians discerned limitless potential in motor vehicles. Embracing a vision of revolutionary change, they foretold a future in which existing transportation methods would become obsolete. Every American family would own its own luxurious vehicle that would speed them over well-paved roads to almost any destination—

6. George A. Latham, “The Automobile and Automobiling,” *Munsey’s*, May 1903, 164 (quotation). On the pessimists, see Rae, *The American Automobile*, 29; Flink, *America Adopts the Automobile*, 64–70; Michael L. Berger, *The Devil Wagon in God’s Country: The Automobile and Social Change in Rural America, 1893–1929* (Hamden, Conn., 1979), 13–31; Howard L. Preston, *Automobile Age Atlanta: The Making of a Southern Metropolis, 1900–1935* (Athens, Ga., 1979), 34–43; and Thomas Martin McCarthy, “The Road to Respect: Americans, Automobiles, and the Environment” (Ph.D. diss., Yale University, 2001), 92–144. On the pragmatists, see Flink, *America Adopts the Automobile*, 95–100; McShane, 120–22; Ralph C. Epstein, *The Automobile Industry: Its Economic and Commercial Development* (Chicago, 1928), 56–57; and Kirsch, 129–66. For a typical utopian statement, see “The Horseless Age,” *Horseless Age*, November 1895, 7–8.

7. “Regulating the Automobile,” *Nation*, 10 October 1907, 319 (italics in original).

8. “Magistrate Would Bar Autos from Streets: Utterly Regardless of Danger to Pedestrians, Crane Says,” *New York Times*, 7 November 1904.

JULY
2007
VOL. 48

whether on recreational drives into the green countryside or home to the lush suburbs they predicted would spring up outside the nation's cities—and would do so without the tyranny of railroad timetables or the crowded seats and fixed routes of trolley cars. Motor vehicles would become something grander than carriages without horses by possessing an almost ideal mix of attributes: speed, power, reliability, comfort, versatility, and extreme affordability. In addition, they would be tied into an extensive, governmentally subsidized road system that would provide every convenience and comfort. To use a term coined by Joseph Interrante, it was a vision of “autopia.”⁹

At the dawn of the industry, however, engineers were unable to design motor vehicles flexible enough to perform the diverse tasks that early motorists desired. Roomy, elegantly appointed carriages that were good for driving to the theater, for example, performed poorly on unpaved country roads. As a result, automakers produced specialized vehicles that catered to particular purposes, and most early observers shared the opinion expressed in a 1901 issue of *Outing* magazine: the market's cornucopian variety reflected the need for vehicles “adapted for certain kinds of work in the hands of certain classes of people.”¹⁰

The fact that designers chose from three major motor types—steam, electric, and gasoline—underscores both the diversity and the uncertainties of early horseless-carriage design. Between 1895 and 1903, the U.S. industry's most-favored motor type changed several times. Electrics held the early lead, and in 1897 the Pope Manufacturing Company's Columbia electric, the first to be offered as a stock model rather than on a made-to-order

9. Interrante's term can be found in Joseph Interrante, “The Road to Autopia: The Automobile and the Spatial Transformation of American Culture,” in *The Automobile and American Culture*, ed. David L. Lewis and Laurence Goldstein (Ann Arbor, 1983), 89–104; and Interrante, “A Moveable Feast: The Automobile and the Spatial Transformation of American Culture, 1890–1940” (Ph.D. diss., Harvard University, 1983). It also appears, in a very different context, in Peter Wollen and Joe Kerr, *Autopia: Cars and Culture* (London, 2002). The description of turn-of-the-century “autopians” here is a composite; only a handful of individuals embraced all of its individual components. For typical examples of individual turn-of-the-century autopians, see William J. Lampton, “The Meaning of the Automobile,” *Outing*, September 1902, 699; Robert Bruce, “The Promise of the Automobile in Recreative Life,” *Outing*, April 1900, 81–85; “Fairly Howling,” *Motor World*, 11 October 1900, 17; Eustace Clavering, “The Twentieth Century Runabout,” *Munsey's*, December 1902, 387–92; R. G. Betts, “The Rediscovery of America by the Automobile,” *Outing*, May 1903, 167–76; Winthrop E. Scarritt, “The Low-Priced Automobile,” *Munsey's*, May 1903, 178–80; “One More Revolution,” *Independent*, 14 May 1903, 1162–64; and Cleveland Moffett, “Automobiles for the Average Man: Some Everyday Facts about Horseless Carriages, with Their Several Advantages and Disadvantages,” *Review of Reviews*, June 1900, 710.

10. M. C. Krarup, “Automobile Development,” *Outing*, February 1901, 551. The belief that different automotive types were appropriate to different spheres of use has been a focus of much recent scholarship. See, for example, Scharff (n. 2 above), esp. 35–50; Kirsch (n. 2 above), 129–66; and Mom, *The Electric Vehicle* (n. 2 above), 17–63.



FIG. 2 An 1897 Columbia electric horseless carriage, built by the Pope Manufacturing Company (bestseller during 1897–98). (Source: *Scientific American*, 22 May 1897, 331.)

basis, led the nation in sales (fig. 2). Of the 2,500 motor vehicles counted in the *United States Census of Manufactures* for 1899, the vast majority were steam- and electric-powered carriages produced in New England plants. By 1900 steamer sales had inched past electrics, with the young industry producing 1,681 steam, 1,575 electric, and 936 gasoline vehicles. Steamers maintained this lead through 1902, at which point the three engine types held roughly equal shares of the market. Not until 1903, when the Olds Motor Vehicle Company's curved-dash Oldsmobile led the industry with 4,000 sales, did gasoline-powered carriages become dominant.¹¹

Writers in the popular and trade presses assessed electric, steam, and gasoline engines differently. Of the three, critics characterized electrics as

11. Flink, *America Adopts the Automobile* (n. 4 above), 29–31 (census figures); and J. T. Sullivan, "New England a 1900 Leader," *Motor Age*, 2 March 1911, 2. No standardized procedure for recording production figures existed, making counts for early motor-vehicle production unreliable. Exact registration statistics from the turn of the century are also hard to determine. See also John B. Rae, *American Automobile Manufacturers: The First Forty Years* (Philadelphia, 1959), 12.

JULY
2007
VOL. 48

the cleanest, quietest, most reliable, and simplest to operate. Steamers were the best hill-climbers and able freight carriers, would not stall, and often carried the smallest price tags. Gasoline-powered carriages fell between electrics and steamers in cost and ease of use and were the most versatile, being able to climb ordinary hills and run through snow, mud, and sand. Pronounced weaknesses balanced these strengths. Early electrics required special time-consuming recharging stations, could travel only twenty-five miles or so between charges, and performed poorly in hilly areas and on rough roads. Steamers could range farther than electrics, but in the days before condensers they needed to refuel with pure water every twenty or thirty miles, required special training (and, in some states, licensing) to operate, and even after the invention of the flash boiler—which used a pilot light to maintain the engine’s water near the boiling point—were slow to build up a full head of steam at the beginning of a drive. Early gas-powered carriages were noisy, smelly, prone to fierce vibration, difficult to start, easy to stall, and demanded frequent adjustment and repair. Automotive engineers debated whether each engine type would find its own niche, or whether one would eventually prevail.

