

Books and Technology: A Printer's View

RODERICK D. STINEHOUR

IT WAS ON the sixteenth day of April 1775 that Isaiah Thomas, with the advice and urging of John Hancock and other friends in the Provincial Congress, made up his mind to leave Boston immediately. The exodus is recorded by his grandson, Benjamin Franklin Thomas, in his *Memoir of Isaiah Thomas*: 'He came back to Boston, packed up his presses and types, and . . . to use his own phrase "stole them out of town in the dead of night.'" Thomas was aided in their removal by General Warren and Colonel Bigelow. They were carried across the ferry to Charlestown and thence put on their way to Worcester.' That was it: no big deal for the leading printer in Boston to pack up his technology and fly by night.

Some members of the Society may be familiar with this portable equipment of Isaiah Thomas, since it is preserved today and on view at the library of the Society in Worcester that he founded. There, on a balcony, stands the standard furnishings of the colonial printing office: a typecase frame with cases of type and antique composing sticks; there is a chase to hold the composed types and an imposing stone on which to make up the forms. Next is the press, an open contrivance of heavy ink-stained timbers as tall as a grandfather clock; a heavy iron screw, turned by grasping a long bar, would have brought the wooden platen down, pressing the paper against the inked type. Simple, plain, straightforward.

This paper was read at the semiannual meeting of the American Antiquarian Society, held at the Boston Public Library on April 18, 1984.

Rude, even crude and elemental, the sight of these pieces of wooden furniture and wooden machinery can be surprising and challenging to the modern printer and bookman, surrounded as he is by the complexities of today's technology.

Lawrence C. Wroth, in his admirable book, *The Colonial Printer*, published in 1931, describes the operation of the old wooden press thus:

With all the clumsiness of action that characterized the wooden press, one is astonished to learn of the amount of daily work it was capable of performing. Its relatively high production rate seems to have been attained by the skill of the workman set to overcome the deficiencies of the tool. Nothing so astonishes the reader of Moxon's meaty pages as to learn that scientific motion study, one of our modern fetishes, was an old story in the seventeenth-century printing shops. To produce a single impression of type on paper, there were required thirteen distinct processes involving a bewildering number and variety of set and coordinated movements on the part of the two workmen serving the press. The hourly product of a single press served by two men was, in theory, in a well-organized printing office, no less than a 'token', or 240 sheets, printed on one side with two pulls to the form, and in order to approximate this stint throughout a long working day, a rigid discipline of their movements was required of the men working at press. In a working day of ten hours a press continuously served with no changing of forms could theoretically turn out ten tokens, or 2400 sheets, printed on one side. Inevitably the ordinary shop routine in a day of ten hours would reduce this number to a normal output of eight tokens, but the figure shows at least the admirable speed at which skillful men could operate a machine that we too condescendingly regard as a rickety and clumsy contrivance.

Crude and elemental as these old wooden presses appear, they do compel our respect and admiration. With very little refinement, and no change at all in basic principles, this was the equipment that took form in the Gutenberg workshop in Mainz 350 years earlier. In the cultural history of mankind there is no event that even approaches in importance the in-

vention of printing with movable types. The mechanization of writing shook the world. History written from that watershed point in the mid-fifteenth century has been largely the story of the far-reaching effects of this development. Every activity of human endeavor and experience has since felt liberation of the spirit from the fetters of ignorance and superstition. Every activity of the human family has felt the mighty power of the printed word. The manipulation of the press has been the greatest means for influencing human thought and activity, for good or for evil. It has been the chief instrument for exercising control of thought and activities as well as for toppling tyranny and freeing the creative energies of those it enlightens.

What was this mechanical technology that revolutionized society, shaped the modern world, and has brought us now to another watershed period in cultural history? It is, in all its physical elements, the 'rackety and clumsy contrivances' that are on view in Antiquarian Hall in Worcester. As Lawrence Wroth noted in his 1939 study in *The Book in America*: 'In the English colonies as elsewhere throughout the world in the seventeenth and eighteenth centuries the actual equipment of the printing house was very little different in its mechanical features from that used by the European typographers of the closing years of the fifteenth century. Though the press had undergone minor mechanical improvements in certain places, these were improvements in details of construction and in features rather than in principles of operation. With this machine the English and American printer worked happily enough until the early years of the nineteenth century.'

