Day 14: Powering the Dream Ch 10

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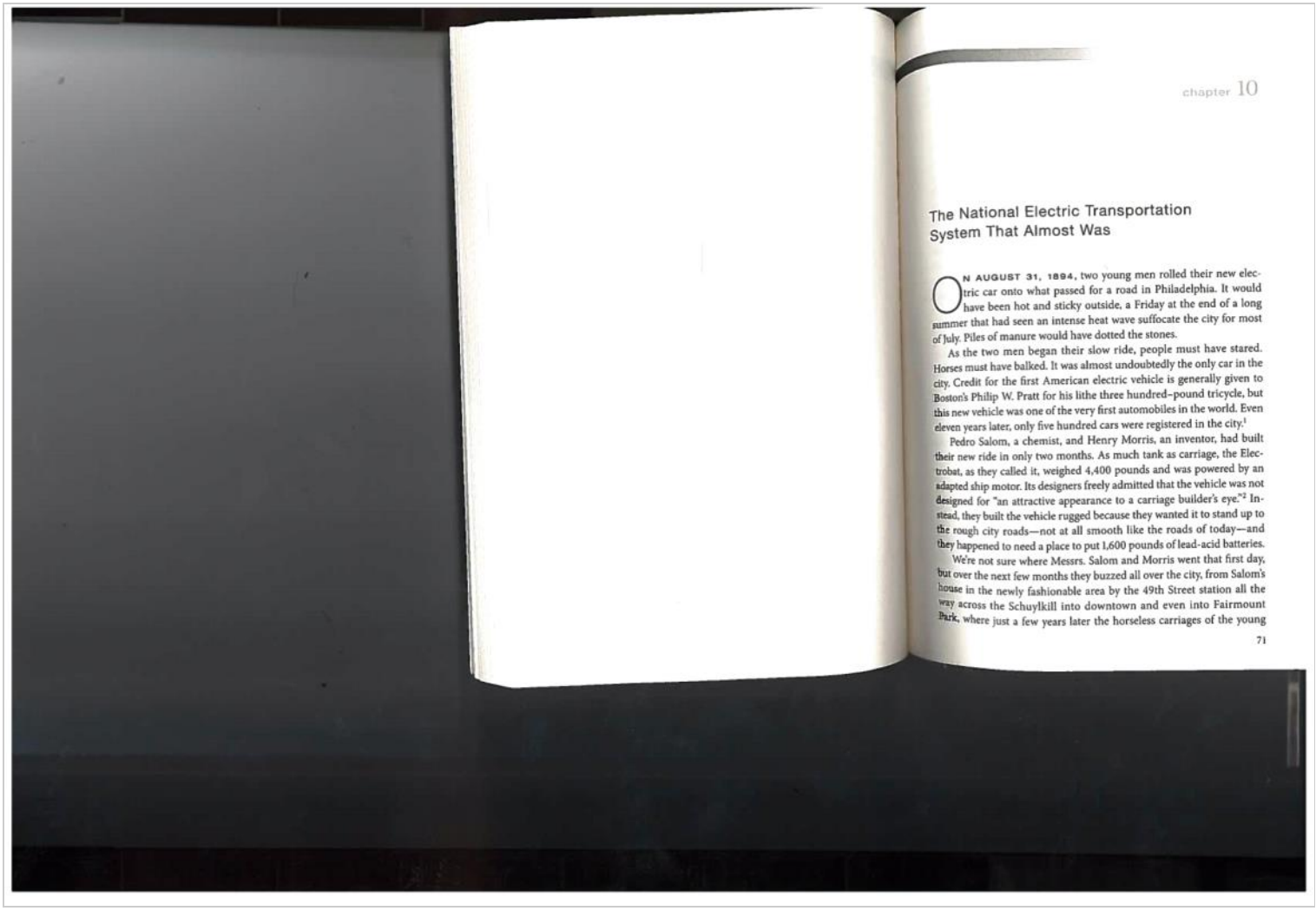
Powering the Drea...



chapter 10

The National Electric Transportation System That Almost Was

ON AUGUST 31, 1894, two young men rolled their new electric car onto what passed for a road in Philadelphia. It would have been hot and sticky outside, a Friday at the end of a long summer that had seen an intense heat wave suffocate the city for most of July. Piles of manure would have dotted the stones.

As the two men began their slow ride, people must have stared. Horses must have balked. It was almost undoubtedly the only car in the city. Credit for the first American electric vehicle is generally given to Boston's Philip W. Pratt for his lithe three hundred–pound tricycle, but this new vehicle was one of the very first automobiles in the world. Even eleven years later, only five hundred cars were registered in the city.[1]

Pedro Salom, a chemist, and Henry Morris, an inventor, had built their new ride in only two months. As much tank as carriage, the Electrobat, as they called it, weighed 4,400 pounds and was powered by an adapted ship motor. Its designers freely admitted that the vehicle was not designed for "an attractive appearance to a carriage builder's eye."[2] Instead, they built the vehicle rugged because they wanted it to stand up to the rough city roads—not at all smooth like the roads of today—and they happened to need a place to put 1,600 pounds of lead-acid batteries.

