1909

The Bridge to the Twentieth Century

Part III

The Industrial Revolution:

The impact of industrial technology upon visual communications

1859 Darwin, Origin of Species

1865 Lincoln assassinated

1863 Emancipation Proclamation

1874 Prang, 1st American Christmas card

1862 Nast joins Harper's Weekly

1884 Twain, Huckleberry Finn

10

1877 Morris makes his 1st public lectures on design

1903 Doves Press Bible

1883 Mackmurdo, Wren’s City Churches title page

1893 Morris, Chaucer type

1884 Hobby Horse published

1891 Edison, kinetoscopic camera

1940 Goudy, Typologia

1918 Koch forms workshop community

1883 Stevenson, Treasure Island

1898 Curie discovers radium

1869 Suez Canal opens

1861 Morris opens art-decorating firm

1884 Art Worker’s Guild is formed

1886 Statue of Liberty

1894 Morris & Crane, The Story of the Glittering Plain

1894 Nicolas II becomes Russian Czar

1896 -Morris, Kelmscott Chaucer; Pissarro founds Eragny Press;
Rogers joins Riverside Press; Hornby starts Ashendene Press; Morris dies

1888 Morris designs Golden type

1886 Grasset, 1st poster

1886 Grasset, 1st poster

1876 Bell, telephone

1889 Van Gogh, Starry Night

1874 Tiffany opens glassworks

1891 -Toulouse-Lautrec, Moulin Rouge poster

1899 Van de Velde, Tropon poster

c 1856–59 Hiroshige, Evening Squall at Great Bridge near Atake

c1896 Jugend, 1st issue; Steinlen, La Rue poster; Ricketts begins Vale Press

c1866 Chéret, La Biche au Bois poster

1879 Edison, electric lamp

1879 Edison, electric lamp

1881 Barnum & Bailey, circus

1894 -Toorpp, Delft Salad Oil Poster; Mucha, Gismonda poster;
Rhead returns to America; Bradley, Inland Printer covers

1895 Bing, l’Art Nouveau gallery opens

1890 Chéret, Legion of Honor

1898 Behrens, The Kiss

1901 Dudorvich, Bitter Campar poster

1898 Ver Sacrum begins publication; Berthold Foundry, Akzidenz Grotesk

1898 Curie discovers radium

1896 Wright designs The House Beautiful

1891 Edison, kinetoscopic camera

1907 -Deutscher Werkbund formed; Loeffler designs Fledermaus poster

1902 Moser, 13th Vienna Secession poster; Wright, the 1st “prairie style” house

1895 McNair and Macdonalds, Glasgow fine arts poster

1897 Vienna Secession formed

1901 Klingspor issues Behrensschrift

1903 Hoffmann & Moser, Vienna Workshops are established

1904 Lauweriks teaches geometric grid composition in Germany

Behrens and Bernhard, AEG turbine hall

1910 Behrens, AEG lamp poster

Graphic Design and the Industrial Revolution

9

Although it might be said that the Industrial Revolution first occurred in England between 1760 and 1840, it was a radical process of social and eco-nomic change rather than a mere historical period. Energy was a major impetus for this conversion from an agricultural society to an industrial one. Until James Watt (1736–1819) perfected the steam engine, which was deployed rapidly starting in the 1780s, animal and human power were the primary sources of energy. During the course of the nineteenth century, the amount

of energy generated by steam power increased a hundredfold. During the last three decades of the century, electricity and gasoline-fueled engines further expanded productivity. A factory system with machine manufacturing and divisions of labor was developed. New materials, particularly iron and steel, became available.

Cities grew rapidly, as masses of people left a subsistence existence on the land and sought employment in the factories. Political power shifted away from the aristocracy and toward capitalist manufacturers, merchants, and even the working class. The growing body of scientific knowledge was applied to manufacturing processes and materials. People's sense of dominion over nature and faith in the ability to exploit the earth's resources for material needs created a heady confidence.

The capitalist replaced the landowner as the most powerful force in Western countries; investment in machines for mass manufacture became the basis for change in industry. Demand from a rapidly growing urban population with expanding buying power stimulated technological improvements. In turn, this enabled mass production, which increased availability and lowered costs. The cheaper, more abundant merchandise now available stimulated a mass market and even greater demand. As this supply-and-demand cycle became the force behind relentless industrial development, graphics played an important role in marketing factory output.

The giddy progression of the Industrial Revolution was not without its social costs. Workers who traded overpopulated rural areas for urban factories worked thirteen-hour days for miserable wages and lived in filthy, unsanitary tenements. This huge workforce of men, women, and children often suffered from shutdowns caused by overproduction, depressions, economic panics, business and bank failures, and the loss of jobs to newer technological improvements. On measure, the overall standard of living in Europe and America improved dramatically during the nineteenth century.

Nevertheless, critics of the new industrial age cried that civilization was shifting from an interest in humanist values toward a preoccupation with material goods and that people were losing their ties with nature, aesthetic experience, and spiritual values.

Greater human equality sprang from the French and American Revolutions and led to increased public education and literacy. The audience for reading matter proliferated accordingly. Graphic communications became more important and more widely available during this unsettled period of incessant change. As with other commodities, technology lowered unit costs and increased the production of printed materials. In turn, the greater availability created an insatiable demand, and the era of mass communications dawned.

Handicrafts greatly diminished as the unity of design and production ended. Earlier, a craftsman designed and fabricated a chair or pair of shoes, and a printer was involved in all aspects of his craft, from typeface design and page layout to the actual printing of books and broadsheets. Over the course of the nineteenth century, however, the specialization of the factory system fractured graphic communications into separate design and production components. The nature of visual information was profoundly changed. The range of typographic sizes and letterform styles exploded. The invention of photography—and, later, the means of printing photographic images—expanded the meaning of visual documentation and pictorial information. The use of color lithography passed the aesthetic experience of colorful images from the privileged few to the whole of society. This dynamic, exuberant, and often chaotic century witnessed an astonishing parade of new technologies, imaginative forms, and new functions for graphic design. The nineteenth century was an inventive and prolific period for new typeface designs, ranging from new categories such as Egyptian and sans serif to fanciful and outrageous novelty styles.

Innovations in typography

The Industrial Revolution generated a shift in the social and economic role of typographic communication. Before the nineteenth century, dissemination of information through books and broadsheets was its

dominant function. The faster pace and mass-communication needs of an increasingly urban and industrialized society produced a rapid expansion of jobbing printers, advertising, and posters. Larger scale, greater visual impact, and new tactile and expressive characters were demanded, and the book typography that had slowly evolved from handwriting did not fulfill these needs.

It was no longer enough for the twenty-six letters of the alphabet to function only as phonetic symbols. The industrial age transformed these signs into abstract visual forms projecting powerful concrete shapes of strong contrast and large size. At the same time, letterpress printers faced increasing competitive pressure from lithographic printers, whose skilled craftsmen rendered plates directly from an artist's sketch and produced images and letterforms limited only by the artist's imagination. The letterpress printers turned to the typefounders to expand their design possibilities, and the founders were only too happy to comply. The early decades of the nineteenth century saw an outpouring of new type designs without precedent.

As in many other aspects of the Industrial Revolution, England played a pivotal role in this development; major design innovations were achieved by London typefounders. It might almost be said that the first William Caslon was the grandfather of this revolution. In addition to his heirs, two of his former apprentices who were dismissed for leading a workers' revolt, Joseph Jackson (1733–92) and Thomas Cotterell (d. 1785), became successful type designers and founders in their own right. Apparently Cotterell began the trend of sand-casting large, bold display letters as early as 1765, when his specimen book included, in the words of one of his amazed contemporaries, a "proscription, or posting letter of great bulk and dimension, as high as the measure of twelve lines of pica!" (about 5 centimeters, or 2 inches) (Fig. 9–1).