The Gutenberg technology was the answer to a long-felt need to produce cheaper books, both secular and divine, in larger editions. There was an unfulfilled demand for the tools of learning and a thirst for education. When the answer came, the avalanche broke. During the last four decades of the fifteenth century, printing and printed books spread to every

country in Europe. A totally new craft produced more than forty thousand editions, and many millions of books were distributed far and wide. The dissemination of learning to the whole of society had begun.

The Gutenberg technology in its physical mechanisms, while the product of genius, vision, and organizational brilliance exercised over a sustained period of fifteen to twenty years was also, in its completion, small, simple and manageable. It was a technology that lasted in its original form for over three centuries.

This new technology did not produce an immediately noticeable change in the appearance of the books it was making. The changes in production methods were radical enough, but the goal of the printer was to counterfeit the manuscript book. Its success would be measured against the standards of the past, and by adhering to the characteristics of the manuscript books it was displacing, printing was assured of acceptance. It was not until the mid-sixteenth century that changing type styles dimmed the calligraphic antecedents of books with the emergence of a typographic standard.

Hellmut Lehmann-Haupt reminds us in a 1951 article, 'The Industrialization of Printing': 'Two things should always be remembered by any student of the technological revolution of the graphic arts. No invention is ever an isolated achievement nor is it usually the result of the exclusive efforts of an individual genius. The need is there and the opportunity, and there are almost always several minds at work on the solution of a given problem. To assign the credit for a single invention, to interpret the patent lists and to weigh the evidence of priority claims belongs among the most difficult tasks in typographic research. The path is strewn with broken hearts and frustrations.

'There is no invention in the field of printing and bookmaking which is not the result of a keenly-felt need, which is not based on an already existing process and which in its turn does not cause and make necessary further new inventions.'

The nineteenth century saw the next great period in the development of typography and printing as a mechanical art. The wooden common press of Isaiah Thomas gave way first to the iron hand-press of Earl Stanhope. While not a new development, the change from wooden to metal presses was the highest evolution of the old-style machine, for it allowed the printer to double his production. This technological change looked backward to the perfection of old principles rather than forward to the development of new ones. However, new developments were not long in emerging. Before the century would end, technological change completely transformed and industrialized what had begun as a handcraft. Typesetting, typefounding, printing, and book binding were all mechanized, with the machines power-driven by steam engines. No longer could the means of book production be described as 'simple, small, and manageable by the individual craftsman.' As mechanical development turned printing into an industry, systems of planning and management were developed. By 1855, the firm of Harpers of New York was manufacturing books in an efficient assembly line, remarkably similar to the so-called modern methods.

The entire nineteenth century was a continuous speeding-up of bookmaking operations that were previously performed by hand in a more or less leisurely manner. John Wilson, a responsible book printer from Cambridge, in an address to the Master Printers Association of Boston in 1888 recalled changes in his lifetime: 'It was on a Stanhope press, in 1840, that I first tried my hand as an apprentice, 2,000 copies being considered a good day's work. On that same press, about 1843, I assisted in printing a sixteen-page octavo tract of 100,000 copies. . . . This was a formidable number to print on a hand press, for it took fifty days to print the edition. Today on a two revolution press, we could print the edition in a little over five days, and on a Hoe perfecting machine in five hours!'

This tremendous speeding-up of one operation demanded a

like response from others. Paper could no longer be made a sheet at a time and satisfy the market demands of high-powered cylinder presses. By the middle of the century, the annual production of paper in the United States seems to have exceeded that produced in either Great Britain or France, and the annual consumption of paper in the United States exceeded that of both those countries. Lyman Horace Weeks, in his 1916 *History of Paper Manufacturing in the United States, 1690–1916*, wrote that by midcentury, ‘nearly all the mills, particularly those that were newly built, had been equipped with Hollanders, Fourdriniers or cylinders and other machinery. Even the old single-vat mills had come into line and there remained few of importance that any longer made pretense of manufacturing paper by hand.’ In 1897, the only mill making paper by hand was the L. L. Brown Paper Company in Adams, Massachusetts, and by 1906 even that firm abandoned the practice.