We're not sure where Messrs. Salom and Morris went that first day, but over the next few months they buzzed all over the city, from Salom's house in the newly fashionable area by the 49th Street station all the way across the Schuylkill into downtown and even into Fairmount Park, where just a few years later the horseless carriages of the young

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and restless would become common enough to require an ordinance explicitly permitting them.[3]

The first version of the Electrobat, on which they glided through the streets of Philadelphia that fall and winter, looks like an uncovered wagon, complete with the spoked wheels—big ones in back, small ones up front. Two could comfortably sit atop the battery compartment, which housed the monster lead-acid cells, but it could have carried up to a dozen people. It gives the impression of a stagecoach missing both the horses and the coach, but it got the job done. It had a maximum range of fifty to one hundred miles and traveled hundreds of miles in its few months of testing, if Salom is to be believed.[4]

Its successor, the Electrobat 2, weighed closer to 1,800 pounds and packed a couple hundred pounds of batteries. It looked like a box on wheels, and a conductor sitting in the middle of the front of the car drove it with a steering stick. This automobile was the one that would propel Morris and Salom into history.

The week before Christmas of 1895 Salom showed up at the Franklin Institute in the Electrobat 2. Sessions at the Institute were like the TED talks of their day. The most exciting science was discussed. For example, a few weeks after Salom spoke, audience members were wowed by Roentgen rays — known to you and me as X-rays — that let humans see their skeletons right through their skin. Behind the stage, a screen hung onto which lantern pictures were projected. The Institute helped define the landscape of mechanical dreams. In this august setting, Salom delivered a talk on the subject of automobiles, most specifically his own and its advantages. "The subject of automobile vehicles is almost as old as the locomotive," he began, and proceeded to show images of hallucinations of automobiles from classics of literature: Homer had dreamed of "self-moved" tripods that were "instinct with spirit," and Milton had described the Chinese, who "drive / With sails and wind their canny wagons light."[5]

Then Salom launched into his adventures with the Electrobat. The car had made a fine showing at a car race sponsored by the *Chicago Tribune* the previous month. It didn't come close to finishing the race, but it was awarded a gold medal for handling and good looks.[6] Finally, he made his plea for electric vehicles in thirteen easy points. The electric car was safe and clean; it made no noise, vibration, or heat; and it

seemed unlikely to cause environmental problems if produced en masse. In a way, Salom foresaw 1970s Los Angeles:

> All the gasoline motors we have seen belch forth from their exhaust pipe a continuous stream of partially unconsumed hydrocarbons in the form of thin smoke with a highly noxious odor. Imagine thousands of such vehicles on the streets, each offering up its column of smell as a sacrifice for having displaced the superannuated horse.

Each of his points was an attack on the gasoline-powered vehicle, which was something like a bomb on wheels. It was loud as a motorcycle at Sturgis, vibrated like a jackhammer, threw off enough heat to burn its passengers, and belched smoke. The competition between electric, gasoline, and steam-powered horseless carriages was real.

At the turn of the century each type of automobile had about a third of the market.[7] We can be sure that proponents of each method of propulsion—not to mention the "lovers of horseflesh"—had frothy-mouthed adherents who would have left nasty comments all over the Internet had such a medium existed. In 1898 one Philadelphia electric vehicle proponent explained, "The electric vehicle possesses so many advantages over those propelled by oil or gas motors that, except in special conditions, where extremely large distances have to be covered without charging facilities, there seems to be little, if any, doubt that the former type will be the one to fill the field."[8]

Many nineteenth-century heavyweights agreed, and the Philadelphia duo became a part of the most ambitious effort to create an integrated, nationwide, electric-powered transportation system that the world has ever seen. Morris and Salom's second Electrobat became the technological basis of the Electric Vehicle Company, the first corporate car concern in the world, the first cab company in New York, and, in the words of automotive historian John B. McRae, the "Monopoly that Missed."[9]

The sociotechnological battle between types of cars is one of the most intriguing technological battles in American history. From it, an entire new mobility system swept through the United States. It required new roads and ways of thinking about roads, changing land-use

patterns enabled by electrification, fortunate fossil-fuel industry dynamics, particular quasi-Victorian mores, and even the latent anger of the urban working class. The changes were radical and they snowballed throughout the twentieth century, making Americans the most car-dependent people on earth. The system is so deeply entrenched now that developing alternatives seems far-fetched.[10]

But in the waning years of the nineteenth century, it was not apparent that gasoline-powered cars would dominate. A betting man, otherwise known as an investor, might have put his money on the continuance of two long-term trends: the increasing centralization and the electrification of the nation's transportation system. Mobility would be sold as a service, he might have wagered. Why would anyone want to buy a two thousand–pound hunk of metal powered by a controlled explosion of a substance known to be as dangerous as TNT? The same Philadelphia electric vehicle fan noted, "The last few years have seen the electric motor replace horses in our street cars, and those who have followed the conception and growth of the electric vehicle prophesy the same revolution in carriages, cabs, wagons, etc, in our cities."[11]

Thus, a certain kind of wealthy investor might have seen the electric vehicle as the perfect extension of the electric rail systems that blanketed every sizeable American city.

A NEW COMBINATION

In April 1899 William C. Whitney, a New York financier, walked out of his home on 5th Avenue, bound for Hartford, with a million dollars earmarked to jump-start the creation of a nationwide electric vehicle company.