Other founders designed and cast fatter letters, and type grew steadily bolder. This led to the invention of fat faces (Fig. 9–2), a major category of type design innovated by Cotterell's pupil and successor, Robert Thorne (d. 1820), possibly around 1803. A fat-face typestyle is a roman face whose contrast and weight have been increased by expanding the thickness of the heavy strokes. The stroke width has a ratio of 1:2.5 or even 1:2 to the capital height. These excessively bold fonts were only the beginning, as Thorne's Fann Street Foundry began an active competition with William Caslon IV (1781–1869) and Vincent Figgins (1766–1844). The full range of Thorne's accomplishment as a type designer was documented after his death, when William Thorowgood—who was not a type designer, punch cutter, or printer, but who used lottery winnings to offer the top bid when Thorne's foundry was auctioned after his death—published the 132-page book of specimens that had been typeset and was ready to go onto the press when Thorne died.

9–2. Robert Thorne, fat-face types, 1821. Although the record dates these designs to William Thorowgood's 1821 publication of New Specimen of Printing Types, Late R. Thorne's, it is generally thought that Thorne designed the first fat faces in 1803.

9–1. Thomas Cotterell, twelve lines pica, letterforms,
c. 1765. These display letters, shown actual size, seemed gigantic to eighteenth-century compositors, who were used to setting handbills and broadsides using types that were rarely even half this size.

9–3. Vincent Figgins, two lines pica, Antique, c. 1815. The inspiration for this highly original design, first shown by Figgins, is not known. Whether Figgins, Thorne, or an anonymous sign painter first invented this style is one of the mysteries surrounding the sudden appearance of slab-serif letterforms.

9–4. Robert Thorne, Egyptian type designs, 1821. Comparison with Figgins's design reveals subtle differences. Thorne based this lower-case on the structure of modern-style letters, but he radically modified the weight and serifs.

9–5. Henry Caslon, Ionic type specimen, mid-1840s. Bracketing refers to the curved transition from the main strokes of a letterform to its serif. Egyptian type replaced the bracket with an abrupt angle; Ionic type restored a slight bracket.

9–6. Robert Besley (designer, with Thorowgood), specimen of an early Clarendon, 1845. An adaptation of Ionic that was even more subtle than the development of Ionic from Egyptian, Clarendon styles were wildly popular after their introduction. When the three-year patent expired, numerous imitations and piracies were issued by other founders.

9–7. The top two specimens are typical Tuscan styles with ornamental serifs. They demonstrate the diversity of expanded and condensed widths produced by nineteenth-century designers. The bottom specimen is an Antique Tuscan with curved and slightly pointed slab-serifs. Note the care given to the design of negative shapes surrounding the letters.

One of Joseph Jackson's apprentices, Vincent Figgins, stayed with him and took full charge of his operation during the three years preceding Jackson's death in 1792. Figgins failed in his efforts to purchase his master's foundry because William Caslon III offered the highest bid. Undeterred, he established his own type foundry and quickly built a respectable reputation for type design and mathematical, astronomical, and other symbolic material, numbering in the hundreds of sorts. By the turn of the century Figgins had designed and cast a complete range of romans and had begun to produce scholarly and foreign faces. The rapid tilt in typographic design taste toward modern-style romans and new jobbing styles after the turn of the century seriously affected him, but he rapidly responded, and his 1815 printing specimens showed a full range of modern styles, antiques (Egyptians)—the second major innovation of nineteenth-century type design (Fig. 9–3)—and numerous jobbing faces, including "three-dimensional" fonts.

The antiques convey a bold, machinelike feeling through slablike rectangular serifs, even weight throughout the letters, and short ascenders and descenders. In Thorowgood's 1821 specimen book of Thorne's type, the name Egyptian—which is still used for this style—was given to the slab-serif fonts shown (Fig. 9–4). Perhaps the name was inspired by the era's fascination with all aspects of ancient Egyptian culture, an interest that was intensified by Napoleon's 1798–99 invasion and occupation. Design similarities were seen between the chunky geometric alphabets and the visual qualities of some Egyptian artifacts. As early as the 1830s, a variation of Egyptian, having slightly bracketed serifs and increased contrast between thicks and thins, was called Ionic (Fig. 9–5). In 1845 William Thorowgood and Company copyrighted a modified Egyptian called Clarendon (Fig. 9–6). Similar to the Ionics, these letterforms were condensed Egyptians with stronger contrasts between thick and thin strokes and somewhat lighter serifs.

Figgins's 1815 specimen book also presented the first nineteenth-century version of Tuscan-style letters (Fig. 9–7). This style, characterized by serifs that are extended and curved, was put through an astounding range of variations during the nineteenth century, often with bulges, cavities, and ornaments.

It seems that the English typefounders were trying to invent every possible design permutation by modifying forms or proportions and applying all manner of decoration to their alphabets. In 1815 Vincent Figgins showed styles that projected the illusion of three dimensions (Fig. 9–8) and appeared as bulky objects rather than two-dimensional signs. This device proved very popular, and specimen books began to show perspective clones for every imaginable style. An additional variation was the depth of shading, which ranged from pencil-thin shadows to deep perspectives. Because contrivances—including perspectives, outline (Fig. 9–9), reversing (Fig. 9–10), expanding, and condensing—could multiply each typeface into a kaleidoscope of variations, foundries proliferated fonts with boundless enthusiasm. The mechanization of manufacturing processes during the Industrial Revolution made the application of decoration more economical and efficient. Designers of furniture, household objects, and even typefaces delighted in design intricacy. During the first half of the century, pictures, plant motifs, and decorative designs were applied to display letterforms (Fig. 9–11).

The third major typographic innovation of the early 1800s, sans-serif type, made its modest debut in an 1816 specimen book issued by William Caslon IV (Fig. 9–12). Buried among the decorative display fonts of capitals in the back of the book, one line of medium-weight monoline serifless capitals proclaimed "W CASLON JUNR LETTER FOUNDER." It looked a lot like an Egyptian face with the serifs removed, which is probably how Caslon IV designed it. The name Caslon adopted for this style—Two Lines English Egyptian—tends to support the theory that it had its origins in an Egyptian style. (English denoted a type size roughly equivalent to today's fourteen-point; thus, Two Lines English indicated a display type of about twenty-eight points.)

9–8. Vincent Figgins, five lines pica, In Shade, 1815. The first three-dimensional or perspective fonts were fat faces. Perhaps designers were seeking to compensate for the lightness of the thin strokes, which tended to reduce the legibility of fat faces at a distance.

9–9. Vincent Figgins, two-line Pearl, Outline, 1833. In outline and open fonts, a contour line of even weight encloses the alphabet shape, which usually appears black.

9–10. William Thorowgood, six-line Reversed Egyptian Italic, 1828. Types that appeared white against a printed black background enjoyed a brief popularity during the middle decades of the nineteenth century, then went out of fashion.

9–11. Woods and Sharwoods, letters from ornamented fonts, 1838–42. The wide fat-face letterforms provided a background for pictorial and decorative elements.

9–12. William Caslon IV, two-line English Egyptian, 1816. This specimen quietly introduced what was to become a major resource for graphic design.

9–13. Vincent Figgins, two-line Great Primer Sans-serif, 1832. Both the name and wide use of sans-serif typography were launched by awkward black display fonts in Figgins's 1832 Specimens of Printing Types.

9–14. Handbill for an excursion train, 1876. To be bolder than bold, the compositor used heavier letterforms for the initial letter of important words. Oversized terminal letterforms combine with condensed and extended styles in the phrase Maryland Day!