Until late in the century, the complicated mechanism required to set type by machine baffled ingenious inventors, as it impoverished their backers. Joseph Blumenthal, the printer-historian, in his *Art of the Printed Book* (1973), writes: ‘Satisfactory mechanical type composition was not achieved until the last decades of the nineteenth century because early inventors sought its solution in cumbersome slotted machines which would drop previously-cast individual type characters into place. The burdens of standing type and type distribution, time-consuming procedures which harked back to the fifteenth century, were left unresolved. Mark Twain was only one among the many inventors and investors who lost large sums along this fruitless path. Ottmar Mergenthaler, a German-American at work in Baltimore, cut through these difficulties with a machine that simultaneously composed and cast lines of new type for each job. Hence the name, “Linotype.” When printed (or reprinted) the metal was thrown back into the melting pot. Tolbert Lanston followed shortly with a composing machine that cast individual letter composition, logically called “Monotype.”’

The rapid mechanization of printing resulted in the displacement of many craft practices and of the craftsmen who had adhered to well-established procedures. Styles and tastes changed and withal a decline in workmanship led to a revulsion against machine practices. Elaborating on this subject, Joseph Blumenthal presented the following explanation: 'During the nineteenth century and well into the twentieth, the machine was thought to be an obstacle to fine bookmaking. Actually the machine did bring about a cleavage. Heretofore all printers used the same kinds of equipment and the same methods of production. The great designer-printers, whether Estienne or Bodoni, whether subsidized or not, differed from the lesser members of their craft by the measure of their capacities for scholarship, artistry, and craftsmanship. With the accumulation of complex, expensive machinery, and with accelerating wages, the industrial printer became a merchant who sold machine time at the bidding of publishers, advertisers, and other consumers of printed matter. Craftsmanship sank to low levels. Design and taste, if any, were imposed from without. The ruthless demands of machinery and the vast growth of the capitalistic structure imposed the need for increasing specialization.'

There was a good deal of theoretical argument about the degrading role of machine production in fine printing which went on well into the twentieth century. Much of the private press movement found its motivation in loyalty to antiquated production methods with the implied revival of the dignity of the craftsman through a return to the practices of a simpler age. While the great war of 1914 put an end to much of the private press movement, there were still those who proclaimed, as Giovanni Mardersteig did, that 'just as in all the arts and crafts which were the bearers of an old tradition, so did the invention of machinery imply the destruction of the art of printing.' However, the role of the twentieth-century printer was pungently put forward by Aldous Huxley in a 1927 article, 'Printing of To-Day':

The problem which confronts the contemporary printer may be briefly stated as follows: to produce beautiful and modern print-patterns by means of labor-saving machinery. There have been numerous attempts in recent years to improve the quality of printing. But of these attempts too many have been made in the wrong spirit. Instead of trying to exploit modern machinery, many artistic printers have rejected it altogether and reverted to the primitive methods of an earlier age. Instead of trying to create new forms of type and decoration, they have imitated the styles of the past. This prejudice in favor of hand-work and ancient decorative forms was the result of an inevitable reaction against the soulless ugliness of nineteenth-century industrialism. . . . It has become obvious that the machine is here to stay. Whole armies of William Morris and Tolstoy could not now expel it. . . . The sensible thing to do is not to revolt against the inevitable, but to use and modify it, to make it serve your purposes. Machines exist; let us then exploit them to create beauty—a modern beauty, while we are about it. For we live in the twentieth century; let us frankly admit it and not pretend that we live in the fifteenth. The work of the backward-looking hand-printers may be excellent in its way; but its way is not the contemporary way. . . . The printer who makes a fetish of hand-work and medieval craftsmanship, who refuses to tolerate the machine or to make any effort to improve the quality of its output, thereby condemns the ordinary reader to a perpetuity of ugly printing. As an ordinary reader, who cannot afford to buy hand-made books, I object to the archaizing printer.

With an ever-increasing speed of production as a goal, the mechanization of book printing moved on. To counter the prediction that this trend would only result in 'two bad books being made instead of one,' men such as Stanley Morison, typographic adviser to the Monotype Corporation, devised ambitious programs to revive the best typefaces of the past and adapt them to machine composition. By putting the highest ideals of typography before the printers and publishers through an enlightened publicity program, their type-setting machines became dominant in the trade. One of the means of promoting the new gospel was through the publication of *The Fleuron*, a journal of typography published in London between 1923 and

1930 and edited by Oliver Simon. Here were published the scholarly delvings into typographic history that were so necessary an underpinning to the commercial exploitation of the revivals of earlier methods of book printing. Once again, the new technology was validated by imitation of the past.