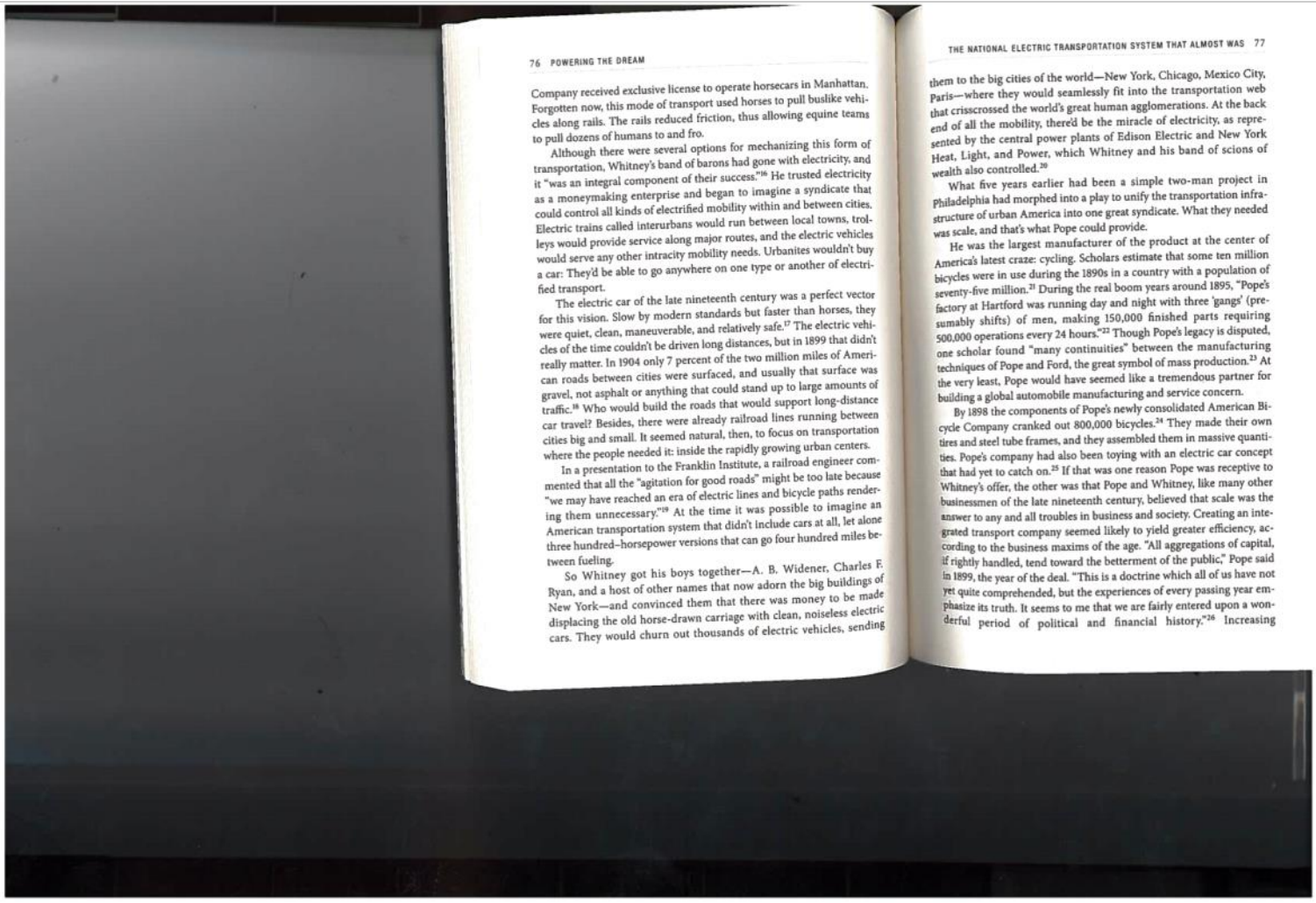
Whitney was a robber baron, playboy, lover of fine horses, former Secretary of the Navy, and syndicate builder. He married well; his mansion featured a Marie Antoinette room. Whitney's henchmen purchased ceilings, walls, and chimneys from old European manses and reassembled them in his home. It was a pastiche of the best pre-Industrial crafts remade into a modern home across the street from Central Park. The library was hung with sumptuous velvet tapestries and was paneled in dark oak. Vast expanses of Persian rugs cushioned footfalls. In the cavernous hall that led outside hung an enormous portrait by the Flemish realist Van Dyck of Charles I astride a white horse. Charles I believed in the divine right of kings and fought Parliament twice to maintain his power. The message to all visitors to the Whitney residence was clear: from God to Charles I to W. C. Whitney.[12]

The million dollars was an enticement for Colonel Albert Pope, who was the country's leading bicycle maker, to tie up with the Electric Storage Battery Company (ESB). The ESB had bought out Morris and Salom's Electric Carriage and Wagon Company, which had successfully opened up a cab service in Manhattan with thirteen modified Electrobats. During April 1897, their first month at Broadway and West 39th, Morris and Salom happily reported to the Society of Western Engineers that they had served a thousand passengers and the small fleet collectively traveled two thousand miles across the city.[13] There was just one problem with the vehicles: They did not have the range of their gasoline competitors. Batteries, even our modern lithium ion ones, do not pack as much energy per pound or cubic volume as gasoline does.