With turn-of-the-century manufacturers jockeying for marketplace advantage, horseless-carriage enthusiasts peered into a murky future. “What we want,” one declared in 1900, “is something that has gone through the inevitable period of groping and mistakes, and developed the three essential qualities of safety, simplicity, and efficiency.” No engine type could yet meet each criterion. “Indeed,” this enthusiast concluded, “the greatness of the automobile lies chiefly in the future.” Still, as another commented in 1901: “It must be remembered that the electric motor, the steam engine, and the gas engine have all been proven successful, and that an automobile made by a well-known concern and fitted with any one of these three types of motive power is a practical motor vehicle.”¹²

The uncertainty generated by the range of specialized motor-vehicle designs at the turn of the century casts doubt on the inevitable triumph of gasoline technology, a belief often shared by historians. For example, John Bell Rae, one of the deans of automotive history, has explained the gasoline engine’s success in technologically deterministic terms, describing it as “simply a manifestation of the survival of the fittest.” James Flink, another leading automotive historian, has argued that turn-of-the-century uncertainty should not obscure the reality that “the four-cycle internal-combustion engine was vastly superior as an automotive power plant over alternatives.” Such claims suggest that “fittest” and “superior” have consistent and timeless definitions, a supposition that undermines their explanatory power. Regardless of how things appear today, Americans at the beginning

12. Moffett, “Automobiles for the Average Man,” 704, 710 (first quotation); J. A. Kingman, “Automobile-Making in America,” *Review of Reviews*, September 1901, 301 (second quotation).

of the twentieth century could not agree on the superiority of one engine type over the others. An important question thus remains: What changed in the first decade of the twentieth century that caused manufacturers and consumers alike to develop an overwhelming preference for gasoline-powered vehicles?¹³

Recent scholarship suggests that one key to this question lies in the declining importance of the market for commercial motor vehicles, such as urban trucks and taxis, and the rapid expansion of the market for private, recreational vehicles.¹⁴ As one author put it in 1900, “the serious thought of designers and makers finds utterance in the construction of models first for pleasure and afterwards for commercial uses.” “So far,” another wrote in 1901, “the greater part of the machines have been for pleasure purposes.” This trend, which ownership statistics bear out, accelerated through the decade as private motor-vehicle ownership became more widespread. As one author claimed in 1908, “their conspicuous success has been achieved almost wholly as pleasure vehicles, so that their mention suggests to the average person only a new way of enjoying one’s self.” Contemporary usage reinforced the point, as “pleasure car” became a popular label for a privately owned motor vehicle.¹⁵

The emphasis that successful manufacturers placed on catering to personal pleasure suggests that the gasoline carriage triumphed in the United States because elites seeking recreational vehicles comprised the largest market for motor vehicles. Gijs Mom, for example, has recently argued that the gasoline carriage was primarily an “adventure machine”—a technology well-suited to the vogue among elite motorists for racing and long-distance touring. Automakers thus capitalized on various anxieties and enthusiasms of the era, providing both an enjoyable pastime and a way to reinforce motorists’ elite status.¹⁶

13. Rae, *The American Automobile* (n. 5 above), 15; Flink, *The Automobile Age* (n. 4 above), 10. Rudi Volti renewed interest in the question of why internal combustion triumphed over available alternatives with his article, “Why Internal Combustion?” *American Heritage of Invention and Technology* 6 (1990): 42–47. Others contributing to the debate include Scharff, McShane (n. 2 above), Kirsch, Schiffer (n. 2 above), and Mom, *The Electric Vehicle*. See also Tom McCarthy, “The Coming Wonder? Foresight and Early Concerns about the Automobile,” *Environmental History* 6 (2001): 46–74.

14. Gijs Mom and David Kirsch have developed this idea in a number of works. In addition to their monographs cited in note 2 above, see David A. Kirsch and Gijs P. A. Mom, “Visions of Transportation: The EVC and the Transition from Service- to Product-Based Mobility,” *Business History Review* 76 (2002): 75–110; and Gijs P. A. Mom and David A. Kirsch, “Technologies in Tension: Horses, Electric Trucks, and the Motorization of American Cities,” *Technology and Culture* 42 (2001): 489–518.

15. Bruce (n. 9 above), 81; Kingman, 304; Frederick Dwight, “Automobiles: The Other Side of the Shield,” *Independent*, 3 December 1908, 1300. On the use of “pleasure car,” see Henry Ford, with the collaboration of Samuel Crowther, *My Life and Work* (Garden City, N.Y., 1922), 72; and Nancy Koppelman, “One for the Road: Mobility in American Life, 1787–1985” (Ph.D. diss., Emory University, 1999), 314.

16. Mom, *The Electric Vehicle* (n. 2 above), 32–47.

JULY
2007
VOL. 48

Viewed from the perspective of elite consumers looking for “adventure machines,” the internal-combustion engine indeed seemed superior to its steam and electric competitors. Gasoline carriages were easier to operate than steamers and could travel farther than electrics. Even more significantly, they possessed a combination of strengths that allowed them to travel unhindered on the country’s unpaved back roads—something that neither steamers nor electrics could do with quite the same ease. Unlike the electric taxicabs that competed with cheap public transportation and horse-drawn taxis, and unlike the motorized trucks that competed with horse-drawn wagons, gasoline carriages operated on country roads where the only real alternatives were to use horses, ride bicycles, or walk.¹⁷ Moreover, even if they lacked the quiet elegance of electrics or the power of steamers, gasoline carriages could usually do roughly the same things as their rivals, and do so on country roads as well as city streets.

The ability to escape the city to motor across the countryside held a powerful appeal for many new owners, giving the technology an almost magical aura. “To possess a car is to become possessed of a desire to go far afield,” wrote one enthusiastic city dweller. “The limits of the city become narrow, contracted, cramped, cagelike. The desire, so to speak, to spread its wings is in the nature of the motor-car, if things inanimate may be said to be moved by desire.” The desire to fly on outstretched wings was of course the writer’s, not the vehicle’s, but the ability to gratify that desire inhered in gasoline carriages more than in electrics or steamers. Thus did technology and cultural values begin to fuse at the turn of the twentieth century, helping explain the slow tilt of U.S. consumer preferences toward gasoline carriages.¹⁸ Still, despite its strengths, the adventure-machine thesis does not fully explain the development of automotive technology in the United States, where the split between mobility-minded and horse-minded buyers put the evolution of automotive technologies on a very different trajectory from the adventure-oriented path followed in Europe.

Updating the Horseless Carriage, Americanizing the Automobile

Europe, and particularly France and Germany, embraced gasoline carriages earlier and more fully than did the United States, leading one American to declare in 1902 that the “rest of the world appears to have gone daft on gasoline.”¹⁹ As a result, European manufacturers quickly advanced gaso-

17. As Mom puts it, this left the “subculture of the electric car” firmly planted “in the shadow of gasoline adventure” (*ibid.*, 47–63).

18. Betts (n. 9 above), 171 (quotation). For an alternative view that argues that urban uses were central to the shape of early automotive technology, see McShane.