Tucked into the first number of *The Fleuron*, published in 1923, was a short article by Bernard H. Newdigate, a leading English book printer, entitled 'Respite: Prospice, a chronicle and a forecast.' A couple of prophetic paragraphs pop out. The first paragraph exclaims:

PHOTO-LITHO OFFSET AND ITS OPPORTUNITIES

Of late years no printing method has made such strides as that of photo-litho-offset. The three principles which give it its name—photography, lithography, and offset printing—achieve in combination results which are likely to make the method one of the most important of all ways of printing. So far, most of the work done has been of a cheap kind. Its most notable success has been with a bi-weekly provincial newspaper.

In January, 1922, *The Blackpool Times* was printed by offset for the first time; so that the experiment has had more than a year's trial. The news columns and advertisements are set up partly by the linotype, partly from case type, in the usual way, then made up into formes and transferred to the lithographic surface with a very liberal admixture of photographic illustration. Indeed, the ease with which photographs are reproduced to fill sometimes an entire page, and are creditably printed without the use of half-tone letterpress blocks, is perhaps the most notable feature of the whole adventure. On the occasion of the wedding of Princess Mary, the paper was printed with coloured illustrations. The result was more hopeful in promise than successful in its achievement; for the use of colour in offset has yet to reveal its own right technique.

The other paragraph offers no less a prophetic declaration:

THE DOOM OF TYPESETTING

No views about the future development of photography in relation to printing are entitled to so much respect as those of Mr. Gamble, who has edited *Penrose's Annual* ever since its first ap-

pearance twenty-seven years ago. So convinced is he that letterpress printing is likely before long to be supplanted by photolithographic methods that he thinks it right to warn the far-seeing printer to prepare for the impending change. He gives examples of Mr. A. Dutton's photoline process of composing letters and ornaments without the use of types or relief blocks. He writes, too, of a patent—lately taken out by Messrs. Robertson, Brown & Orrel, who are interested in *The Blackpool Times*—for a 'very ambitious invention' which applies the essential mechanism of the linotype to photo-text composition. Instead of matrices the magazine holds a number of metal frames, each of which contains a glass negative or positive bearing a letter or a figure sign, like those in type-print. These are released and assembled by the operator at the keyboard; a beam of light is projected through them, and a camera, harnessed to the mechanism, receives the image.

Within a few years book designers, publishers, and printers were confronting this development of photography as dominant in shaping the modern book. Motion pictures, illustrated magazines, then television made a powerful bid for the public's attention. Marshall Lee, one of the advocates and practitioners in modern book design, was part of a committee formed by the American Institute of Graphic Arts in 1950 to explore the new freedom in book design brought on by the flexibility of photographic applications. In the foreword to the catalogue *Books for Our Time* (1951), he writes:

What, then, are the characteristics of contemporary book design? From whence do they derive their validity? Perhaps the only rules that can be safely applied to all arts at all times is that the work must grow out of the world in which it is born. The world has changed almost beyond recognition since the seventeenth century, yet we are told that the design of books must not change, that the application of modern design to books is invalid because change must come about gradually, not radically. Actually, this resistance to change has retarded the normal development of book design to such an extent that today the abandonment of traditional forms is not so much a radical

departure as it is an overdue alignment with a world that has long since conferred obsolescence on these conventions. . . .

The book public has had its graphic perceptions sharpened by exposure to an enormous volume and variety of printed matter, photography, motion pictures, and television. This public demands a graphic presentation that is of the kind and quality to which it has become accustomed in other mediums. As the demand is different from what it used to be, so the problems are different also. We are getting away from the separation of text and pictures into sections and are developing books in which text illustrations are coordinated and integrated on the page. We have freed the illustrations from the rigid confines of the text rectangle, and we employ such devices as blow-ups, bleeds, fragmentation, silhouetting and collage to make the presentation of the text more effective and stimulating.

Photography and electronics eclipsed the mechanization of printing, and the advent of the computer has now rendered most past developments obsolete. The obituary appeared recently in the *Wall Street Journal* under the byline of Jerry E. Bishop. The headline reads, 'Gutenberg's Marvel Began With a Bang, Ends with a Whimper.' Following the lead-in, 'After 500 years, Movable Type Moves Into the Museum, Replaced by the Computer,' the text of the obituary declares:

Awe and excitement greet the arrival of a great invention, but when its usefulness ends, its passing often goes unheralded. Few people, for example, probably took notice the day the last merchant ship slipped into a harbor under sail, or the day the last steam locomotive roared down the tracks on a scheduled run.