That disadvantage could be mitigated with an efficient central station that would allow for fast battery swapping. During that year Isaac Rice and the ESB took over more active management of the enterprise. In particular, they asked George Herbert Condict to design a new way to swap batteries in and out of cabs quickly. Condict responded with an ingenious system that drew on his experience supervising a Manhattan streetcar line that used swappable batteries for power. The ESB constructed it in a converted skating rink at 1684 Broadway to service the rapidly growing fleet.[14]

When a cab drove into the station, technicians secured and centered it with hydraulic shoes. They then hitched the 1,300-pound battery tray, which ran underneath the cab, to a hydraulic piston that pulled out the whole thing and sat it on a table, where "an overhead crane plucked it from the table and deposited it in the charging room." They slotted in a new battery and off the cab went again into the wild Manhattan streets. Transportation historian David Kirsch, the most sensitive of contemporary historians of the company, called it "a marvel of modern mechanical engineering. For the first time, industrial practice was brought to bear on the age-old problem of transportation over city streets."[15]

The business caught Whitney's eye. In the early 1890s, while working Whitney's political connections, the Metropolitan Street Railway



Company received exclusive license to operate horsecars in Manhattan. Forgotten now, this mode of transport used horses to pull buslike vehicles along rails. The rails reduced friction, thus allowing equine teams to pull dozens of humans to and fro.

Although there were several options for mechanizing this form of transportation, Whitney's band of barons had gone with electricity, and it "was an integral component of their success."[16] He trusted electricity as a moneymaking enterprise and began to imagine a syndicate that could control all kinds of electrified mobility within and between cities. Electric trains called interurbans would run between local towns, trolleys would provide service along major routes, and the electric vehicles would serve any other intracity mobility needs. Urbanites wouldn't buy a car: They'd be able to go anywhere on one type or another of electrified transport.

The electric car of the late nineteenth century was a perfect vector for this vision. Slow by modern standards but faster than horses, they were quiet, clean, maneuverable, and relatively safe.[17] The electric vehicles of the time couldn't be driven long distances, but in 1899 that didn't really matter. In 1904 only 7 percent of the two million miles of American roads between cities were surfaced, and usually that surface was gravel, not asphalt or anything that could stand up to large amounts of traffic.[18] Who would build the roads that would support long-distance car travel? Besides, there were already railroad lines running between cities big and small. It seemed natural, then, to focus on transportation where the people needed it: inside the rapidly growing urban centers.

In a presentation to the Franklin Institute, a railroad engineer commented that all the "agitation for good roads" might be too late because "we may have reached an era of electric lines and bicycle paths rendering them unnecessary."[19] At the time it was possible to imagine an American transportation system that didn't include cars at all, let alone three hundred–horsepower versions that can go four hundred miles between fueling.

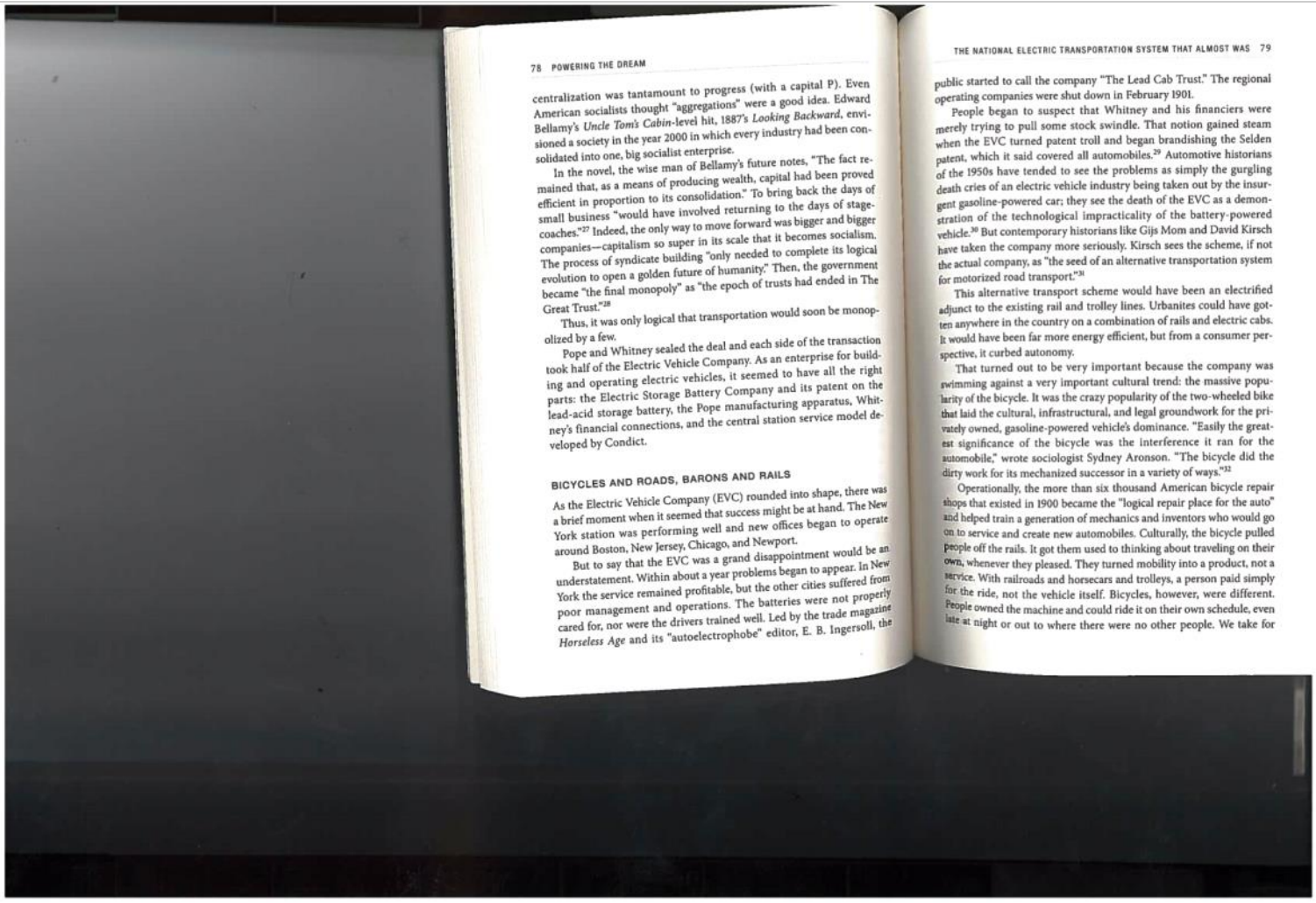
So Whitney got his boys together—A. B. Widener, Charles F. Ryan, and a host of other names that now adorn the big buildings of New York—and convinced them that there was money to be made displacing the old horse-drawn carriage with clean, noiseless electric cars. They would churn out thousands of electric vehicles, sending

