sources is mind-boggling. How is a person to choose?

Anne Woodsworth and Theresa M. Maylone do a good job of pulling together some of these diverse, contradictory elements in their foreword and afterword. But the collection remains no more than the sum of its parts. It never really fulfills the promise of its subtitle, "The Diffusion of Internet Expertise in the Academic Library." I doubt that the fault lies with the authors, or even the editors. It may be that the topic itself is too amorphous or would be better addressed in a monograph. Despite some disappointments, this book is well worth adding to library collections for the practical ideas and tools that it makes available on a topic of importance to all librarians.—*Jean M. Alexander, Carnegie Mellon University.*

Rhodes, Barbara, and William Wells Streeter. *Before Photocopying: The Art & History of Mechanical Copying, 1780–1938.* New Castle, Del.: Oak Knoll Pr., 1999. 494p. $95 (ISBN 1-884718-61-2). LC 98-8045.

The ubiquity and speed of modern communication—computers, photocopiers, e-mail, cellular phones, and scanners—tend to obscure the technological achievements of the preelectronic age when, for the effective conduct of business and government, it also was necessary to make rapid copies of letters, contracts, inventories, shipping manifests, invoices, receipts—the entire galaxy of documents upon which contemporary, transaction-oriented civilization rests. Today's scholars and students take for granted the ready, cheap availability of copies. But how did their predecessors, long before electric power and photography became practical realities, make record copies of data except by laboriously, and sometimes inaccurately, hand-copying everything? How did they efficiently copy their letters and papers?

The surprising answer lies in a forgotten mechanical copying device that originated more than two centuries ago: the copying press, an apparatus that enabled almost anyone in the Western world to make, with considerable dispatch, identical multiple copies of vital documents. In fact, Washington, Franklin, Jefferson, and Madison all used the copying press to generate file copies of their correspondence. The copying press encouraged the rapid growth of scientific communication and publishing, accelerated the expansion of industry, and, ultimately, led to the early establishment of institutions such as the United States National Archives. It was not the Xerox process or the laser printer that first threatened to drown us in a sea of paper. Rather, it was the copying press, invented in 1780 by James Watt, the Scottish-born engineer who perfected the steam engine. Why Watt? Watt was a businessman as well as an inventor. In the course of England's rapid industrialization, he traveled widely to promote his engines and needed to have with him copies of designs and specifications, contracts, and correspondence. Thus, he was powerfully motivated to develop a copying apparatus.

Watt's device, which was to have many imitators, relied on the simple principle of offset, the same principle that led Alois Senefelder in 1796 to invent offset lithography, the printing method that produces virtually all modern newspapers, books, and other mass ink-printed publications. But each exploited offset in a quite different way. Senefelder's use of offset relied on the natural repulsion of water and oil-based inks. But Watt's process relied on inks capable of producing several additional copies onto special paper from an original, handwritten document. In the Watt process, a recently written ink original is squeezed against a fresh piece of unsized paper in a press whose force transfers some of the ink from the original to the carefully dampened copy paper.

After the Watt process was perfected, it spread with incredible speed. "Inventors" brazenly infringed his patents; chemists formulated new inks; manufacturers improved the device and developed mechanical variations; and salespeople flooded the market. The copying press

quickly became the hallmark of every progressive nineteenth-century business office, and portable models quickly emerged for traveling sales personnel. Despite the rapid emergence of the typewriter as the supreme early twentieth-century office instrument and the development of allied nonphotographic copying processes, especially carbon paper, the copying press continued to be used even past the middle of the twentieth century. Rhodes and Streeter report that Calvin Coolidge, as president from 1923 to 1929, used a copying press; and in industry, it was employed as late as the 1960s at the Smith & Wesson Company to copy export invoices. But unable to compete with the typewriter and carbon paper, around 1920, copying presses ceased to be manufactured. Today, as the authors point out, the copying press has become an unremembered instrument, most often seen in antique shops where uninformed salespersons erroneously call it a "bookbinder's press" and claim that it was devised to flatten cockled pages or wrinkled manuscripts, or even to press leaves and flowers.

The copying press was not the only early mechanical device available for producing multiple copies of documents. Rhodes and Streeter describe a somewhat less successful and much less popular apparatus, the pantograph, a device whereby a "master" pen controls one or more slave pens to create several copies of the same document. They pay generous tribute to Silvio Bedini for his excellent monograph, *Thomas Jefferson and His Copying Machines* (Virginia, 1984), which also describes Watt's invention but provides significantly more detail on the pantograph.