Movable type, one of mankind's greatest inventions, is on the verge of disappearing after more than five centuries. Its demise has been almost overlooked amid the printing industry's recent and rapid conversion to electronic technology. So forget, momentarily, the relentless march of progress. This is an obituary for an invention that literally changed the world.

Johann Gutenberg's development, around 1450, of a practical way of making movable metal type unleashed an information and communications revolution rivaled only now by the electronic computer. As recently as two decades ago, ink-stained

oak cabinets containing drawers of type were essential fixtures in any print shop, and it was every printer's pride to have memorized which compartment held each letter. But when electronic photocomposition technology swept through the printing industry in the 1960s and 1970s, most printers scrapped all forms of metal type. Today the old type drawers fetch \$25 or \$30 each in antique shops. In their place in the printing shops are chrome-and-plastic computer consoles with flashing lights and keyboards.

For over 2,000 years the tools of thought have changed little in essence; basically it has been ink, paper, and the means of applying one to the other. But the computer will surely give intellectual activity a new shape. The question is, what shape will emerge? And what form for the printed word? There are now more than five million computers in the United States, and for some time the amount of computing power has been doubling every two years. The average computer user now has access to information that would fill the Library of Congress and can control as much computing power as a large university computing center. Will this reduce the need for books, or make it unnecessary to print and distribute books in the ways of the past?

There are laser printing units using xerography that can print a complete book from the digitized type page stored in disk memory banks. Such a custom book printer can churn out pages, verso and recto, at the rate of a leaf every second. A complete book of 124 pages would be ready for binding in sixty-two seconds. It takes little imagination to envision a bookstore of a decade hence filled with 'sample' volumes only. One would need only to pick a title and the book would be printed and bound on the spot. Such a bookstore could readily keep on hand three or four times the number of titles now stocked at a fraction of present costs, since there would be no shipping charges, no overstock or understock problems, and no returns.

Recently the Library of Congress has been working with

publishers on a pilot project to test the use of optical discs for the storage and dissemination of journals and periodicals. The material would be copied onto twelve-inch discs that can hold up to 20,000 pages on a side. A reading machine would enable the user to read the material on the disc and give a command to the machine to print out the material on a connected high-speed printer.

What does this technology have to do with books as we now know them? There are many predictions abroad today about the shape of things to come in a computer age that is just emerging in the first flush of a new day. Books are obviously only one means of disseminating information and cogitative writing in the midst of an increasing plethora of electronic options. Even the Congress of the United States seeks guidance. A recent Congressional resolution has asked for a study to explore the influence of the computer and video technologies on books, reading, and the printed word. An advisory committee, meeting at the Library of Congress, was told by Sen. Charles Mathias, Jr., to 'set no limits to your vision for perhaps the future of the book is not as solid as it might appear.' The committee is exploring four specific questions: What difference does it make that the forms and functions of books are changing? How do technology and literacy affect each other? Who is responsible for stimulating reading and the reading habit? How is publishing facing the challenges of new technologies?

The results of this study will be issued in, have you guessed it, a BOOK, entitled *The Book in the Future*, to be presented by Librarian of Congress Daniel J. Boorstin to the Congress no later than December 1, 1984. Perhaps that is when we shall all learn what the outlook will be for this seemingly endangered species, or at least the official outlook.

Meanwhile, we who are gathered here today have the greatest vested interest in the book of the future as well as of the past: scholars, students, librarians, booksellers, publishers, and printers.

Henry Stevens of Vermont, the nineteenth-century bookseller, once said, 'Books are both our luxuries and our daily bread. They have become to our lives and happiness prime necessities.' I have pondered this saying often—'Books are both our luxuries and our daily bread.' It has become a kind of motto, one that I believe is most apt for a printer. But no less so than for my fellow Antiquarians to whom books are prime necessities and also very often the means of their livelihood.

This library which gives us shelter today, the Boston Public Library, houses the accumulation of all our world's knowledge and wisdom and makes that available to any literate person who will come in and open the covers of a book. Books embody all the humanizing arts that make thought tangible and give form to ideas, so that mind can touch mind over vast distances and through the ages of time itself. This library is a powerhouse of the most potent force, knowledge. Its fuel is books and technology. Books and technology are symbiotic. Books and technology have been generating and regenerating each other since the beginning—and so they will, I firmly believe, until the end.

Copyright of Proceedings of the American Antiquarian Society is the property of American Antiquarian Society and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.