them to the big cities of the world—New York, Chicago, Mexico City, Paris—where they would seamlessly fit into the transportation web that crisscrossed the world's great human agglomerations. At the back end of all the mobility, there'd be the miracle of electricity, as represented by the central power plants of Edison Electric and New York Heat, Light, and Power, which Whitney and his band of scions of wealth also controlled.[20]

What five years earlier had been a simple two-man project in Philadelphia had morphed into a play to unify the transportation infrastructure of urban America into one great syndicate. What they needed was scale, and that's what Pope could provide.

He was the largest manufacturer of the product at the center of America's latest craze: cycling. Scholars estimate that some ten million bicycles were in use during the 1890s in a country with a population of seventy-five million.[21] During the real boom years around 1895, "Pope's factory at Hartford was running day and night with three 'gangs' (presumably shifts) of men, making 150,000 finished parts requiring 500,000 operations every 24 hours."[22] Though Pope's legacy is disputed, one scholar found "many continuities" between the manufacturing techniques of Pope and Ford, the great symbol of mass production.[23] At the very least, Pope would have seemed like a tremendous partner for building a global automobile manufacturing and service concern.

By 1898 the components of Pope's newly consolidated American Bicycle Company cranked out 800,000 bicycles.[24] They made their own tires and steel tube frames, and they assembled them in massive quantities. Pope's company had also been toying with an electric car concept that had yet to catch on.[25] If that was one reason Pope was receptive to Whitney's offer, the other was that Pope and Whitney, like many other businessmen of the late nineteenth century, believed that scale was the answer to any and all troubles in business and society. Creating an integrated transport company seemed likely to yield greater efficiency, according to the business maxims of the age. "All aggregations of capital, if rightly handled, tend toward the betterment of the public," Pope said in 1899, the year of the deal. "This is a doctrine which all of us have not yet quite comprehended, but the experiences of every passing year emphasize its truth. It seems to me that we are fairly entered upon a wonderful period of political and financial history."[26] Increasing



centralization was tantamount to progress (with a capital P). Even American socialists thought "aggregations" were a good idea. Edward Bellamy's *Uncle Tom's Cabin*-level hit, 1887's *Looking Backward*, envisioned a society in the year 2000 in which every industry had been consolidated into one, big socialist enterprise.

In the novel, the wise man of Bellamy's future notes, "The fact remained that, as a means of producing wealth, capital had been proved efficient in proportion to its consolidation." To bring back the days of small business "would have involved returning to the days of stage-coaches."[27] Indeed, the only way to move forward was bigger and bigger companies—capitalism so super in its scale that it becomes socialism. The process of syndicate building "only needed to complete its logical evolution to open a golden future of humanity." Then, the government became "the final monopoly" as "the epoch of trusts had ended in The Great Trust."[28]

Thus, it was only logical that transportation would soon be monopolized by a few.

Pope and Whitney sealed the deal and each side of the transaction took half of the Electric Vehicle Company. As an enterprise for building and operating electric vehicles, it seemed to have all the right parts: the Electric Storage Battery Company and its patent on the lead-acid storage battery, the Pope manufacturing apparatus, Whitney's financial connections, and the central station service model developed by Condict.

BICYCLES AND ROADS, BARONS AND RAILS

As the Electric Vehicle Company (EVC) rounded into shape, there was a brief moment when it seemed that success might be at hand. The New York station was performing well and new offices began to operate around Boston, New Jersey, Chicago, and Newport.

But to say that the EVC was a grand disappointment would be an understatement. Within about a year problems began to appear. In New York the service remained profitable, but the other cities suffered from poor management and operations. The batteries were not properly cared for, nor were the drivers trained well. Led by the trade magazine *Horseless Age* and its "autoelectrophobe" editor, E. B. Ingersoll, the