Sans serifs, which became so important to twentieth-century graphic design, had a tentative beginning. The cumbersome early sans serifs were used primarily for subtitles and descriptive material under excessively bold fat faces and Egyptians. They were little noticed until the early 1830s, when several typefounders introduced new sans-serif styles. Each designer and foundry attached a name: Caslon used *Doric*, Thorowgood called his *grotesques*, Blake and Stephenson named their version *sans-surryphs*, and in the United States, the Boston Type and Stereotype Foundry named its first American sans-serif faces *Gothics*. Perhaps the rich black color of these display types seemed similar to the density of Gothic types. Vincent Figgins dubbed his 1832 specimen *sans serif* (Fig. 9–13) in recognition of the font's most apparent feature, and the name stuck. German printers had a strong interest in sans serifs, and by 1830 the Schelter and Giesecke foundry issued the first sans-serif fonts with a lowercase alphabet. By midcentury, serifless alphabets were seeing increased use.

The wood-type poster

As display types expanded in size, problems multiplied for both printer and founder. In casting, it was difficult to keep the metal in a liquid state while pouring, and uneven cooling often created slightly concave printing surfaces. Many printers found large metal types to be prohibitively expensive, brittle, and heavy. An American printer named Darius Wells (1800–75) began to experiment with hand-carved wooden types and in 1827 invented a lateral router that enabled the economical mass manufacture of wood types for display printing. Durable, light, and less than half as expensive as large metal types, wood type rapidly overcame printers' initial objections and had a significant impact on poster and broadsheet design. Beginning in March 1828, when Wells launched the wood-type industry with his first specimen sheets, American wood-type manufacturers imported typeface designs from Europe and exported wood type. Soon, however, wood-type manufactories sprang up in European countries, and by midcentury American firms were creating innovative decorative alphabets of their own.

After William Leavenworth (1799–1860) combined the pantograph with the router in 1834, new wood-type fonts could be introduced so easily that customers were invited to send a drawing of one letter of a desired new style; the manufactory offered to design and produce the entire font based on the sketch without an additional charge for design and pattern drafting.

The impetus of this new display typography and the increasing demand for public posters by clients ranging from traveling circuses and vaudeville troupes to clothing stores and the new railroads led to poster houses specializing in letterpress display material (Fig. 9–14). In the eighteenth century, job printing had been a sideline of newspaper and book printers. The design of handbills, wood-type posters, and broadsheets at the poster houses did not involve a graphic designer in the twentieth-century sense. The compositor, often in consultation with the client, selected and composed the type, rules, ornaments, and wood-engraved or metal-stereotyped stock illustrations that filled the typecases. The designer had access to a nearly infinite range of typographic sizes, styles, weights, and novel ornamental effects, and the design philosophy was to use it. The need to lock all the elements tightly on the press enforced a horizontal and vertical stress on the design; this became the basic organizing principle.

Design decisions were pragmatic. Long words or copy dictated condensed type, and short words or copy were set in expanded fonts. Important words were given emphasis through the use of the largest available type sizes. There was a practical side to the extensive mixing of styles in job printing, because many fonts, each having a limited number of characters, were available at the typical print shop. Wood and metal types were used together freely.

The typographic poster houses that developed with the advent of wood type began to decline after 1870 as improvements in lithographic printing resulted in more pictorial and colorful posters by that process. Also, the importance of traveling entertainment shows—a mainstay among their clients—declined. The growth of magazines and newspapers with space advertising, and the legislative restrictions on posting, began to shift commercial communications away from posted notices, and the number of letterpress poster firms declined significantly by the end of the century.

A revolution in printing

The printing presses used by Baskerville and Bodoni were remarkably similar to the first one used by Gutenberg over three centuries earlier. Inevitably, the relentless progress of the Industrial Revolution radically altered printing. Inventors applied mechanical theory and metal parts to the hand press, increasing its efficiency and the size of its impression. Several improvements to make the hand press stronger and more efficient culminated in Lord Stanhope's printing press (Fig. 9–15), constructed completely of cast-iron parts in 1800. The metal screw mechanism required approximately one-tenth the manual force needed to print on a wooden press, and Stanhope's press enabled a doubling of the printed

sheet's size. William Bulmer's printing office installed and experimented with Lord Stanhope's first successful prototype. These innovations served to improve a partially mechanized handicraft.

The next step actually converted printing into a high-speed factory operation. Friedrich Koenig, a German printer who arrived in London around 1804, presented his plans for a steam-powered printing press to major London printers. Finally receiving financial support in 1807, Koenig obtained a patent in March 1810 for his press, which printed 400 sheets per hour in comparison to the hourly output of 250 sheets on the Stanhope hand press.

Koenig's first powered press was designed much like a hand press connected to a steam engine. Other innovations included a method of inking the type by rollers instead of the hand-inking balls. The horizontal movement of the type forms in the bed of the machine and the movement of the tympan and frisket were automated. This press was a prelude to Koenig's development of the stop-cylinder steam-powered press, which enabled much faster operation. In this design the type form was on a flat bed, which moved back and forth beneath a cylinder. During the printing phase the cylinder rotated over the type, carrying the sheet to be printed. It stopped while the form moved from under the cylinder to be inked by rollers. While the cylinder was still, the pressman fed a fresh sheet of paper onto the cylinder.

9–15. This engraved illustration depicts the printing press of all-iron parts invented in England by Charles, third Earl of Stanhope.

9–16. The first steam-powered cylinder press, 1814. Koenig's invention caused the speed of printing to skyrocket, while its price dropped considerably.

John Walter II of the *Times* in London commissioned Koenig to build two double-cylinder steam-powered presses (Fig. 9–16). These were capable of printing 1,100 impressions an hour on sheets of paper that were 90 centimeters (35 inches) long and 56 centimeters (22 inches) wide. Fearing the sabotage that often destroyed new machinery when workers felt their jobs were endangered, Walter had the new presses moved to Printing House Square in absolute secrecy. Employees who had threatened Koenig and his invention
were directed to wait for news from the Continent on the fateful morning of 29 November 1814. At six o'clock Walter entered the pressroom and announced, "The *Times* is already printed—by steam." The day's edition informed its readers, "Our Journal of this day presents to the public the practical result of the greatest improvement connected with printing since the discovery of the art itself. The reader of this paragraph now holds in his hand one of the many thousand impressions of The Times newspaper, which were taken off last night by a mechanical apparatus." An immediate savings resulted in the composing room, for the *Times* had been typesetting a duplicate of each edition so the two hand presses could print each page. Also, the news could be printed to reach subscribers several hours earlier.

In 1815 William Cowper obtained a patent for a printing press using curved stereotyped plates wrapped around a cylinder. This press achieved 2,400 impressions per hour, and it could be used to print 1,200 sheets on both sides. In 1827 the *Times* commissioned Cowper and his partner, Ambrose Applegath, to develop a four-cylinder steam-powered press using curved stereotyped plates made rapidly from papier-mâché molds. This press printed 4,000 sheets per hour, on both sides.

All across Europe and North America, book and newspaper printers began to retire their hand presses and replace them with steam-powered ones. The Applegath and Cowper steam-powered multiple-cylinder press produced thirty-two impressions for every one printed on the Stanhope hand press, and the cost of

printing began to plunge downward as the size of editions soared upward. By the 1830s printing began its incredible expansion, as newspaper, book, and jobbing printers proliferated.

The value of high-speed steam-powered printing would have been limited without an economical and abundant source of paper. A young clerk in the Didot paper mill in France, Nicolas-Louis Robert, developed a prototype for a paper-making machine in 1798, but political turmoil in France prevented him from perfecting it. In 1801 English patent number 2487 was granted to John Gamble for "an invention for making paper in single sheets without seam or joining from one to twelve feet and upwards wide, and from one to forty-five feet and upwards in length." In 1803 the first production paper machine was operative at Frogmore, England. This machine, which was similar to Robert's prototype, poured a suspension of fiber and water in a thin stream upon a vibrating wire-mesh conveyor belt on which an unending sheet of paper could be manufactured. The rights were acquired by Henry and Sealy Fourdrinier, who invested their fortune financing and promoting what is called the Fourdrinier machine to this day. Ironically, although the Fourdrinier brothers gave the world economical and abundant paper, they ruined themselves financially in the process.