19. Ritchie G. Betts, “Faster than the Locomotive: The Flight of the Automobile,” *Outing*, January 1902, 394.

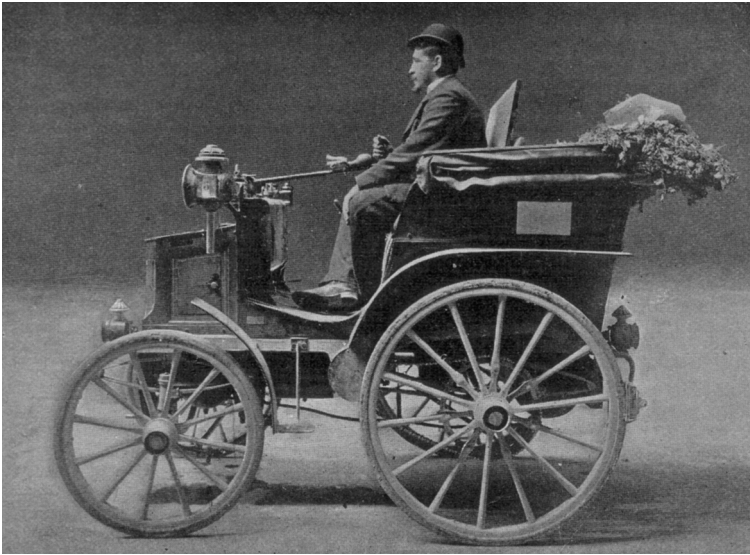


FIG. 3 The 1895 Panhard et Levassor, based on the firm’s innovative 1891 front-engine design, averaged fifteen miles per hour in the 725-mile Paris–Bordeaux race. (Source: *Harper’s Weekly*, 13 July 1895, 663.)

line-carriage design during the 1890s. The first breakthrough came in 1891, when Panhard et Levassor, a leading French automaker, departed from the theretofore orthodox design principles that favored rear-mounted engines and introduced a vehicle with a front-mounted engine, clutch, gearbox, countershaft, and chain drive connected to the rear axle. Known as the *Système Panhard*, the design spread rapidly among European designers (fig. 3).

A second breakthrough came a decade later when wealthy enthusiast and Daimler board member Emile Jellinek asked Wilhelm Maybach, an engineer at Daimler’s Cannstatt factory, to develop an innovative motor vehicle based on Jellinek’s suggestions. Introduced in 1901 and named after Jellinek’s daughter, *Mercédès*, the new design combined a number of advances—including mechanically operated inlet valves, honeycomb radiator, improved gearbox, front-mounted four-cylinder engine, and pressed-steel chassis—that have led historians of technology to characterize it as the first “modern” motor vehicle (fig. 4). Despite its German origin, Americans described its novel tonneau-style body as “French style,” equating its front-mounted engine with the *Système Panhard*.²⁰

20. Newcomb and Spurr (n. 4 above), 23–24, 35–36; James M. Laux et al., *The Automobile Revolution: The Impact of an Industry*, ed. and trans. James M. Laux (Chapel Hill, N.C., 1982), 34–35; Flink, *The Automobile Age* (n. 4 above), 33–35; Peter J. Hugill, “Technology and Geography in the Emergence of the American Automobile Industry, 1895–

JULY
2007
VOL. 48

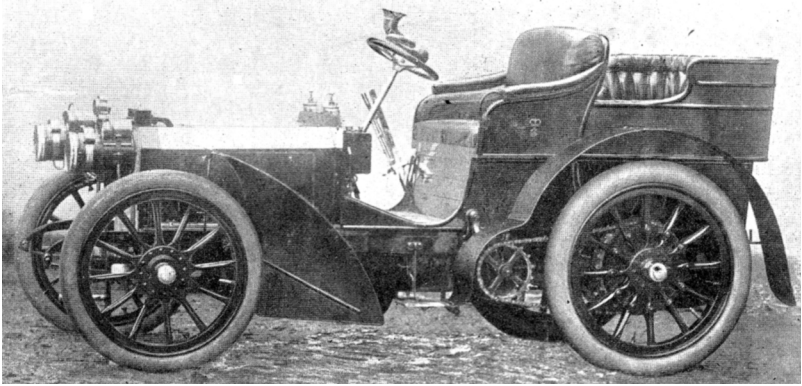


FIG. 4 The revolutionary 1901 Mercedes, commonly called the first modern “automobile,” departed substantially from the “horseless carriage”-style designs represented in figures 1 and 2. (Source: *Horseless Age*, 21 August 1901, 431.)

The Mercedes-style automobile opened new vistas for power and speed, pushing engineers beyond the design considerations that prevailed for horse-drawn carriages. As one designer put it, “the horse standards were slipping—at least they were on the gasoline-carriage—for when we accepted the bonnet in front of the dash we eliminated the vehicle from the elegant horse carriage list. . . . It was to be a machine, and as such it did not belong in the carriage class.” With speeds that could top fifty miles per hour on good roads, another observer described it as “not a wagon without a horse, but a parlor car without a track or cinder.” In other words, it was a car pulled by a locomotive—or, to use the French term, an *automobile* unabashedly built for speed and adventure (fig. 5).²¹ As such, it prompted many mobility-minded consumers to cast a condescending gaze upon the horseless carriage. “It did not seem to enter the minds of the makers,” ran one typical comment, “that the kind of wagon suitable for a horse to draw was not the kind that could be best propelled by an engine.”²² For this author and others like him, “best propelled” implied speeds that no horse-

1915,” in *Roadside America: The Automobile in Design and Culture*, ed. Jan Jennings (Ames, Iowa, 1990), 29–39, esp. 31–34; Peter J. Hugill, “Technology Diffusion in the World Automobile Industry, 1885–1985,” in *The Transfer and Transformation of Ideas and Material Culture*, ed. Peter J. Hugill and D. Bruce Dickson (College Station, Tex., 1988), 110–42; and Guy Jellinek-Mercédès, *My Father Mr. Mercédès*, trans. Ruth Hassell (Philadelphia, 1961), esp. 87–100. Before 1903, U.S. manufacturers who used gasoline engines utilized the horseless-carriage design, mounting the engine under or behind the vehicle’s seat.

21. Hiram Percy Maxim, *Horseless Carriage Days* (New York, 1936), 127; David T. Wells, “The Growth of the Automobile Industry in America,” *Outing*, November 1907, 208.

22. Wells, 209.

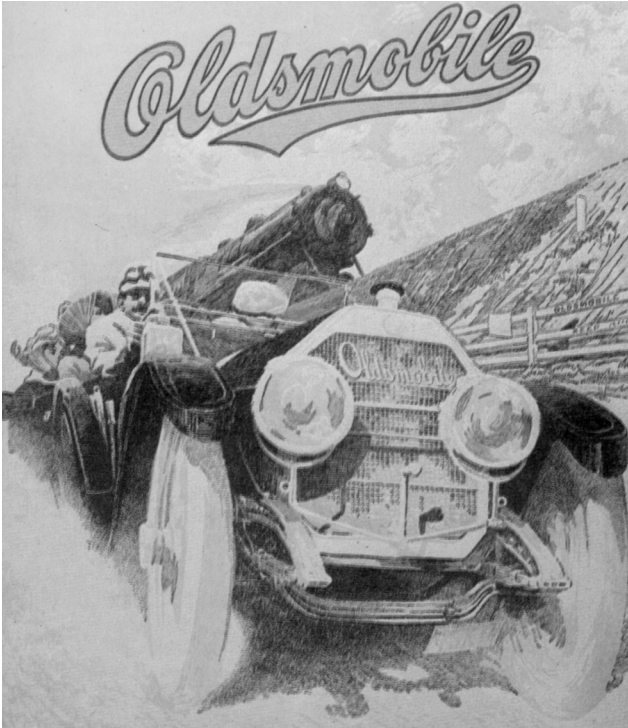


FIG. 5 As Mercedes-style design gained influence, comparisons to railroad locomotives abounded, as in this 1909 painting by William Harnden Foster, *Setting the Pace*.

drawn carriage could deliver. From that perspective, the idea that anyone might prefer slower speeds was laughable.