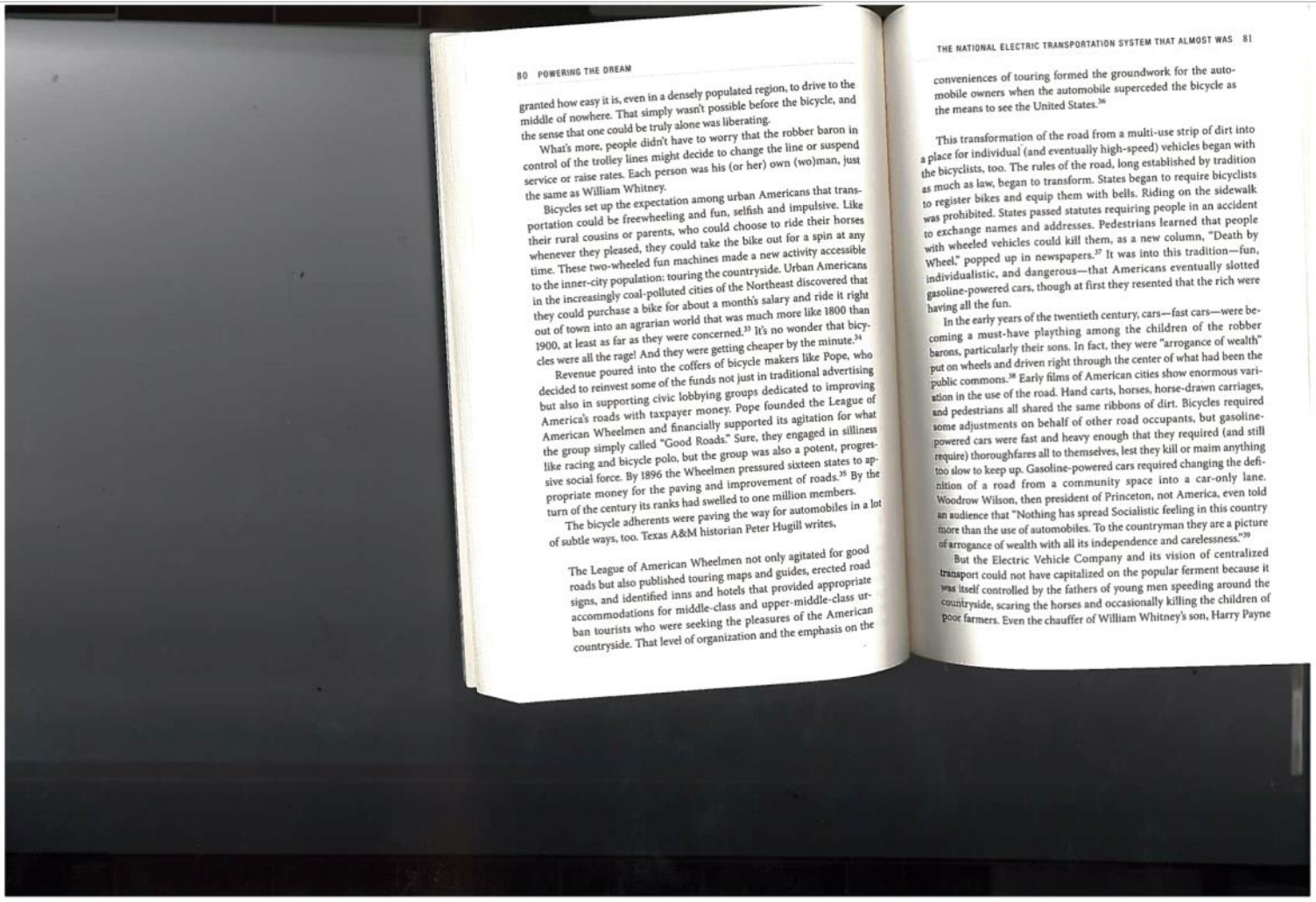
public started to call the company "The Lead Cab Trust." The regional operating companies were shut down in February 1901.

People began to suspect that Whitney and his financiers were merely trying to pull some stock swindle. That notion gained steam when the EVC turned patent troll and began brandishing the Selden patent, which it said covered all automobiles.[29] Automotive historians of the 1950s have tended to see the problems as simply the gurgling death cries of an electric vehicle industry being taken out by the insurgent gasoline-powered car; they see the death of the EVC as a demonstration of the technological impracticality of the battery-powered vehicle.[30] But contemporary historians like Gijs Mom and David Kirsch have taken the company more seriously. Kirsch sees the scheme, if not the actual company, as "the seed of an alternative transportation system for motorized road transport."[31]

This alternative transport scheme would have been an electrified adjunct to the existing rail and trolley lines. Urbanites could have gotten anywhere in the country on a combination of rails and electric cabs. It would have been far more energy efficient, but from a consumer perspective, it curbed autonomy.

That turned out to be very important because the company was swimming against a very important cultural trend: the massive popularity of the bicycle. It was the crazy popularity of the two-wheeled bike that laid the cultural, infrastructural, and legal groundwork for the privately owned, gasoline-powered vehicle's dominance. "Easily the greatest significance of the bicycle was the interference it ran for the automobile," wrote sociologist Sydney Aronson. "The bicycle did the dirty work for its mechanized successor in a variety of ways."[32]

Operationally, the more than six thousand American bicycle repair shops that existed in 1900 became the "logical repair place for the auto" and helped train a generation of mechanics and inventors who would go on to service and create new automobiles. Culturally, the bicycle pulled people off the rails. It got them used to thinking about traveling on their own, whenever they pleased. They turned mobility into a product, not a service. With railroads and horsecars and trolleys, a person paid simply for the ride, not the vehicle itself. Bicycles, however, were different. People owned the machine and could ride it on their own schedule, even late at night or out to where there were no other people. We take for



granted how easy it is, even in a densely populated region, to drive to the middle of nowhere. That simply wasn't possible before the bicycle, and the sense that one could be truly alone was liberating.

What's more, people didn't have to worry that the robber baron in control of the trolley lines might decide to change the line or suspend service or raise rates. Each person was his (or her) own (wo)man, just the same as William Whitney.