The mechanization of typography

Setting type by hand and then redistributing it into the job case remained a slow and costly process. By the middle of the nineteenth century, presses could produce twenty-five thousand copies per hour, but each letter in every word in every book, newspaper, and magazine had to be set by hand. Dozens of experimenters worked to perfect a machine to compose type, and the first patent for a composing machine was registered in 1825. By the time Ottmar Mergenthaler (1854–99) perfected his Linotype machine in 1886, about three hundred machines had been patented in Europe and America, and several thousand patent claims were on file. Many people, including the writer Mark Twain, invested millions of dollars in the search for automatic typesetting. Before the Linotype was invented, the high cost and slow pace of composition limited even the largest daily newspapers to eight pages, and books remained fairly precious.

Mergenthaler was a German immigrant working in a Baltimore machine shop who struggled for a decade to perfect his typesetter. On 3 July 1886, the thirty-two-year-old inventor demonstrated his keyboard-operated machine (Fig. 9–17) in the office of the *New York Tribune*. Whitelaw Reid, the editor of the *Tribune*, reportedly exclaimed, "Ottmar, you've done it! A line o' type." The new machine received its name from this enthusiastic reaction.

Many earlier inventors had tried to make a machine that would compose metal type mechanically by automating the traditional typecase. Others had tried a typewriter affair that pressed letters into a papier-mâché mold or attempted to transfer a lithographic image into a metal relief. Mergenthaler's brilliant breakthrough (Fig. 9–18) involved the use of small brass matrixes with female impressions of the letterforms, numbers, and symbols. Ninety typewriter keys controlled vertical tubes that were filled with these matrixes. Each time the operator pressed a key, a matrix for that character was released. It slid down a chute and was automatically lined up with the other characters in that line. Melted lead was poured into the line of matrixes to cast a slug bearing the raised line of type.

In 1880 the New York newspapers offered over half a million dollars in prizes to any inventor who could create a machine that would reduce the compositor's time by 25 to 30 percent; Mergenthaler's Linotype machine could do the work of seven or eight hand compositors! The rapid deployment of the Linotype replaced thousands of highly skilled hand-typesetters, and strikes and violence threatened many installations. But the new technology caused an unprecedented explosion of graphic material, creating thousands of new jobs. The three-cent price of an 1880s newspaper plunged to one or two pennies, while the number of pages multiplied and circulation soared. Book publishing expanded rapidly,

with fiction, biographies, technical books, and histories joining the educational texts and literary classics that were being issued. The Linotype led to a surge in the production of periodicals, and illustrated weeklies, including the *Saturday Evening Post* and *Collier's*, reached audiences of millions by the turn of the century. Another American, Tolbert Lanston (1844–1913), invented the Monotype machine, which cast single characters from hot metal, in 1887. It was a decade before the Monotype was efficient enough to be put into production.

Hand-set metal type faced a dwindling market. Since most text type was now machine set, less foundry type was needed. Devastating price wars and cutthroat competition featured discounts of 50 percent plus another 10 percent for cash payment. Consortiums, such as the 1892 merger of fourteen foundries into the American Type Founders Company, were formed in an effort to stabilize the industry by forcing weaker foundries out of business and thereby reducing surplus capacity. Design piracy was rampant. After foundries released new typefaces, competitors immediately electroplated the new designs, then cast and sold types from the counterfeit matrixes. By century's end the type-foundry business stabilized. Hand-set metal typography found a smaller but significant niche providing display type for advertising and editorial headlines until the advent of phototypography in the 1960s.

Technological advances permitted machine-set typography to be printed on machine-manufactured paper with high-speed steam-powered printing presses. There was a global spread of words and pictures, and the age of mass communication arrived.

Photography, the new communications tool

Making pictorial images, and preparing printing plates to reproduce them, remained handwork processes until the arrival of photography. The concept behind the device used for making images by photochemical processes, the *camera obscura* (Latin for "dark chamber"), was known in the ancient world as early as the time of Aristotle in the fourth century B.C. A camera obscura is a darkened room or box with a small opening or lens in one side. Light rays passing through this aperture are projected onto the opposite side and form a picture of the bright objects outside. Artists have used the camera obscura as an aid to drawing for centuries. Around 1665, small, portable, boxlike camera obscuras were developed (Fig. 9–19). The only additional element needed to "fix" or make permanent the image projected into a camera obscura was a light-sensitive material capable of capturing this image.

9–17. Ottmar Mergenthaler demonstrates the Blower Linotype, the first line-casting keyboard typesetter, to editor Whitelaw Reid on 3 July 1886.

9–18. The Model 5 Linotype became the workhorse of typesetting, with keyboards and matrixes available in over a thousand languages.

9–19. As this nineteenth-century box camera obscura demonstrates, the optical principles of photography were well understood and used by artists to aid in drawing.

9–20. Joseph Niepce, photolithographic print of Cardinal d'Ambroise, c. 1822. This routine portrait print is the first image printed from a plate that was created by the photochemical action of light rather than by the human hand.

The inventors of photography

Photography and graphic communications have been closely linked beginning with the first experiments to capture an image of nature with a camera. Joseph Niepce (1765–1833), the Frenchman who first produced a photographic image, began his research by seeking an automatic means of transferring drawings onto printing plates. As a lithographic printer of popular religious images, Niepce searched for a way to make

plates other than by drawing. In 1822 he coated a pewter sheet with a light-sensitive asphalt, called *bitumen of Judea*, that hardens when exposed to light. Then he contact-printed a drawing, which had been oiled to make it transparent, to the pewter with sunlight. Niepce washed the pewter plate with lavender oil to remove the parts not hardened by light, and then he etched it with acid to make an incised copy of the original. Niepce called his invention *heliogravure* (sun engraving) (Fig. 9–20).

In 1826 Niepce expanded his discovery by putting one of his pewter plates in the back of his camera obscura and pointing it out the window. This allowed him to make a picture directly from nature; the earliest extant photograph is a pewter sheet that Niepce exposed all day (Fig. 9–21). When he removed it from the camera obscura and washed it with lavender oil, a hazy image of the sunlit buildings outside his workroom window was captured. Niepce continued his research with light-sensitive materials, including silver-coated copper. A theatrical performer and painter who had participated in the invention of the diorama, Louis Jacques Daguerre (1799–1851), contacted him. Daguerre had been conducting similar research, Niepce warmed to him, and they shared ideas until Niepce died of a stroke in 1833.

9–21. Joseph Niepce, the first photograph from nature, 1826. Looking out over the rear courtyard of the Niepce home, the light and shadow patterns formed by (from left to right) a wing of the house, a pear tree, the barn roof in front of the low bakehouse with its chimney, and another wing of the house are seen.

9–22 Louis Jacques Daguerre, Paris boulevard, 1839. In this early daguerreotype, the wagons, carriages, and pedestrians were not recorded because the slow exposure could only record stationary objects. On the lower left street corner, a man stopped to have his boots polished. He and the polisher were the first people ever to be photographed.

9–23. William Henry Fox Talbot, cameraless shadow picture of flowers, 1839. By sandwiching the flowers between his photographic paper and a sheet of glass and exposing the light-sensitive emulsion to sunlight, Talbot invented the photogram, later extensively used as a design tool by designers such as Laszlo Moholy-Nagy.

Daguerre persevered, and on 7 January 1839 his perfected process was presented to the French Academy of Sciences. The members marveled at the clarity and minute detail of his *daguerreotype* prints (Fig. 9–22) and the incredible accuracy of the images. In his perfected process, a highly polished silver-plated copper sheet was sensitized by placing it, silver side down, over a container of iodine crystals. After the rising iodine vapor combined with the silver to produce light-sensitive silver iodide, the plate was placed in the camera and exposed to light coming through the lens, to produce a latent image. Placing the exposed plate over a dish of heated mercury formed the visible image. After the mercury vapors formed an alloy with the exposed areas of silver, the unexposed silver iodide was removed and the image was fixed with a salt bath. The bare metal appeared black in areas where no light had struck it. The luminous, vibrant image was a base relief of mercury and silver compounds that varied in intensity in direct proportion to the amount of light that had struck the plate during exposure. In one giant leap, the technology for making pictures by machine was realized. In one early year, a half-million daguerreotypes were made in Paris.

