

Henry Maudslay and the Pioneers of the Machine Age. *Edited by John Cantrell and Gillian Cookson.* Stroud, U.K.: Tempus, 2002. 192 pp. Index, notes, bibliography, illustrations. Paper, \$26.99. ISBN 0-752-42766-0.

Reviewed by Christine MacLeod

For an industry of its size and strategic importance, mechanical engineering has attracted surprisingly little attention from economic and business historians. Moreover, the recent tendency to prioritize consumption over production (and, often, luxury items over mass-produced goods) threatens the engineering industries with further neglect. One cannot but welcome, therefore, this well-produced volume of essays that explores the network of machine-tool manufacturers, engineers, and machine-makers that sprang from the London workshop of Henry Maudslay (1771–1831) in the early decades of the nineteenth century.

The names of these “pioneers of the machine age” and their links to Maudslay are relatively well known, but this collection of authoritative, up-to-date biographical articles provides a valuable compendium. John Cantrell’s chapter on Maudslay and A. P. Woolrich’s on the contemporary London engineering industry together illuminate the roles played by the Woolwich Arsenal as the conduit of machine-tool technology to London’s machine-making workshops (under Maudslay’s leadership), and by the geographic mobility of ambitious and talented young men who were drawn to the capital, mainly from Scotland and the north of England, to learn the new skills, then to develop and diffuse them—by setting up in business, often in Manchester, at the heart of the burgeoning cotton industry.

As Gillian Cookson emphasizes, in her introductory chapter, historians in this field face the dual challenge of a paucity of archival resources and the “long shadow” of Samuel Smiles, who inflated a few reputations at the expense of many others. The contributors have ingeniously supplemented scarce personal and business records with “obituaries, patent records, newspapers, directories, technical journals, census enumerators’ lists, parliamentary papers and a variety of other biographical sources”—including, it is admitted, Smiles’s “invaluable” researches (pp. 12–13). They have also

enlivened it with profuse and pertinent illustrations of the men, their machines, and their workplaces; most engaging is a drawing by James Nasmyth of Maudslay, the thick-set engineer dressed in working clothes, seated in his very elegant study.

To a considerable degree, one can ascribe the shortcomings of the volume to the limited amount of information that, despite their exertions, was available to the contributors. While they largely succeed in shifting the focus of study from the details of technological change to a biographical perspective on this network of innovative and highly skilled men, most lacked the archival resources necessary to penetrate beneath the surface of patent specifications, trade and exhibition catalogues, and deeds of partnership. They chart the structure and locations of these engineers' businesses, the nature of their inventions and their products (occasionally even their sexual transgressions), but have little to say about sources of capital, labor relations, turnover and profitability, marketing, or the management of intellectual property. Instead, too much effort is expended on apportioning the credit for technical achievements and on establishing hierarchies of merit. Some of the best chapters escape the claustrophobia of this workbench to situate their subjects in a broader economic and social context. Angus Buchanan, for instance, connects Joseph Whitworth's campaign for universal standards of precision with his philanthropic concern for engineering education, and recognizes in both the mounting anxiety in mid-nineteenth-century Britain over manufacturing's international competitiveness. Richard Hills's chapter on Richard Roberts identifies some of the economic pressures and opportunities that directed Roberts's inventive activity, while Tim Procter provides an unusual insight into the stimulus given to "temperance technology" (and to relatively enlightened employment practices) by William Muir's Presbyterian religious beliefs.

The volume would have benefited from a longer introductory chapter that would have allowed the editors to synthesize and debate more fully some of the themes that run through these biographical pieces. The most obvious one to emerge (out of the concern for precision and standardization evinced by all these early machine-tool manufacturers) is the British alternative to the "American System of Manufactures." Originating in Maudslay's construction of forty-five machines (to Marc Isambard Brunel's design) for the mass production of ships' blocks at the Portsmouth Royal Dockyard, it resurfaces

here in Roberts's manufacture of standard parts for his textile machines and locomotives, in Charles Babbage's frustrations with Joseph Clement's production of his Difference engine, in Nasmyth's stock of "ready made" items, and in Whitworth's and Muir's rifles, built with identical, interchangeable parts; it culminates in Whitworth's advocacy of universal standards of measurement. Another common, but unacknowledged, thread is the relation between the military state and the private sector: from the innovatory role of the Woolwich Arsenal and the naval dockyards, to the diversification of Whitworth, Muir, and David Napier into arms manufacturing—and the casuistry of reconciling it with pacifistic consciences.

Cookson's introduction focuses on the nature of Maudslay's "nursery"—the heterogeneity of his prodigies' origins, training, and previous experience; the attraction for them of London in general and his workshop in particular; the degree of reciprocity in his professional relationship with these talented trainees, and their subsequent careers. "Perhaps the greatest contrast between these men," she comments, "is manifested in their business aptitude and commercial fortunes" (p. 15). In the absence of closer comparative scrutiny, however, it is premature to ascribe the variance in their fortunes to the extent of their inventive activities, and to conclude that "constant innovation was evidently a mistake in business terms" (p. 16). While the wealthiest of them, James Nasmyth, largely ceased experimentation once his steam hammer was in production, it may be more significant, as Cantrell shows, that he had unusually good access to capital, or that he was able to enjoy monopoly profits on a highly distinctive and invaluable piece of equipment (which he patented ruthlessly and marketed energetically). And, if Nasmyth had been concerned that the firm should survive his (early) retirement, it seems unlikely that such a conservative policy would have been equally efficacious. Richard Roberts's impecunious old age, by contrast, may have owed less to the fertility of his inventive brain per se than to the vulnerability of his position as an independent inventor and consulting engineer, once the successful engineering firm of Sharp, Roberts had been dissolved. Patenting was a greater drain on his "retirement" income than were Nasmyth's astronomical pursuits on his!

*Christine MacLeod is senior lecturer in economic and social history at the University of Bristol. She is the author of *Inventing the Industrial Revolution: The English Patent System, 1660–1800* (1988, 2002), and of numerous articles on inventors, patents, and the management of intellectual property. She is presently completing a monograph entitled “*Heroes of Invention: Celebrating the Industrial Culture of Nineteenth-Century Britain.*”*