According to *Scientific American*, the nation's most popular magazine devoted to mechanical innovations, Americans were gaining "an instinctive appreciation of the fact that an automobile belongs more to the class of the locomotive than that of the carriage." In 1905, *Country Life in America* editorialized that "[t]he moneyed class of the buying public has finally come to understand why surrey patterns and box seats are out of place in a touring car; as a general thing they have come to look upon the automobile for what it is—a highway locomotive—and not for what it is not." The author did not explain what he meant by "what it is not," but his implication was clear: automobiles were not, and by right ought not to be, horseless carriages designed to perform the same tasks as horses. Instead, they ought to be Mercedes-style highway locomotives.²³

23. "The Seventh National Automobile Show at Madison Square Garden," *Scientific*

JULY

2007

VOL. 48

Reflecting this new conceptualization of “proper” motor-vehicle design, U.S. manufacturers quickly emulated the French-style automobile after its debut at the 1902 New York Motor Show. “The first impression produced by a walk through the show,” *Outing* noted of the New York exposition just two years later, “was essentially a humble tribute to French ideas and French skill.” This trend accelerated. “[T]he American car is settling down to certain fixed types,” reported *Cassier’s* in 1906. “The American car to-day follows the general lines of the French automobile.”²⁴

Like most cultural imports, however, the social meanings that the French attached to the automobile were subject to subtle change when translated into the American idiom. In particular, longstanding disagreements over appropriate standards for judging motor-vehicle technologies influenced U.S. reactions to the French-style automobile. Its biggest supporters tended to be those among the mobility-minded set that judged motor vehicles in the context of all transportation alternatives. In its view, the French-style automobile promised to enhance existing transport and recreation options. The mobility-minded embraced its potential and enthusiastically adapted it to U.S. conditions. Backroads touring and high-speed racing became wildly popular sports among U.S. elites in the early twentieth century, and for these activities no options were better than automobiles modeled on the Mercedes.

A large part of the U.S. market was still horse-minded, however, and rejected the paradigm-changing French-style automobile in favor of refined versions of the horseless carriage. At one leading U.S. manufacturer, for example, an executive declared that “the French machines were monstrosities of complication and by no stretch of the imagination could be successful with the American carriage-riding public.” French automobiles “bristled with levers and handles and foot pedals and instruments,” and in his estimation were entirely too complicated for normal people to operate.²⁵ He was not alone in this assessment. Despite the significant influence of the French-style automobile and the quick spread of European ideas among Americans, the U.S. market continued to support a variety of other motor-vehicle types, most of which evolved from the older horseless-carriage

American, 12 January 1907, 22; Herman Wade, “Style in Automobiles,” *Country Life in America*, August 1905, 449–50.

24. “The Automobile of 1904,” *Outing*, March 1904, 734; Winthrop E. Scarritt, “The Future of the Automobile: Tendencies in American Practice,” *Cassier’s*, March 1906, 427. It is worth noting that the success of French-style automobiles in the United States came almost entirely from U.S. manufacturers imitating French designs rather than from foreign imports, which faced tariff barriers prohibitive to all but the very wealthiest of auto enthusiasts. See also Hugill, “Technology and Geography,” 31–34; Peter J. Hugill, “Good Roads and the Automobile in the United States, 1880–1929,” *Geographical Review* 72 (1982): 331; and Flink, *America Adopts the Automobile* (n. 4 above), 262–65.

25. Maxim, 122.



FIG. 6 The gasoline-powered, curved-dash Oldsmobile was a popular representative of early runabout design and a bestseller in 1902. (Source: *Motor Age*, 27 February 1902, 41.)

designs that advocates of French-style automobiles derided as hopelessly inferior.

Two new types of gasoline carriages, both of which cost significantly less than Mercedes-style automobiles, claimed growing numbers of horse-minded buyers after 1902. The first—the “runabout” or “gas buggy”—was an inexpensive, one- or two-cylinder gasoline-powered vehicle with a rear-mounted motor and seating for two. The wildly popular curved-dash Oldsmobile, which captured 36 percent of the U.S. market in 1902 with 4,000 sales, provides the most celebrated example of early runabouts (fig. 6). It also illustrates what in 1904 *Outing* called a “distinctly American” trend toward building vehicles “in very large numbers for a ready sale at prices well below the thousand-dollar mark.” Some of the more important manufacturers to follow Oldsmobile in runabout production between 1903 and 1910 included the Thomas B. Jeffery Company, the Cadillac Motor Car Company, and the Ford Motor Company, all of which used economies of scale to help them incorporate the high-quality materials and craftsmanship of French-style automobiles into low-priced vehicles. The second new type of gasoline carriage—the “high-wheeler”—was basically a motorized farm wagon with large-diameter, solid-tired wheels, low horsepower, high road clearance, a rear-mounted engine, and prices ranging from \$250 to \$950 (fig. 7). Among the more important high-wheeler manufacturers, which concentrated heavily in the Midwest, were the W. H. McIntyre Company in Auburn, Indiana;

JULY
2007
VOL. 48



FIG. 7 The 1910 Holsman, an example of the “high-wheelers” that were popular in the Midwest as well-to-do farmers and townsfolk moved into the ranks of motor vehicle owners. (Source: *Automobile*, 9 September 1909, 450.)

the Schacht Company in Cincinnati; and Chicago’s International Harvester, H. K. Holsman Company, and Sears, Roebuck and Company.²⁶

That runabouts and high-wheelers captured a growing share of the market even as technical opinion coalesced around the Mercedes-style automobile should give pause to those who would conclude that the internal-combustion engine triumphed simply because it was technologically superior, or even because it made the best “adventure machine.” Mercedes-style vehicles had demonstrably greater power, reliability, and range than steamers and electrics, but the same could not be said of underpowered runabouts with their limited seating or of high-wheelers, many of which vibrated so badly that nuts often shook loose and joints sometimes broke. For mundane tasks, however, runabouts and high-wheelers competently replaced the horse and were generally more effective than similar steam- or electric-powered machines.