Daguerreotypes had limitations, for each plate was a one-of-a-kind image of predetermined size, and the process required meticulous polishing, sensitizing, and development. The polished surface had a tendency to produce glare, and unless it was viewed at just the right angle, the image had a curious habit of reversing itself and appearing as a negative.

Simultaneous research was conducted in England by William Henry Fox Talbot (1800–77), who pioneered a process that formed the basis for both photography and photographic printing plates. While sketching in the Lake Como region of Italy in 1833, Talbot became frustrated with his limited drawing ability and his difficulty in recording beautiful landscapes. He reflected on “how charming it would be if it were possible to cause these natural images to imprint themselves durably, and remain fixed upon the

paper." After returning to England he began a series of experiments with paper treated with silver compounds, chosen because he knew silver nitrate was sensitive to light. In his early explorations he floated paper in a weak brine solution, let it dry, and then treated it with a strong solution of silver nitrate to form an insoluble light-sensitive silver-chloride compound in the paper. When he held a piece of lace or a leaf tight against the paper with a pane of glass and exposed it in sunlight, the paper around the object slowly darkened. Washing this image with a salt solution or potassium iodide would fix it somewhat by making the unexposed silver compounds fairly insensitive to light. Talbot called these images, made without a camera, *photogenic drawings* (Fig. 9–23); today we call images made by manipulating with objects the light striking photographic paper *photograms*. The technique was often used by twentieth-century graphic designers.

During the course of his 1835 experiments Talbot began to use his treated paper in the camera obscura to create minute photographic images that had light areas rendered dark and dark areas appearing light. These images were mirror images of nature.

Talbot let his research drop and turned to other interests for almost three years, until the sudden international uproar over Daguerre. Talbot rushed his work to London, and on 31 January 1839, three weeks after Daguerre's announcement, Talbot presented a hastily prepared report to the Royal Society entitled, "Some account of the Art of Photogenic Drawing, or the process by which Natural Objects may be made to delineate themselves without the aid of the artist's pencil."

Upon learning about the research of Daguerre and Talbot, the eminent astronomer and chemist Sir John Herschel (1792–1871) tackled the problem. In addition to duplicating Talbot's results, he was first to use sodium thiosulfate to fix or make permanent the image by halting the action of light. On 1 February 1839 he shared this knowledge with Talbot. Both Daguerre and Talbot adopted this means of fixing the image. During that month Talbot solved the problem of the reversed image by contact printing his reverse image to another sheet of his sensitized paper in sunlight. Herschel named the reversed image a *negative* (Fig. 9–24) and called the contact a *positive* (Fig. 9–25). These terms and Herschel's later name for Talbot's invention, *photography* (from the Greek *photos graphos*, meaning "light drawing"), have been adopted throughout the world.

Late in 1840 Talbot managed to increase the light sensitivity of his paper, expose a latent image, then develop it after it was removed from the camera. He called his new process *calotype* (from the Greek *kalos typos*, meaning "beautiful impression") and also used the name *talbotype* at the suggestion of friends. In 1844 Talbot began publishing his book, *The Pencil of Nature*, in installments for subscribers (Fig. 9–26; see also Fig. 9–40); it featured twenty-four photographs mounted into each copy by hand. In the foreword he expressed a desire to present "some of the beginnings of the new art." As the first volume illustrated completely with photographs, *The Pencil of Nature* was a milestone in the history of books.

The crystal clarity of daguerreotypes was superior to the softness of calotype images. To make a positive calotype print, a sheet of the light-sensitive paper was tightly sandwiched underneath the calotype negative and placed in bright sunlight. Because the sun's rays were diffused by the fibers of the paper negative, the positive print was slightly blurred. But because a negative could be exposed to other light-sensitive materials to make an unlimited number of prints and could later be enlarged, reduced, and used to make photoprocess printing plates, Talbot's invention radically altered the course of both photography and later graphic design as well. In photography's earliest stages, however, Daguerre's process was dominant, because Talbot's potpourri of exclusive patents slowed the spread of his methods.

Although the softness of calotypes was not without character, having a textural quality similar to charcoal drawing, a search began for a suitable vehicle to adhere light-sensitive material to glass so that extremely detailed negatives and positive lantern slides could be made. A wet-plate process was announced by the English sculptor Frederick Archer (1813–57) in the March 1850 *Chemist*. By

candlelight in a darkroom, a clear viscous liquid called *collodion* was sensitized with iodine compounds, poured over a glass plate, immersed in a silver-nitrate bath, and exposed and developed in the camera while still wet. Photographers throughout the world adopted Archer's process. Because he did not patent his process, and it enabled much shorter exposure times than either daguerreotypes or calotypes, it almost completely replaced them by the mid-1850s.

The scope of photography was seriously limited by the need to prepare a wet plate immediately before making the exposure and to develop it immediately afterwards. Research finally led to the commercial manufacture of gelatin-emulsion dry plates by several firms in 1877. The three-decade heyday of the collodion wet plate rapidly yielded to the dry-plate method after 1880.

9–24. William Henry Fox Talbot, the first photographic negative, 1835. This image was made on Talbot's light-sensitive paper in the camera obscura, which pointed toward the leaded glass windows in a large room of his mansion, Lacock Abbey.

9–25. William Henry Fox Talbot, print from the first photographic negative. The sun provided the light source to contact-print the negative to another sheet of sensitized paper, producing this positive image of the sky and land outside the windows.

9–26. Pages from Talbot's The Pencil of Nature, 1844. This first book to be illustrated entirely with photographs had original prints mounted onto the printed page. Plate VII is a photogram. (The use of modern-style type with ornate initials is typical of early Victorian book design.)

9–27. Advertisement for the Kodak camera, c. 1889. George Eastman's camera, simple enough for anyone "who can wind a watch," played a major role in making photography every person's art form.

9–28. Illustration of Moss's photographic department, from Scientific American, 1877. When this major science journal reported on the rise of photoengraving, it revealed that, unknown to its readers, thousands of photoengravings had been used side by side with hand engravings during the 1870s with no recognizable differences.

An American dry-plate manufacturer, George Eastman (1854–1932), put the power of photography into the hands of the lay public when he introduced his Kodak camera (Fig. 9–27) in 1888. It was an invention without precedent, for ordinary citizens now had the ability to create images and keep a graphic record of their lives and experiences.

The application of photography to printing

Beginning in the 1840s, the rising employment use of wood engraving that started with Thomas Bewick fostered an effective use of images in editorial and advertising communications. Because wood-engraving blocks were type-high and could be locked into a letterpress and printed with type, while copperplate and steel engraving or lithographs had to be printed as a separate press run, wood engraving dominated book, magazine, and newspaper illustration. However, the preparation of wood-engraved printing blocks was costly, and numerous inventors and tinkerers continued the search begun by Niepce to find an economical and reliable photoengraving process for preparing printing plates. Once a patent became a matter of record, competitors searched for a loophole to circumvent the inventor's legal rights, making the identification of many inventors difficult.

In 1871 John Calvin Moss of New York pioneered a commercially feasible photoengraving method for translating line artwork into metal letterpress plates. A negative of the original illustration was made on a copy camera suspended from the ceiling by a rope to prevent vibration (Fig. 9–28). In a highly secret process, a negative of the original art was contact-printed to a metal plate coated with a light-sensitive gelatin emulsion, then etched with acid. After hand-tooling for refinement, the metal plate was mounted on

a type-high block of wood. The gradual implementation of photoengraving cut the cost and time required to produce printing blocks and achieved greater fidelity to the original.

