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in 1850, after several years in Cuba. Through a sequence of implausible accidents that started with his attempts to treat headaches using electricity, he developed from scratch a true and complete telephone system between 1849 and 1870. He made the first complete prototype in 1856 and used it to communicate with his disabled wife: His laboratory was in the basement and she was in seclusion on the upper floor. His invention, which he called a “telettrofono,” led to the fabrication and operation of a small functioning but short-lived telephone network in his village of Clifton in Staten Island, New York. In the 1850s he also developed a working microphone and a process to produce adequate electrical copper wires.

In the following years, Meucci relentlessly sought investors to commercially develop his invention; to that end he delivered a complete set of blueprints and prototypes to American District Telegraph, with which Bell was connected. Later, when Meucci requested the return of the papers, ADT officials claimed they had gone missing.

Meucci established a company that in December 1871 filed for a caveat—a one-year provisional patent—because he did not have enough money for a full patent application. In July 1871 he had been severely injured during the fire on the *Westfield* ferry in New York Harbor and was hospitalized for several months. His impoverished wife had to sell off even the prototype telephone samples for the sum of \$6. Bell filed his patent application in 1876 and had it granted. Meucci fought Bell’s patent in the courts for many years, but he lacked the financial resources to confront the powerful Bell Telephone Co. He was defeated in what many consider an unjust and corrupt trial. The case was “discontinued as moot,” and the matter legally unresolved, because of his death and the expiration of Bell’s patent.

The history outlined here is amply documented at, for example, the Garibaldi-Meucci Museum—Meucci’s former home in Staten Island. In Italy, Meucci is acknowledged as the inventor of the telephone, regardless of who the patentee may have been. In 2002 the US Congress recognized his role with House Resolution 269 (<http://www.gpo.gov/fdsys/pkg/BILLS-107hres269ih/pdf/BILLS-107hres269ih.pdf>).

The Meucci versus Bell versus Gray affair clearly demonstrates how, for centuries, the patent legal system in the US and elsewhere, far from protecting the rights of individual inventors and promoting innovation, has served the interests of well-organized, capital-

backed corporations. The new direction for the patent system—“first to file” rather than “first to invent”—can only exacerbate the wrong.

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■ **Boucher replies:** Roberto Molteni’s interesting discussion highlights weaknesses in the patent system that few fail to acknowledge. But the full history surrounding the various claims—set forth in some 600 legal cases—over who invented the telephone distorts a fuller objective evaluation of the merits of patent systems. That history is unusually rife with allegations of fraud—including against Antonio Meucci, who was accused of backdating his own records in an attempt to predate Alexander Graham Bell—and of conflicts of interest and intellectual theft.

Meucci’s caveat highlights pitfalls that still exist for inventors, particularly those who rely on provisional applications with incomplete descriptions. Critics have pointed to relevant omissions—notably the lack of any meaningful disclosure of converting sound to variable electrical conduction or vice versa—that continue to drive the debate over who invented the telephone. Even House Resolution 269, while attempting to bring a measure of appropriate recognition to Meucci’s role, avoids an unambiguous assertion that he invented the telephone. Rather, it states that “if Meucci had been able to pay the \$10 fee to maintain [his] caveat after 1874, no patent could have been issued to Bell.” That statement pertains most precisely to the caveat’s potential impact as prior art to Bell’s specific patent claims.

Molteni’s criticisms have merit, even if I do not fully agree that the patent system fails to protect the rights of individual inventors. The US decision to transition to a first-inventor-to-file system reflects a political judgment that favors greater certainty and increased harmonization with the world’s other patent systems. But like all political judgments, it is not without its flaws.

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Questioning mantle plumes

Upon reading “Looking for mantle plumes” by Eugene Humphreys and Brandon Schmandt (PHYSICS TODAY, August 2011, page 34), I had a