Measured against a horse’s cost and capabilities, many Americans—particularly those from rural areas—chose the cheap, utilitarian options

26. “The Automobile of 1904,” 734; Flink, *The Automobile Age* (n. 4 above), 31–39. As James Flink and others have demonstrated, the widely held notion that Henry Ford was the first to think of building low-priced motor vehicles in large quantities is mistaken. Ford did stand alone, however, in applying the idea on a much grander scale than others ever envisioned possible. On high-wheeler production, see Flink, *The Automobile Age*, 34–35; and Hugill, “Technology and Geography” (n. 20 above), 34–36. By 1909 nearly fifty firms, concentrated almost entirely in the Midwest, produced high-wheeled vehicles. The indispensable compendium of information on U.S. motor vehicles during this period is Beverly Rae Kimes and Henry Austin Clark Jr., *Standard Catalog of American Cars, 1805–1942*, 3rd ed. (Iola, Wisc., 1996).

provided by runabouts and high-wheelers over powerful Mercedes-style automobiles, fashionable electrics designed for city streets, or complicated steamers. One writer in *Munsey's* declared:

Of course there are many enthusiastic automobilists who delight in possessing cars of forty or even sixty horse-power. That is their privilege, and they can afford to pay for it, just as some choose to own fast horses for which they pay enormous sums.

On the other hand, where the automobile is not intended for touring, but rather as a substitute for the old-fashioned horse and buggy, a little six to ten horse-power runabout will amply answer the purpose.²⁷

A growing number of horse-minded buyers agreed.

Perhaps, however, the most important factor explaining why so many horse-minded consumers chose gasoline-powered runabouts and high-wheelers lies in an important factor that all manufacturers had to address: the poor state of U.S. roads. Succinctly summarizing the sentiments of most of the country's motoring class, a writer in the *Independent* declared in 1903 that U.S. roads "put our civilization to shame."²⁸ Poor roads created a range of problems that challenged the durability and performance of all types of motor vehicles, whatever their motive power, and demanded almost as much attention from U.S. designers in the early motor age as did such pressing issues as the type of engine to use, where to locate it in the vehicle, and how to design the body.

For Mercedes-style cars true to French designs and built for speed on smooth surfaces rather than for durability on rough ones, the bruising conditions on U.S. country roads initially limited their utility—and thus their market share. "Those Americans who have imported French or German racing or road vehicles are finding them excellent for very high speeds, and stanch in their wagon work," ran one typical critique, "but hard to take care of, delicate in motor mechanism, inconvenient to repair, and generally to be

27. Latham (n. 6 above), 166.

28. "One More Revolution" (n. 9 above), 1163. The director-general of French roads from 1775 to 1785, P. M. J. Trésaguet, developed a method of construction for French roads that included a heavy stone foundation and multiple layers of crushed rock, each packed tight by heavy rollers. Combined with good drainage ditches and regular inspection and repairs, Trésaguet made French roads the best in the world. They remained such into the early twentieth century, though others elsewhere in Europe such as John Loudon McAdam and Thomas Telford also made great strides. See U.S. Department of Transportation, *America's Highways, 1776–1976: A History of the Federal-Aid Program* (Washington, D.C., 1976), 12, 72; M. G. Lay, *Ways of the World: A History of the World's Roads and of the Vehicles That Used Them* (New Brunswick, N.J., 1992), 69–90; Flink, *The Automobile Age*, 2; John Bell Rae, *The Road and the Car in American Life* (Cambridge, Mass., 1971), 27; Albert C. Rose, "The Highway from the Railroad to the Automobile," in *Highways in Our National Life: A Symposium*, ed. Jean Labatut and Wheaton J. Lane (Princeton, N.J., 1950), 84.

classed as ‘white elephants.’” The *Nation* concurred, explaining that “many foreign cars built for European conditions are unfitted for use in America, where the roads are of a kind wholly undreamed of in Europe. Indeed, it is the mud of these highways that accounts for the high-wheel automobile buggies many farmers are now using.”²⁹

JULY

2007

VOL. 48

Such complaints were clearly based in reality. The problem grew from the European practice of placing the automobile’s chassis close to the road to increase stability during rapid cornering. In the United States, however, as one enthusiast explained to auto tourists, “you must be prepared for ‘roads’ that are simply two deep ruts, with a stony ridge in the middle on which the car bottom will drag.” Further illustrating this point, an author in 1905 explained the differences in European and U.S. motor-vehicle design by telling the story of a Turkish man who traveled to the United States to buy an automobile. The author asked the man why he did not make his purchase in France and thus reduce his shipping costs to Turkey. “His answer was that a car made for use on American roads would be far more serviceable in his own country, than a French car built chiefly for speed, as the latter sets too low to the ground for satisfactory use on ordinary and sometimes very bad roads.”³⁰

For mobility-minded motorists interested primarily in high-speed racing, the dearth of good roads created major problems. Many, for example, became active in the well-established “good-roads” campaign that bicycling enthusiasts had launched during the 1880s. “The American who buys an automobile finds himself confronted with this great difficulty. He has nowhere to use it,” wrote Albert Pope, who, as the nation’s largest bicycle manufacturer in the late 1880s, was often called the father of the American good-roads movement. “He must pick and choose between bad roads and worse.”³¹

Yet securing good roads, even on a small scale, proved a slow and herculean task, and many elite—and impatient—motorists sought other solutions. Some selected vacation sites in locales with good roads, whether at home or abroad. Those hoping to set speed records opted for naturally smooth, level surfaces and targeted frozen lakes, salt flats, and hard-packed Florida beaches. Still others constructed specially surfaced oval racetracks. Perhaps the best example of the extreme lengths to which some aficionados of high-speed racing would go to secure a well-paved road is provided by

29. M. C. Krarup, “The Automobile,” *Outing*, February 1901, 620; “Growth of the Automobile Industry,” *Nation*, 7 January 1909, 8.

30. Hrolf Wisby, “Camping Out in an Automobile,” *Outing*, March 1905, 740; H. P. Burchell, “America Sets the Automobile Pace,” *Outing*, March 1905, 747.

31. Albert Pope, “Automobiles and Good Roads,” *Munsey’s*, May 1903, 168. On the good-roads movement during this period, see Christopher W. Wells, “The Changing Nature of Country Roads: Farmers, Reformers, and the Shifting Uses of Rural Space, 1880–1905,” *Agricultural History* 80 (2006): 143–66.

William Vanderbilt, great-grandson of Commodore Cornelius Vanderbilt and heir to the Vanderbilt fortune, who in 1908 constructed a private, twenty-mile-long toll road on Long Island. The new tollway allowed Vanderbilt to operate his high-powered automobiles, which boasted names like “The White Ghost” and “The Red Devil,” without fear of being ticketed by local police for speeding. It also provided a venue for the Vanderbilt Cup, one of the premier early American automobile races.³²

Expensive trips in search of smooth surfaces were at best a stopgap solution, and few elite racing enthusiasts had Vanderbilt’s resources to construct expensive private highways. But given the promise shown by the internal-combustion engine for traveling over poor roads, many manufacturers sought to develop workable designs. “Don’t preach that motor vehicles depend on roads. They don’t,” one *Motor Age* writer argued, presenting an argument that emerged early in the evolution of U.S. motor vehicles. “They depend on good, suitable construction to negotiate any kind of road surface, and on perfectly reliable motors.”³³

Engineers thus began adapting Mercedes-style automobiles to U.S. conditions by raising the chassis to provide greater road clearance. They also specified thicker and stronger materials to ensure durability, outfitted automobiles with extra-strong axles, frames, and suspension systems, and, in contrast to European manufacturers, adopted larger engines that provided drivers with enough power to escape from treacherous spots in the road while reducing the need for frequent gear changes. The result was the American touring car, a versatile modification of the Mercedes-style automobile, which allowed mobility-minded U.S. consumers to drive on even the worst of roads. “The automobile . . . must force its way over stony places,” editorialized *Munsey’s*, “must plunge through slough, and climb steep gradients, must take the luck of the road, and, at its home coming, must be content with the rough and ready cleansing of an ignorant attendant.” Manufacturers thus “Americanized” French technology by accommodating both American desires and road conditions into their designs, transforming a natural-born racer into a powerful backroads touring car.³⁴

The emergence of a distinctly American touring car based on French gasoline technology increased the average cost of automobiles in the United

32. McShane, 130–31, 220–21; “W. K. Vanderbilt Dies in Home Here,” *New York Times*, 8 January 1944. On the connections between American elites and road-improvement efforts in New York, see Peter J. Hugill, *The Elite, the Automobile, and the Good-Roads Movement in New York: The Development and Transformation of a Technological Complex, 1904–1913* (Syracuse, N.Y., 1981).