Before it was possible to print photographs, photography was used as a research tool in developing wood-engraved illustrations. The documentary reality of photography helped illustrators capture current events. During the 1860s and 1870s wood engravings drawn from photographs became prevalent in mass communications (Figs. 9–29 and 9–30). An example is found in the photograph *Freedmen on the Canal Bank in Richmond*, attributed to Mathew Brady. Arriving in Richmond, Virginia, shortly after the evacuation and destruction by fire of most of the business district on 2 April 1865, when the Union forces broke through the Confederate defenses of the city, Brady turned his camera upon a group of former slaves who suddenly found themselves freedmen. A moment in time was preserved; a historical document to help people understand their history was formed with the timeless immediacy of photography. As the means to reproduce this image was not yet available, *Scribner's* magazine turned to an illustrator to reinvent the image in the language of the wood engraving so that it could be reproduced.

Beginning with Talbot, researchers believed a photographic printing plate could print the subtle nuances of tone found in a photograph if a screen changed continuous tones into dots of varying sizes. Then, tones could be achieved in spite of the even ink application of the relief press. During the 1850s Talbot experimented with gauze as a way to break up tones.

Many individuals worked on the problem and contributed to the evolution of this process. A major breakthrough occurred on 4 March 1880, when the *New York Daily Graphic* printed the first reproduction of a photograph with a full tonal range in a newspaper (Figs. 9–31 and 9–32). Entitled *A Scene in Shantytown*, it was printed from a crude *halftone screen* invented by Stephen H. Horgan. The screen broke the image into a series of minute dots whose varying sizes created tones. Values from pure white paper to solid black ink were simulated by the amount of ink printed in each area of the image.

9–29. Attributed to Mathew Brady, photograph, "Freedmen on the Canal Bank at Richmond," 1865. The photographer supplied the visual evidence needed by the illustrator to document an event.

9–30. John Macdonald, wood engraving, Freedmen on the Canal Bank at Richmond. The tonality of the photographer's image was reinvented with the visual syntax of wood-engraved line.

9–31 and 9–32. Stephen H. Horgan, experimental photoengraving, 1880. This first halftone printing plate to reproduce a photograph in a newspaper heralded the potential of photography in visual communications.

9–33. David O. Hill and Robert Adamson, Reverend Thomas H. Jones, c. 1845. The painter's attention to lighting, characterization, placement of hands and head, and composition within the rectangle replaced the mug-shot sensibility of earlier photographers.

9–34. Julia Margaret Cameron, "Sir John Herschel," 1867. Moving beyond descriptive imagery, Cameron's compelling psychological portraits revealed her subjects' inner being.

Frederick E. Ives (1856–1937) of Philadelphia developed an early halftone process and worked on the first commercial production of halftone printing plates in 1881. The sum of all the minute dots produced the illusion of continuous tones. Later Ives joined brothers Max and Louis Levy to produce consistent commercial halftones using etched glass screens. A ruling machine was used to inscribe parallel lines in an acid-resistant coating on optically clear glass. After acid was used to etch the ruled lines into the glass, the indentations were filled with an opaque material. Two sheets of this ruled glass were sandwiched, face to face, with one set of lines running horizontally and the other set running vertically. The amount of light

passing through each little square formed by the lines determined how big each dot would be. Halftone images could be made from these screens, and the era of photographic reproduction had arrived.

The first photomechanical color illustrations were printed in the 1881 Christmas issue of the Paris magazine *L'llustration*. Complicated and time-consuming, photomechanical color separation remained experimental until the end of the century. During the 1880s and 1890s, photomechanical reproduction began to rapidly make obsolete the highly skilled craftsmen who transferred artists' designs to handmade printing plates. Up to a week had been required to prepare a complex wood engraving; the photographic processes reduced the time
from art to printing plate to one or two hours, with greatly
reduced costs.

Defining the medium

During the same decades, when inventors were expanding photography's technical boundaries, artists and adventurers were exploring its image-making potential. Photography accurately reflects the external world, yielding a precise and repeatable image. However, merely isolating a single moment in time was not enough for some nineteenth-century photographers; they defined and extended the aesthetic and communicative frontiers of the new medium.

An early effort to introduce design concerns into photography began in May 1843, when the Scottish painter David Octavius Hill (1802–70) decided to immortalize the 474 ministers who withdrew their congregations from the Presbyterian Church and formed the Free Church of Scotland. Hill teamed up with Edinburgh photographer Robert Adamson (1821–48), who had been making calotypes for about a year. Using forty-second exposures, Hill posed the subjects in sunlight using all knowledge gained in two decades of portraiture (Fig. 9–33). The resulting calotypes were lauded as superior to Rembrandt's paintings. Hill and Adamson also created landscape photographs that echoed the visual order found in landscape paintings of the period.

When Julia Margaret Cameron (1815–79) received a camera and the equipment for processing collodion wet plates as a forty-ninth birthday present from her daughter and son-in-law, the accompanying note said, "It may amuse you, Mother, to photograph." From 1864 until 1874, this wife of a high British civil servant extended the artistic potential of photography through portraiture that recorded "faithfully the greatness of the inner man as well as the features of the outer man." (Fig. 9–34)

A lively contribution to photography was made by the Frenchman F. T. Nadar (1820–1910). His portraits of writers, actors (Fig. 9–35), and artists have a direct and dignified simplicity and provide an invaluable historical record.

In 1886 the first photographic interview was published in *Le journal illustré* (Fig. 9–36). Nadar's son Paul made a series of twenty-one photographs as Nadar interviewed the eminent hundred-year-old scientist Michel Eugène Chevreul. The elderly man's expressive gestures accompanied his answers to Nadar's questions.

Photography as reportage

9–35. F. T. Nadar, "Sarah Bernhardt," 1859. The famous actress took Paris by storm and became a major subject for the emerging French poster.

9–36. Paul Nadar, "Nadar Interviewing Chevreul," 1886. The words spoken by the one-hundred-year-old chemist were recorded below each photograph to produce a visual-verbal record of the interview.

9–37. Mathew Brady, “Dunker Church and the Dead,” 1862. Made in the aftermath of the Battle of Antietam, the bloodiest battle of the Civil War, this photograph shows how visual documentation took on a new level of authenticity with the arrival of photography.

9–38. Timothy H. O’Sullivan, “Sand Dunes near Sand Springs, Nevada,” 1867. The virgin territory of the American West was documented by expedition photographers. O’Sullivan’s photography wagon—isolated by the almost Asian space of the sand dunes—becomes a symbol of these lonely journeys over vast distances.

9–39. Eadweard Muybridge, plate published in The Horse in Motion, 1883. Sequence photography proved the ability of graphic images to record time-and-space relationships. Moving images became a possibility.

The ability of photography to provide a historical record and define human history for forthcoming generations was dramatically proven by the prosperous New York studio photographer Mathew Brady (c. 1823–96). When the American Civil War began, Brady set out in a white duster and straw hat carrying a handwritten card from Abraham Lincoln reading “Pass Brady—A. Lincoln.” During the war Brady invested a $100,000 fortune to send a score of his photographic assistants, including Alexander Gardner (1821–82) and Timothy O’Sullivan (c. 1840–82), to document the American Civil War. From Brady’s photography wagons, called “Whatsit” by the Union troops, a great national trauma was etched forever in the collective memory. Brady’s photographic documentation had a profound impact upon the public’s romantic ideal of war (Fig. 9–37). Battlefield photographs joined artist’s sketches as reference materials for wood-engraved magazine and newspaper illustrations.

After the Civil War, photography became an important documentary and communications tool in the exploration of new territory and the opening of the American West. Photographers, including O’Sullivan, were hired by the federal government to accompany expeditions into the unexplored western territories (Fig. 9–38). From 1867 until 1869, O’Sullivan accompanied the Geological Exploration of the Fortieth Parallel, beginning in western Nevada. Returned to the East and translated into illustrations for reproduction, images of the West inspired the great migratory wanderlust that eventually conquered all of North America.

