



SLOW CYCLING



➔ **SOME TECHNICAL ADVANCES** are delayed by either a failure of imagination or a concatenation of obstructive circumstances. I can think of no better example of both of these than the bicycle. • Two centuries ago, on 12 June 1817 in Mannheim, Karl Drais, a forester in Germany's grand duchy of Baden, demonstrated for the first time his *Laufmaschine* ("running machine"), later also known as a draisine or hobby-horse. With the seat in the middle, front-wheel steering, and wheels of the same diameter, it was the archetype of all later vehicles that required constant balancing. However, it was propelled not by pedaling but by pushing one's feet against the ground, Fred Flintstone fashion. • Drais covered nearly 16 kilometers (10 miles) in little more than an hour on his heavy wooden bicycle, faster than the typical horse-drawn carriage. But it's obvious, today at least, that the design was too heavy and clumsy and that there weren't yet enough suitable hard-top roads. But why, in the decades after 1820 that abounded with such inventions as locomotives, steamships, and manufacturing techniques, did it take so long to come up with a means of propulsion that could make the bicycle a practical machine, able to be ridden by anybody but infants? • Only in 1866 did Pierre Lallemand get his U.S. patent for a bicycle propelled by pedals attached to a slightly larger front wheel. Starting in 1868, Pierre Michaux made this *vélocipède* design popular in France. But the Michaudine did not become the precursor of modern bicycles; it was just an ephemeral novelty. The entire 1870s and the early 1880s were dominated by high-wheelers (also known as "ordinary" or penny-farthing bicycles) with pedals attached directly to the axles of front wheels with diameters of up to 1.5 meters (5 feet), to provide a longer distance per pedal revolution. These clumsy machines could be fast, but they were also difficult to mount and tricky to steer; their use called for dexterity, stamina, and a tolerance for dangerous falls.

Only in 1885 did two British inventors, John Kemp Starley and William Sutton, begin to offer their Rover safety bicycles with equally sized wheels, direct steering, a chain-and-sprocket drive, and a tubular-steel frame. Although it was not quite yet in the classic diamond shape, it was a truly modern bicycle design, ready for mass adoption. The trend accelerated in 1888, with the introduction of John Dunlop's pneumatic tires.

So a simple balancing machine consisting of two equally sized wheels, a minimal metal frame, and a short drive chain emerged more than a century *after* Watt's improved steam engines (1765), more than half a century *after* the introduction of mechanically far more complex locomotives (1829), years *after* the first commercial generation of electricity (1882)—but *concurrently* with the first designs of automobiles. The first light internal combustion engines were mounted in 1886 on three- or four-wheel carriages by Karl Benz, Gottlieb Daimler, and Wilhelm Maybach.

And although cars changed enormously between 1886 and 1976, bicycle design remained remarkably conservative. The first purpose-built mountain bikes came only in 1977. More widespread adoption of such novelties as expensive alloys, composite materials, strange-looking frames, solid wheels, and upturned handlebars began only during the 1980s.

Some inventions are tardy; others are precocious. One of my favorite examples of the latter is John Barber's 1791 British patent for "Obtaining and Applying Motive Power, & c. A Method of Raising Inflammable Air for the Purposes of Procuring Motion, and Facilitating Metallurgical Operations," which correctly outlined the operation of gas turbines. But in those days there were neither suitable steels for such a machine nor ways to generate the requisite power and pressure. The first working gas turbines came only in the late 1930s. ■

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