33. “The Road Improvement Fallacy: Cry for Improved Roads as Necessary Condition for the Progress of the Motor Vehicle Industry Ill Founded,” *Motor Age*, 1899, 83.

34. Clavering (n. 9 above), 388 (quotation); Flink, *America Adopts the Automobile* (n. 4 above), 280–84; and Newcomb and Spurr (n. 4 above), 47. Most European manufacturers also faced horsepower taxes, which made them hesitant to adopt big, powerful engines.

JULY

2007

VOL. 48

States. In 1903, two-thirds of the country's new motor vehicles sold below the \$1,375 mark; by 1907, two-thirds of sales exceeded it. Rising prices reflected new trends, such as the growing number of cylinders and the higher average weight of heavy touring automobiles. As the *Independent* put it in 1908, the "infancy of spindly, fragile 'horseless carriages' has grown to a youth of mighty road engines continually increasing in size, in power, in cost of purchase and maintenance, and, naturally, in excellence of construction."³⁵

At the same time and despite the emerging consensus that the modified Mercedes represented a superior design, the market for comparatively low-priced runabouts and high-wheelers also expanded, albeit more slowly. *Scientific American* reported in its annual summary of the industry in 1909:

Undoubtedly, the low-price car, costing less than \$1,000, has come to stay. If we include the comparatively new and increasingly popular buggy type of machine, it is safe to say that a large proportion of the space at the Grand Central Palace show was taken up by automobiles of this class, costing from \$500 to \$950.³⁶

With one eye on the potential profitability of the low-priced market and another on the strengths of the Americanized Mercedes style, some manufacturers began to develop stripped-down versions of the touring car. Recognizing this trend as early as 1904, *Outing* noted a "possible third type" of motor vehicle, one that combined low weight, moderate cost, and simple design—a hybrid mix of heavy touring car and low-priced runabout that it dubbed the "lightweight automobile":

It is simply impossible that the average French touring car carrying four persons can be equaled in all-round qualities by any mere amplification of the light American runabout, but it is not impossible that a system of construction may be perfected to a point where it will give a four-passenger car of reasonable efficiency and moderate speed at a cost of not very much over one thousand dollars.

Such a hybrid would certainly compromise the power and amenities of expensive touring cars, the article continued, but would nonetheless find a market among consumers who were "content to dispense with some of the more sensational features of motoring so long as they can travel safely and surely."³⁷

35. Dwight (n. 15 above), 1300 (quotation); Epstein (n. 6 above), 76, 91; and Nevins (n. 3 above), 275.

36. "The 1909 Automobile," *Scientific American*, 16 January 1909, 40.

37. "The Automobile of 1904" (n. 24 above), 734.

Merging Worldviews in Ford's "Universal Car"

Although the prospect of an inexpensive, powerful, lightweight, full-sized automobile had wide appeal, automakers struggled to design such vehicles in the half-decade before 1908. Building powerful engines was not the problem, for as engineering expertise grew, a number of techniques developed to produce them, such as adding cylinders, improving machining tolerances, and reducing the weight of reciprocating parts. Adding horsepower created other problems, however. Bigger engines weighed more, required stronger frames, and, in combination with the rough U.S. roads, subjected vehicles to increased stress and fatigue. In an era of soft steels, engineers could accommodate more powerful engines only by increasing the thickness, and thus the weight, of frames and components.

Because increased power necessitated a heavier frame and thicker, stronger parts, weight-to-power ratios—a rough measure of performance—stabilized among better-quality vehicles in the neighborhood of 80:1. The 22-horsepower engine of the popular 1908 Buick Model 10, for example, powered a relatively light 1,750 pound vehicle and had a weight-to-power ratio of 80:1. The more powerful 28-horsepower engine of the 1906 Olds Model S, on the other hand, propelled a heavier 2,300-pound vehicle, giving it a ratio of 82:1. The even more powerful 1906 Pierce Great Arrow had a 32-horsepower engine, but its 2,700 pounds pushed its ratio to 84:1. In most high-quality Americanized automobiles, the problem and its solution thus fought one another to a draw.³⁸

Despite the difficulties that had to be surmounted, Henry Ford embraced the vision of a lightweight automobile. After winning a power struggle within his company, Ford devoted his resources to the high-volume production of his Model N, a premium runabout with a front-mounted engine that debuted in 1906 for \$500. Although the price rose to \$600 in 1907, the Model N—along with its cousins, the Model R and Model S (essentially Model Ns with some cosmetic upgrades)—generated sales of 8,243 vehicles between October 1906 and September 1907, making the company one of the nation's leading automakers.³⁹

For all its success, however, the Model N was still a two-passenger runabout, and Ford believed his company's future lay in its ability to solve the

38. For three discussions of this problem, see Hugill, "Technology and Geography" (n. 20 above), 34, 36, 38; Flink, *America Adopts the Automobile*, 281–88; and Newcomb and Spurr, 36, 85–86. The ratios cited here are calculated based on information in Association of Licensed Automobile Manufacturers, *Handbook of Gasoline Automobiles, 1904–1906* (New York, 1969), 268–69. On Henry Ford's understanding of the role that steel played in this equation, see Henry Ford, "Special Automobile Steel," *Harper's Weekly*, 16 March 1907, 336G. On Ford's early recognition of this problem, see Nevins, 276–77.

39. Nevins, 338.

JULY
2007
VOL. 48

riddle of how to build a lightweight, full-sized, amply powered automobile. As he wrote in *Automobile* in January 1906:

The greatest need to-day is a light, low-priced car with an up-to-date engine of ample horsepower, and built of the very best material. One that will go anywhere a car of double the horsepower will; that is in every way an automobile and not a toy; and, most important of all, one that will not be a wrecker of tires and a spoiler of the owner's disposition. It must be powerful enough for American roads and capable of carrying its passengers anywhere that a horse-drawn vehicle will go without the driver being afraid of ruining his car.⁴⁰

It was precisely such a lightweight automobile that Henry Ford hoped to bring to market.