An adventurous photographer, Eadweard Muybridge (1830–1904) lived in San Francisco and photographed Yosemite, Alaska, and Central America. Leland Stanford, a former governor of California and the president of the Central Pacific Railroad, commissioned Muybridge to document his belief that a trotting horse lifted all four feet off the ground simultaneously; a $25,000-dollar wager rested on the outcome. While working on the problem, Muybridge became interested in photographing a horse’s stride at regular intervals. Success came in 1877 and 1878, when a battery of twenty-four cameras—facing an intense white background in the dazzling California sunlight—was equipped with rapid drop shutters that were slammed down by springs and rubber bands as a trotting horse broke threads attached to the shutters. The resulting sequence of photographs arrested the horse’s movement in time and space, and Stanford, a breeder and racer of trotters, won the bet (Fig. 9–39). The development of motion-picture photography, the kinetic medium of changing light passing through a series of still photographs joined together by the human eye through the persistence of vision, was the logical extension of Muybridge’s innovation.

Nineteenth-century inventors like Talbot, documentalists like Brady, and visual poets like Cameron had a significant collective impact upon graphic design. By the arrival of the twentieth century, photography was becoming an increasingly important reproduction tool. New technologies radically altered existing ones, and both printing techniques and illustration changed dramatically. As photomechanical reproduction replaced

handmade plates, illustrators gained a new freedom of expression. Photography gradually monopolized factual documentation and pushed the illustrator toward fantasy and fiction. The textural and tonal properties of the halftone image changed the visual appearance of the printed page.

9–40. Title page for The Pencil of Nature, 1844. This design demonstrates the eclectic confusion of the Victorian era. Medieval letterforms, baroque plant designs, and Celtic interlaces are combined into a dense symmetrical design.

9–41. Sir Charles Barry with A. W. N. Pugin, The House of Lords in the British Houses of Parliament, constructed 1840–67. The Gothic Revival evolved from ornamental details inspired by Gothic architecture.

9–42. Owen Jones, color plate from The Grammar of Ornament, 1856. This plate shows patterns found in the arts and crafts of India.

Popular graphics of the Victorian era

The reign of Victoria (1819–1901), who became queen of the United Kingdom of Great Britain and Ireland in 1837, spanned two-thirds of the nineteenth century. The Victorian era was a time of strong moral and religious beliefs, proper social conventions, and optimism. “God’s in his heaven, all’s right with the world” was a popular motto. The Victorians searched for a design spirit to express their epoch. Aesthetic confusion led to a number of often contradictory design approaches and philosophies mixed together in a scattered fashion (Fig. 9–40). A fondness for the Gothic, which suited the pious Victorians, was fostered by the English architect A. W. N. Pugin (1812–52), who designed the ornamental details of the British Houses of Parliament (Fig. 9–41). The first nineteenth-century designer to articulate a philosophy, Pugin defined design as a moral act that achieved the status of art through the designer’s ideals and attitudes; he believed the integrity and character of a civilization were linked to its design. Although Pugin said he looked to earlier periods—particularly the Gothic—not for style but for a principle, the net result of his influence was a wide mimicking of Gothic architecture, ornament, and letterforms.

The English designer, author, and authority on color Owen Jones (1809–74) became a major design influence at midcentury. During his mid-twenties Jones traveled to Spain and the Near East and made a systematic study of Islamic design. Jones introduced Moorish ornament to Western design in his 1842–45 book, *Plans, Elevations, Sections, and Details of the Alhambra.* His main influence was through his widely studied 1856 book of large color plates, *The Grammar of Ornament* (Fig. 9–42). This catalog of design possibilities from Eastern and Western cultures, “savage” tribes, and natural forms became the nineteenth-century designer’s bible of ornament. The Victorian love of exorbitant complexity was expressed by gingerbread woodwork applied to domestic architecture, ornate, extravagant embellishments on manufactured products from silverware to large furniture, and elaborate borders and lettering in graphic design.

In the 1850s the word Victorian began to be used to express a new consciousness of the industrial era’s spirit, culture, and moral standards. In 1849 Prince Albert, husband of Queen Victoria, conceived the idea of a grand exhibition with hundreds of exhibitors from all industrial nations. This became the Great Exhibition of 1851, an important summation of the progress of the Industrial Revolution and a catalyst for future developments. Six million visitors reviewed the products of thirteen thousand exhibitors. This event is commonly called the Crystal Palace Exhibition, after the 800,000-square-foot steel and glass prefabricated exhibition hall that remains a landmark in architectural design.

Victorian graphic design captured and conveyed the values of the era. Sentimentality, nostalgia, and a canon of idealized beauty were expressed through printed images of children, maidens, puppies, and flowers. Traditional values of home, religion, and patriotism were symbolized with sentimentality and

piety. The production medium for this outpouring of Victorian popular graphics was *chromolithography*, an innovation of the Industrial Revolution that unleashed a flood of colorful printed images.

The development of lithography

Lithography (from the Greek, literally "stone printing") was invented by Bavarian author Aloys Senefelder (1771–1834) in 1796. Senefelder sought a cheap way to print his own dramatic works by experimenting with etched stones and metal reliefs. He eventually arrived at the idea that a stone could be etched away around grease-pencil writing and made into a relief printing plate. His experiments, however, culminated in the invention of lithographic printing, in which the image to be printed is neither raised, as in relief printing, nor incised, as in intaglio printing. Rather, it is formed on the flat plane of the printing surface. Printing from a flat surface is called *planographic* printing.

Lithography is based on the simple chemical principle that oil and water do not mix. An image is drawn on a flat stone surface with oil-based crayon, pen, or pencil. Water is spread over the stone to moisten all areas except the oil-based image, which repels the water. Then an oil-based ink is rolled over the stone, adhering to the image but not to the wet areas of the stone. A sheet of paper is placed over the image and a printing press is used to transfer the inked image onto the paper. In the early 1800s Senefelder began experimenting with multicolor lithography, and in his 1819 book he predicted that one day this process would be perfected to allow reproduction of paintings.

Since the time of medieval block books, applying color to printed images by hand had been a slow and costly process. German printers spearheaded color lithography, and the French printer Godefroy Engelmann patented a process named *chromolithographie* in 1837. After analyzing the colors contained within the original image, the printer separated them into a series of printing plates and printed these component colors, one by one. Frequently, one printing plate (often black) established the image after separate plates printed other colors. The arrival of color printing had vast social and economic ramifications.

The Boston school of chromolithography

American chromolithography began in Boston, where several outstanding practitioners pioneered a school of lithographic naturalism. They achieved technical perfection and imagery of compelling realism.

In 1846 the American inventor and mechanical genius Richard M. Hoe (1812–86) perfected the rotary lithographic press (see Fig. 9–47), which was nicknamed "the lightning press" because it could print six times as fast as the lithographic flatbed presses then in use. This innovation proved an important boost in lithography's competition with letterpress. Economical color printing, ranging from art reproductions for middle-class parlors to advertising graphics of every description, poured from the presses in millions of impressions each year.

The next major innovator of chromolithography in Boston was John H. Bufford (d. 1870), a masterly draftsman whose crayon-style images achieved a remarkable realism. After

9–43. John H. Bufford's Sons, "Swedish Song Quartett" poster, 1867. Arced words move gracefully above seven carefully composed musicians. Large capital letters point to the three soloists, establishing a visual relationship between word and image.