Although their main focus is the copying press, the authors devote considerable attention to other systems besides the pantograph. In fact, it may be argued that their chosen title is slightly misleading in that an entire chapter is actually devoted to both nonphotographic duplicating processes—the hectograph, mimeograph, and many others—and to photo-optical copiers, such as the Photostat, the Rectigraph, and early varieties of Xerox machines. All are described fairly minutely. This same chapter explains the terminal date of the authors' research: It was on September 8, 1938, that Chester Carlson filed a patent application for his newly invented system of "electron photography," now universally known as xerography.

The authors divide their work and their book into two major sections. The first, by Rhodes, a conservator at the American Museum of Natural History, deals with hardware, materials (including the special inks and paper), and methods of operating the copying press. In this first part, Rachel-Ray Cleveland, a paper conservator, contributes expert knowledge to the chapter on inks. The second part, by Streeter, a hand bookbinder and former museum curator, thoroughly documents the technology, construction, and history of the device. Curiously, the intended readership of the book—research librarians, museum curators, conservators, historians, bookbinders, printers, and booksellers—is not explicitly revealed until one reaches the preface to the second part. But next to the title page is a handsomely bordered dedication, replete with images of the copying press, to these very professionals.

Not designed to encourage its readers to curl up in an armchair (the book is 12 inches high by 91/2 inches wide and just

six pages short of 500 pages), *Before Photocopying* is a hefty volume that requires a study table for comfortable reading. Not only does the work describe the copying press's development in exquisite detail, but it also provides in-depth information on the technology of the process, with close focus on the characteristics of the required special inks and papers. The authors provide more than twelve hundred illustrations of equipment and schematic drawings, taken chiefly from manufacturers' catalogs and patent illustrations. They list every one of seventy known U.S. manufacturers and also illustrate products whose makers are unknown. Illustrations include English and other European presses. More than 1,100 U.S. patents for copying presses and related equipment are cited and illustrations reproduced from approximately five hundred of them. The book concludes with a valuable glossary of terms, an extensive bibliography, and a first-rate index. To help gauge the cost of copying presses and supplies in contemporary terms, the book features a table illustrating the equivalent value (in 1996 dollars) of one dollar for each year from 1780 to 1939. This will be of special value to reference librarians and also may help put into perspective current concerns about the cost of computers and software in libraries.

Encyclopedic in scope, *Before Photocopying* is a remarkable and magnificent volume that stuns the reader. I could not be more enthusiastic. Seldom has a highly specialized, even abstruse, subject been given a treatment so informative, profusely illustrated, extensively documented, well written, and literate. This beautifully printed book is unquestionably the most comprehensive, exhaustive study of prephotographic mechanical copying yet to be published. The work reaches far beyond its intended readership. It is a prime tool for the study of scholarly communication and a contribution to the history of science. And it is an indispensable guide for the would-be collector haunting antique shops in search of a historical artifact.—*Allen B. Veaner, University of Arizona.*

Rota, Anthony. *Apart from the Text*. New Castle, Del.: Oak Knoll Pr., 1998. 234p. $35 (ISBN 1-884718-52-3). LC 99-177769.

An unexpected dividend from the discussion surrounding the electronic book has been a new appreciation for the extraordinary technological achievement represented by the traditional paper book. This recognition is forthcoming not just from the usual suspects in the humanities, but from computer engineers trying to replicate the paper book's many desirable features in the electronic medium, among them portability, durability, intratextual connectedness, and mnemotechnical sophistication. An MIT e-book designer was quoted recently as conceding that on balance, if books had been invented after the computer rather than long before, they would have surely been considered a "big breakthrough." These books, he marvels, "have several hundred simultaneous paper-thin, flexible displays. They boot instantly. They run on very low power at a very low cost."

In the wake of Derridan deconstructionism and especially Gérard Genette's discovery of "paratexts" (e.g. titles, dust-jacket blurbs, etc.), humanists, too, are seizing with new vigor upon the physicality of books, their various nontextual qualities that serve as coconstituents of meaning in "the complex mediation between book, author, publisher, and reader." In this discussion, the book emerges as a sensual, even sensuous, whole, in which the quality of the paper, the typography of the printed page, design, bindings, and even smell all contribute to meaning creation, and cannot be taken from it or removed from the reading equation without loss. Princeton historian Robert Darnton, for example, in principle an advocate of the new reading technologies, points to "the sensation of paper" as being "bound up in the experience of reading." ("We have a long-term kinetic memory of paper.") Those who "dematerialize" the book do