Ford's confidence that he could do so grew partly from his belief that a workable solution to the weight-to-power dilemma lay in vanadium steel, a tough and light new alloy then commercially unavailable in the United States.⁴¹ After a series of trial heats at a small furnace in Canton, Ohio, Ford gathered a team in the company's "experimental room" and began to design a vehicle that would capitalize on the new alloy's strength and low weight.⁴²

40. Henry Ford, "Arranging to Build 20,000 Runabouts" (letter to the editor), *Automobile*, 11 January 1906, 107.

41. Accounts vary of Ford's first encounter with vanadium steel. Ford himself claimed he came across it "almost by accident" when he salvaged a valve stem from a wrecked French racing car in Palm Beach, Florida (Ford, *My Life and Work* [n. 15 above], 65–66). As Nevins points out, however, accounts of vanadium steel and its properties had been published in scientific journals that Ford executives read, and had been exhibited at an engineering convention in 1905 that a chief Ford executive had attended (Nevins [n. 3 above], footnote, 348–49). Douglas Brinkley concludes that C. Harold Wills, Ford's most influential designer at the time, discovered the alloy for the company (Brinkley, *Wheels for the World: Henry Ford, His Company, and a Century of Progress* [New York, 2003], 101–2). Thomas J. Misa, on the other hand, claims that Wills came across the alloy only when he hired J. Kent Smith, a British metallurgical engineer, as a consultant (Misa, *A Nation of Steel: The Making of Modern America, 1865–1925* [Baltimore, 1995], 223–25). As the company's metallurgical sophistication grew, its goal of a strong, lightweight design remained, but its use of vanadium steel declined. The company's chief metallurgist, John Wandersee, came to realize that heat treatments of different alloys produced steels with the particular characteristics that engineers desired for different components. Vanadium steel proved impractical for crankshafts, for example, whereas properly heat-treated manganese carbon steel worked admirably in that capacity. See John Wandersee, *The Reminiscences of Mr. John Wandersee*, in The Henry Ford's Benson Ford Research Center, Dearborn (hereafter BFRC), acc. 65 (bound), 20–27. "With the proper kind of heat treat you could improve any kind of steel," Wandersee said. "Any steel that had enough alloy or carbon content to permit hardening could be tempered to the requirements" (24–25). Other considerations included price, ease of machining, and availability. See also Ford, *My Life and Work*, 66–69. Ford's belief in vanadium steel was thus crucial to the development of the Model T, but at the same time put unfounded faith in the "revolutionary" nature of the alloy.

42. For two detailed accounts of the Model T's development, see Nevins, 388–93,

One of the most important members of that team, Joseph Galamb, recalled years later that the entire design process had aimed “to make the car light. That’s what Mr. Ford’s idea was always, to make the car light.”⁴³ As Ford himself put it, “Automobiles have been built too heavy in the past . . . and the key-word for getting cars down to a rational weight is, without doubt, ‘Simplicity.’”⁴⁴ After much trial and error, Ford’s team developed a design—dubbed the Model T when it went into production—that finally seemed to thwart the circular curse of weight and power.

Coupling strong, lightweight materials with a four-cylinder, 20-horsepower engine, the Model T’s 100-inch wheelbase—a good deal shorter than that of other Americanized touring automobiles—carried only 1,200 pounds. This gave it a weight-to-power ratio of just 60:1, similar to the 64:1 achieved by the excellent 1906 Thomas Flyer, which won a well-publicized race from New York to Paris in 1908. But where the Thomas Flyer sold for \$3,500 and featured a 50-horsepower engine, the Model T debuted in October 1908 with less than half the horsepower at just \$850. “No car under \$2,000 offers more, and no car over \$2,000 offers more except the trimmings,” crowed a Ford advertisement with justifiable pride.⁴⁵ Spindly, even grasshopper-like in appearance, the Model T sat high above the road like a high-wheeler, had significantly more power than the best runabout, and provided the performance (if not the amenities) of Americanized touring cars. It thus became the first example of the “lightweight automobile” that *Outing* had called for in 1904—an inexpensive hybrid that combined the strengths of other motor-vehicle types while avoiding their most significant weaknesses (fig. 8).

As such, the Model T delivered the first true Mercedes-style adventure machine to the high end of the low-cost market.⁴⁶ Unlike runabouts and

and Brinkley, 99–106. See also Joseph Galamb, “Reminiscences,” in BFRF, acc. 65, box 21, folder “Oral Histories—Galamb” (draft), and C. J. Smith, *The Reminiscences of C. J. Smith*, in BFRF, acc. 65 (bound).

43. Galamb, “Reminiscences,” 18. Henry Ford and C. Harold Wills were the other influential members of the design team.

44. Ford, “Arranging to Build 20,000 Runabouts,” 119.

45. As quoted in Flink, *America Adopts the Automobile* (n. 4 above), 278.

46. Because the Model T’s initial low price has often been misunderstood and exaggerated, it is important to qualify this statement. When the Model T debuted at \$850 in 1908, its cost put it near the top of the “low cost” category, well above most high-wheelers and runabouts—including Ford’s own Model N at \$600. Not until 1 October 1910 did Ford Motor Company institute its famous policy of annual price cuts by lowering the price of the Model T touring car from \$950 to \$780. It cut the price to \$690 in 1911, and to \$600 in 1912 (Nevins, 646–47). The 1912 price marked the first time the Model T’s price dropped below the average annual wage in the United States, indicating the extent to which motor-vehicle ownership remained a privilege of the wealthy and the well-off, even in the early Model T era (Flink, *The Automobile Age* [n. 4 above], 38). In 1910, for example, there were fully 130.9 Americans aged fifteen years or older for every motor vehicle in the country—underlining the extent to which “low cost” remained a relative

JULY
2007
VOL. 48

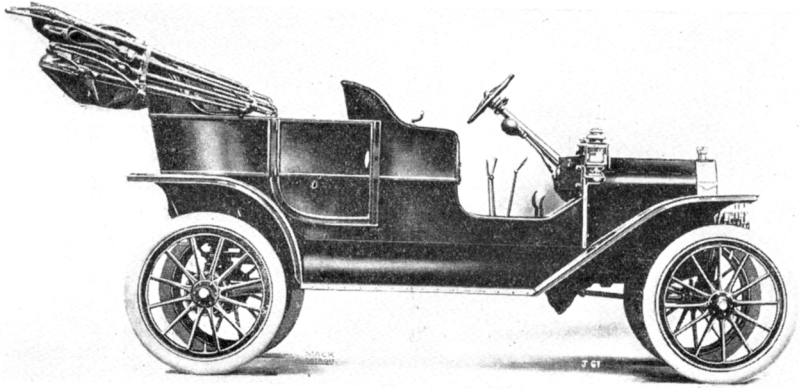


FIG. 8 The Ford Model T sat high above the road like a high-wheeler, had significantly more power than the best runabout, and provided the performance (if not the amenities) of Americanized touring cars. As the first example of the long-sought-after lightweight automobile, it combined the strengths of other motor vehicle types while avoiding their most significant weaknesses, and thus it appealed to both mobility- and horse-minded buyers. (Source: *Horseless Age*, 30 September 1908, 470.)

high-wheelers, which had small engines and poor weight-to-power ratios, the Model T proved itself under the most adventure-filled conditions. In the summer of 1909, for example, a Model T defeated a stable of heavier, pricier touring automobiles in a 4,100-mile race from New York to Seattle. From the outset, public commentary focused on the diminutive stature of the two Model Ts entered in the race, with the *New York Post-Standard* declaring that they “look like pygmies beside the other cars as they sport along through the dust.” The driver of the race’s pace car, itself a big six-cylinder Ford Model K, called the Model Ts “midgets.”⁴⁷ Twenty-two days later, however, when a Model T crossed the finish line in first place, observers were beginning to understand its size as an asset. The *New York Times* explained:

One thing—and a very important one—that was not taken into consideration by those who prophesied defeat for the Fords, was the fact that the little cars had more horse power to comparative weight than the larger and racier looking machines . . . Had it been merely

term (U.S. Department of Transportation, *Highway Statistics: Summary to 1965* [Washington, D.C., 1967], 37). Only after the introduction of assembly-line techniques in 1914 did the Model T begin to become more widely affordable.