Bicycles set up the expectation among urban Americans that transportation could be freewheeling and fun, selfish and impulsive. Like their rural cousins or parents, who could choose to ride their horses whenever they pleased, they could take the bike out for a spin at any time. These two-wheeled fun machines made a new activity accessible to the inner-city population: touring the countryside. Urban Americans in the increasingly coal-polluted cities of the Northeast discovered that they could purchase a bike for about a month's salary and ride it right out of town into an agrarian world that was much more like 1800 than 1900, at least as far as they were concerned.[33] It's no wonder that bicycles were all the rage! And they were getting cheaper by the minute.[34]

Revenue poured into the coffers of bicycle makers like Pope, who decided to reinvest some of the funds not just in traditional advertising but also in supporting civic lobbying groups dedicated to improving America's roads with taxpayer money. Pope founded the League of American Wheelmen and financially supported its agitation for what the group simply called "Good Roads." Sure, they engaged in silliness like racing and bicycle polo, but the group was also a potent, progressive social force. By 1896 the Wheelmen pressured sixteen states to appropriate money for the paving and improvement of roads.[35] By the turn of the century its ranks had swelled to one million members.

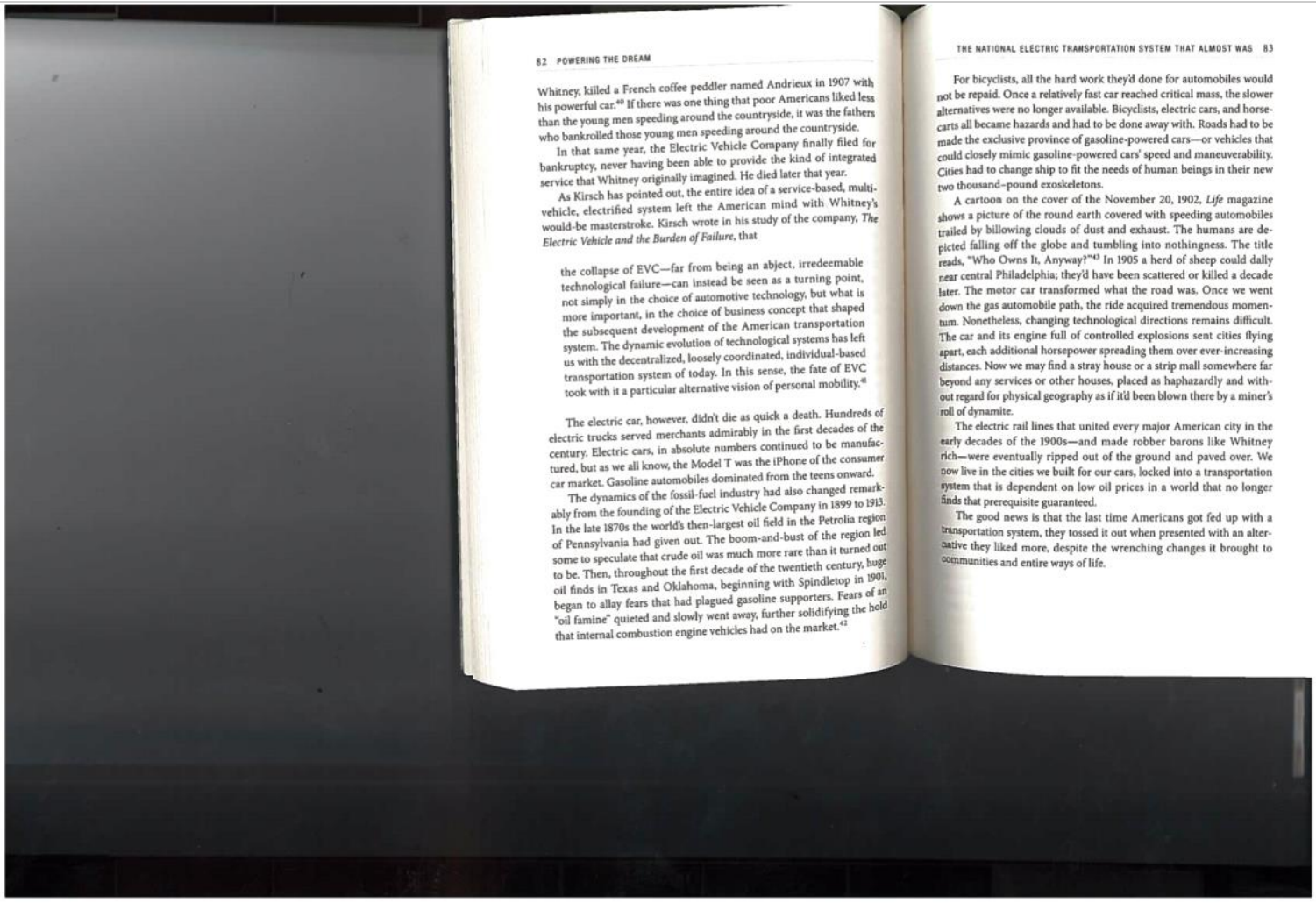
The bicycle adherents were paving the way for automobiles in a lot of subtle ways, too. Texas A&M historian Peter Hugill writes,

> The League of American Wheelmen not only agitated for good roads but also published touring maps and guides, erected road signs, and identified inns and hotels that provided appropriate accommodations for middle-class and upper-middle-class urban tourists who were seeking the pleasures of the American countryside. That level of organization and the emphasis on the conveniences of touring formed the groundwork for the automobile owners when the automobile superceded the bicycle as the means to see the United States.[36]

This transformation of the road from a multi-use strip of dirt into a place for individual (and eventually high-speed) vehicles began with the bicyclists, too. The rules of the road, long established by tradition as much as law, began to transform. States began to require bicyclists to register bikes and equip them with bells. Riding on the sidewalk was prohibited. States passed statutes requiring people in an accident to exchange names and addresses. Pedestrians learned that people with wheeled vehicles could kill them, as a new column, "Death by Wheel," popped up in newspapers.[37] It was into this tradition—fun, individualistic, and dangerous—that Americans eventually slotted gasoline-powered cars, though at first they resented that the rich were having all the fun.

In the early years of the twentieth century, cars—fast cars—were becoming a must-have plaything among the children of the robber barons, particularly their sons. In fact, they were "arrogance of wealth" put on wheels and driven right through the center of what had been the public commons.[38] Early films of American cities show enormous variation in the use of the road. Hand carts, horses, horse-drawn carriages, and pedestrians all shared the same ribbons of dirt. Bicycles required some adjustments on behalf of other road occupants, but gasoline-powered cars were fast and heavy enough that they required (and still require) thoroughfares all to themselves, lest they kill or maim anything too slow to keep up. Gasoline-powered cars required changing the definition of a road from a community space into a car-only lane. Woodrow Wilson, then president of Princeton, not America, even told an audience that "Nothing has spread Socialistic feeling in this country more than the use of automobiles. To the countryman they are a picture of arrogance of wealth with all its independence and carelessness."[39]

But the Electric Vehicle Company and its vision of centralized transport could not have capitalized on the popular ferment because it was itself controlled by the fathers of young men speeding around the countryside, scaring the horses and occasionally killing the children of poor farmers. Even the chauffer of William Whitney's son, Harry Payne



Whitney, killed a French coffee peddler named Andrieux in 1907 with his powerful car.[40] If there was one thing that poor Americans liked less than the young men speeding around the countryside, it was the fathers who bankrolled those young men speeding around the countryside.

In that same year, the Electric Vehicle Company finally filed for bankruptcy, never having been able to provide the kind of integrated service that Whitney originally imagined. He died later that year.

As Kirsch has pointed out, the entire idea of a service-based, multi-vehicle, electrified system left the American mind with Whitney's would-be masterstroke. Kirsch wrote in his study of the company, *The Electric Vehicle and the Burden of Failure*, that

> the collapse of EVC—far from being an abject, irredeemable technological failure—can instead be seen as a turning point, not simply in the choice of automotive technology, but what is more important, in the choice of business concept that shaped the subsequent development of the American transportation system. The dynamic evolution of technological systems has left us with the decentralized, loosely coordinated, individual-based transportation system of today. In this sense, the fate of EVC took with it a particular alternative vision of personal mobility.[41]

The electric car, however, didn't die as quick a death. Hundreds of electric trucks served merchants admirably in the first decades of the century. Electric cars, in absolute numbers continued to be manufactured, but as we all know, the Model T was the iPhone of the consumer car market. Gasoline automobiles dominated from the teens onward.

The dynamics of the fossil-fuel industry had also changed remarkably from the founding of the Electric Vehicle Company in 1899 to 1913. In the late 1870s the world's then-largest oil field in the Petrolia region of Pennsylvania had given out. The boom-and-bust of the region led some to speculate that crude oil was much more rare than it turned out to be. Then, throughout the first decade of the twentieth century, huge oil finds in Texas and Oklahoma, beginning with Spindletop in 1901, began to allay fears that had plagued gasoline supporters. Fears of an "oil famine" quieted and slowly went away, further solidifying the hold that internal combustion engine vehicles had on the market.[42]

For bicyclists, all the hard work they'd done for automobiles would not be repaid. Once a relatively fast car reached critical mass, the slower alternatives were no longer available. Bicyclists, electric cars, and horse-carts all became hazards and had to be done away with. Roads had to be made the exclusive province of gasoline-powered cars—or vehicles that could closely mimic gasoline-powered cars' speed and maneuverability. Cities had to change ship to fit the needs of human beings in their new two thousand–pound exoskeletons.

A cartoon on the cover of the November 20, 1902, *Life* magazine shows a picture of the round earth covered with speeding automobiles trailed by billowing clouds of dust and exhaust. The humans are depicted falling off the globe and tumbling into nothingness. The title reads, "Who Owns It, Anyway?"[43] In 1905 a herd of sheep could dally near central Philadelphia; they'd have been scattered or killed a decade later. The motor car transformed what the road was. Once we went down the gas automobile path, the ride acquired tremendous momentum. Nonetheless, changing technological directions remains difficult. The car and its engine full of controlled explosions sent cities flying apart, each additional horsepower spreading them over ever-increasing distances. Now we may find a stray house or a strip mall somewhere far beyond any services or other houses, placed as haphazardly and without regard for physical geography as if it'd been blown there by a miner's roll of dynamite.

The electric rail lines that united every major American city in the early decades of the 1900s—and made robber barons like Whitney rich—were eventually ripped out of the ground and paved over. We now live in the cities we built for our cars, locked into a transportation system that is dependent on low oil prices in a world that no longer finds that prerequisite guaranteed.

The good news is that the last time Americans got fed up with a transportation system, they tossed it out when presented with an alternative they liked more, despite the wrenching changes it brought to communities and entire ways of life.