47. “Halt Here on Run to Pacific,” *New York Post-Standard*, 3 June 1909, in BFRC, acc. 717, box 5, folder “1909 Race—General”; as quoted in Ford Motor Company, “The Story of the Race,” in BFRC, acc. 717, box 5, folder “1909 Race—General.”

a question of speed over smooth and unobstructed roads the larger cars would have triumphed.⁴⁸

Although the Model T excelled as an adventure machine, it also featured functional, utilitarian characteristics that Ford emphasized to appeal to horse-minded consumers. In celebrating the New York-to-Seattle race, for example, Ford stressed the Model T's practicality as much as the romantic adventure of cross-country racing. "The Ford won in a contest where the roads were just like those on which you want a car to run," one advertisement declared. "That's the reason winning the race means so much to the car-buying public."⁴⁹ Continuing this theme, the company cycled through a number of utility-oriented slogans in its national advertising, including "the family car at an honest price," "the farmer's car," and "the merchant's car," before finally settling on "the Universal Car."⁵⁰

To label the Model T "the Universal Car" was grandiose marketing hype and yet, as a description of the first automobile to appeal to horse- and mobility-minded consumers alike, it contained more than a little truth. American farmers—a major bastion of horse-minded sentiment—bought Model Ts in large numbers during the 1910s, a decade when they enjoyed above-average prosperity. Moreover, they displayed extraordinary ingenuity in adapting it for uses around the farm such as grinding, sawing, pumping, shelling, plowing, and even running washing machines.⁵¹ "These farmers want touring cars, not roadsters. They all have families, hence, a rational five-passenger car," explained *Motor Age* in 1915. "In general the farmer wants a tonneau type as he can carry his produce to market, [and] bring home his flour, groceries and binder twine."⁵² Yet for all its demonstrated practicality, the same Model T proved equally capable of delivering adventure to a whole generation of car owners, urban and rural alike, who took to the nation's highways and byways in impressive numbers during the 1910s

48. "Fast Time Made in Seattle Race," *New York Times*, 27 June 1909. Judges disqualified the winning Model T five months later for having used unauthorized parts for a section of the race, but Ford continued to describe its "win" in its advertisements, and fifty years later the company even staged a reenactment of the Model T's "victory" as part of a celebration of the construction of the fifty-millionth Ford automobile. See "50 Million Fords Ago . . .," in BFRF, acc. 717, box 1.

49. "The New York-Seattle Race" (advertisement), *Ford Times*, 15 July 1909.

50. F. Eugene Melder, "The 'Tin Lizzie's' Golden Anniversary," *American Quarterly* 12 (1960): 468. It should be noted that a utilitarian focus was common in automobile advertising of this period. See Pamela Walker Laird, "The Car without a Single Weakness: Early Automobile Advertising," *Technology and Culture* 37 (1996): 796–812.

51. Ronald Kline and Trevor Pinch, "Users as Agents of Technological Change: The Social Construction of the Automobile in the Rural United States," *Technology and Culture* 37 (1996): 763–95, esp. 773–77; and Kline, *Consumers in the Country* (n. 2 above), 55–86.

52. David Beecroft, "Farmers Are Converting Wheat into Motor Cars," *Motor Age*, 11 February 1915, 18–19.

and 1920s, giving birth to the wildly popular new sport of “autocamping.”⁵³ For a practical, no-frills automobile, the Model T could be a lot of fun.

Conclusion

JULY
2007
VOL. 48

The Model T’s design allowed it to bridge the technological and social chasm that divided mobility- and horse-minded motorists—a signal accomplishment. In its early years, before its price began to plummet, scores of high-wheelers and runabouts underpriced the Model T, just as scores of Americanized touring cars offered greater power and technological sophistication. Nevertheless, the Model T outperformed more inexpensive alternatives in reliability, durability, power, and speed. It also offered a practical, inexpensive alternative to heavier, pricier Americanized touring cars without sacrificing much performance. As a result, particularly as its price fell, the Model T captured an enormous percentage of the U.S. market for new passenger vehicles: 10.8 percent in 1909, 27 percent in 1911, and, following the advent of assembly-line production techniques, 45.6 percent in 1914.⁵⁴ By fusing the previously distinct mobility- and horse-minded markets into a single mass market and by successfully applying a one-size-fits-all approach to a machine that had previously been defined by its variety, the Model T accomplished something no other motor-vehicle design had hitherto managed. And it did so even before Ford introduced its revolutionary assembly-line techniques in 1914.

Because of this fusion, the distinctions between horse- and mobility-minded motorists slowly began to blur and disappear. Among the latter, the Model T extended automotive recreation to a broader class demographic

53. The best work on early autocampers remains Warren James Belasco, *Americans on the Road: From Autocamp to Motel, 1910–1945* (Cambridge, 1979). Other important works focusing on various aspects of this trend include Marguerite Shaffer, *See America First: Tourism and National Identity, 1880–1940* (Washington, D.C., 2001), esp. 130–68; Paul S. Sutter, *Driven Wild: How the Fight against Automobiles Launched the Modern Wilderness Movement* (Seattle, 2002), 19–53; Hal Rothman, *Devil’s Bargains: Tourism in the Twentieth-Century American West* (Lawrence, Kans., 1998), 143–67; and Franz (n. 2 above). The Model T’s solid credentials as an adventure machine also help explain its early success in European countries, where ownership remained relatively more elite—and more strictly adventure-focused—than in the United States. Horsepower taxes eventually undercut some of the Model T’s appeal, since European adventurers generally had better roads to explore than Americans and thus needed less horsepower to escape from the mud. It is telling, for example, that one popular, low-cost vehicle in Europe was the cyclecar, a sporty, lightweight motor vehicle that typically combined a low-horsepower engine with plywood body parts and bicycle tubing and components. Although popular in Europe, cyclecars sold significantly less well in the United States, where poor roads prevailed.

54. For the period from 1908 through 1912, the Model T accounted for 21.2 percent of total passenger-vehicle production; between 1913 and 1919, on the other hand, it aver-

even as it made the practical aspects of everyday automobile use somewhat more obvious. For the horse-minded, it added the delights of power and speed to a vehicle competent to perform most practical tasks traditionally required of horses. As the mobility-minded began to appreciate the appeal of everyday utility, and as the horse-minded began to appreciate easy mobility, the U.S. market for motor vehicles changed forever. So also did the course of automotive history.

aged 44.6 percent. Ford figures are from McCalley (n. 1 above). Total industry production figures are from *Facts and Figures of the Automobile Industry, 1928 Edition* (n. 4 above), 6.