9–44. S. S. Frizzall (artist) and J. H. Bufford's Sons (printers), poster for the Cleveland and Hendricks presidential campaign, 1884. The loose style of the flags and other symbolic imagery framing the candidates emphasizes the extreme realism of the portraits.

training in Boston and working in New York, Bufford returned to Boston in 1840. Specializing in art prints, posters, covers, and book and magazine illustrations, Bufford often used five or more colors. The meticulous tonal drawing of his black stone always became the master plate. For an edition such as the c. 1867 “Swedish Song Quartett” [sic] poster (Fig. 9–43), for example, the original master tonal drawing was precisely duplicated on a lithographic stone. Then, separate stones were prepared to print the flesh tones, red, yellow, blue, and the slate-gray background. Browns, grays, and oranges were created when these five stones were overprinted in perfect registration. The color range of the original was separated in component parts, then reassembled in printing. The near-photographic lithographic crayon drawing glowed with the bright underprinted yellows and reds of the folk costumes.

In 1864, Bufford’s sons entered his firm as partners. The senior Bufford maintained artistic direction responsibilities until his death in 1870. Hallmarks of Bufford designs were meticulous and convincing tonal drawing and the integration of image and lettering into a unified design. In their political campaign graphics, such as the poster for Grover Cleveland and Thomas A. Hendricks in the 1884 presidential campaign (Fig. 9–44), a rich vocabulary of patriotic motifs, including eagles, flags, banners, columned frames, and Liberty clothed in the flag, were used to establish a patriotic tone. The Bufford firm folded in 1890. The two decades following the founder’s death were a period of declining quality, cut-rate pricing, and emphasis on cheap novelties.

American lithography maintained its German heritage. Excellent Bavarian lithographic stones—and the highly skilled craftsmen who prepared them for printing—were exported from Germany to nations around the world. The Düsseldorf Academy of Art, with a curriculum based on rigorous academic drawing, was the major training school for artists who created images for lithographic printing. The four decades from 1860 until 1900 were the heyday of chromolithography as it dominated color printing. Victorian graphics found a most prolific innovator in a German immigrant to America, Louis Prang (1824–1909), whose work and influence were international. After mastering the complexities of his father’s fabric-printing business, twenty-six-year-old Prang arrived in America in 1850 and settled in Boston. His knowledge of printing chemistry, color, business management, designing, engraving, and printing itself was of great value when he formed a chromolithography firm with Julius Mayer in 1856. Initially Prang designed and prepared the stones and Mayer did the printing on a single hand press. Prang’s colorful work was very popular, and the firm grew rapidly. There were seven presses when Prang bought Mayer’s share and changed its name to L. Prang and Company in 1860.

Popular narrative and romantic painting of the Victorian era was closely linked with the graphic illustration of chromolithographers, including Prang, who often commissioned art and held competitions to acquire subjects for printed images. In addition to art reproductions and Civil War maps and scenes, Prang produced literally millions of album cards called *scrap*. Collecting these “beautiful art bits” was a major Victorian pastime, and Prang’s wildflowers, butterflies, children, animals, and birds became the ultimate expression of the period’s love for sentimentalism, nostalgia, and traditional values.

Prang’s meticulously drawn, naturalistic images followed in the tradition of Sharp and Bufford. He has been called the father of the American Christmas card for his pioneering work in holiday graphics. The earliest Christmas card, however, is thought to be an 1843 hand-tinted, dark sepia lithograph by British painter John Callcott Horsley (1817–1903).

After producing Christmas images suitable for framing in the late 1860s, Prang published an English Christmas card in 1873 and American Christmas cards the following year. Typical images included Santa Claus, reindeer, and Christmas trees. A full line of designs followed, and Easter, birthday, Valentine, and New Year’s Day cards were produced annually by L. Prang and Company during the early 1880s. Prang sometimes used as many as forty stones for one design. Exceptional quality was achieved by dropping

Bufford's master black plate in favor of a slow building and heightening of the image through the use of many plates bearing subtle colors.

Album cards evolved into advertising trade cards in the 1870s. Prang's distribution of twenty to thirty thousand business cards with floral designs at the 1873 Vienna International Exhibition popularized chromolithographic advertising cards. Sold in bulk, trade cards enabled merchants or manufacturers to imprint an advertising message on the back or in an open area on the front.

Prang made a lifelong contribution to art education after giving his daughter art lessons in 1856. Unable to find high-quality, nontoxic art materials for children, Prang began to manufacture and distribute watercolor sets and crayons. Finding a complete lack of competent educational materials for teaching industrial artists, fine artists, and children, he devoted tremendous energy to developing and publishing art-instruction books. On two occasions, he ventured into magazine publishing: *Prang's Chromo* was a popular art journal first published in 1868, and *Modern Art Quarterly,* published from 1893 until 1897, verified Prang's ability to grow and explore new artistic possibilities in his old age.

The design language of chromolithography

From Boston, chromolithography quickly spread to other major cities, and by 1860 about sixty chromolithography firms employed eight hundred people. Phenomenal growth put chromolithographers in every American city, and by 1890 over eight thousand people were employed by seven hundred lithographic printing firms. Figure 9–45 shows diverse chromolithographs produced by Prang and his competitors, including the label from a can of beans, a nursery catalogue cover, an early Christmas card, a die-cut friendship card album, and advertising trade cards.

Letterpress printers and admirers of fine typography and printing were appalled that the design was done on the artist's drawing board instead of the compositor's metal press bed. Without traditions and lacking the constraints of letterpress, designers could invent any letterform that suited their fancy and exploit an unlimited palette of bright, vibrant color never before available for printed communications.

The vitality of this graphic revolution stemmed from the talented artists who created the original designs, frequently working in watercolor, and the skilled craftsmen who traced the original art onto the stones. They translated designs into five, ten, twenty, or even more separate stones. Colored inks applied to these stones came together in perfect registration, recreating hundreds or even thousands of glowing duplicates of the original. The lithography firm, rather than the individual artists or craftsmen who created the work, was credited on chromolithographs, and the names of many designers are lost to history.

The Butterfly Brand can label and "peacock" trade card in Figure 9–45 demonstrate the integration of illustration with decorative patterns derived from *Jones's Grammar of Ornament*. The upper left corner of the "peacock" trade card is being peeled away to reveal a geometric pattern underneath. Trompe-l'oeil devices such as this delighted nineteenth-century graphic artists. In the premium booklet *Our Navy* (Fig. 9–46), commissioned by the Allen & Ginter Company, montages use complex three-dimensional ornaments and ribbons as compositional devices unifying the layouts by tying disparate elements together as they move forward and backward in illusionistic space. A poster for the Hoe printing press (Fig. 9–47) demonstrates a new freedom in lettering: lines of lettering become elastic, running in arcs or at angles, and even overlap images; blended and graduated colors flow on lettering and backgrounds; and ruled borders are free to notch and curve
at will.

Traveling amusements such as circuses and carnivals commissioned large posters to herald their arrival. Producers of entertainment spectaculars favored dramatic illustrations with bold, simple lettering placed on brightly colored backgrounds and borders. The bright yellow band at the top of the Carry-Us-All carousel poster (Fig. 9–48) was left blank to provide a place for local printers to imprint the dates and location of

the carnival's visit. The Victorian passion for allegory and personification is seen in a Cincinnati Industrial Exposition poster (Fig. 9–49). In a mythic scene in front of the exhibition hall, an allegorical figure representing the Queen City, as Cincinnati called itself, accepts machinery, agricultural products, and manufactured goods from symbolic figures representing the various states participating in the exhibition.

9–45. L. Prang and Company and others, c. 1880–early 1900s. This collection shows a range of graphic ephemera printed by chromolithography.

9–46. Schumacher & Ettlinger, lithographers, cover and pages from Our Navy premium booklet, 1888. Complex illusions are created by contrasting scale and perspective.

9–47. Forst, Averell & Co., poster for the Hoe printing press, 1870. This press made mass editions of chromolithographs possible.

9–48. The Riverside Print Company of Milwaukee, poster for
C. W. Parker Company's Carry-Us-All portable carousels, undated. Parker's carousels, manufactured in Kansas, were very popular in midwestern nomadic carnivals.

9–49. Krebs Lithographing Company, poster for the Cincinnati Industrial Exposition, 1883. A buoyant optimism in industrial progress is conveyed.

Complex montage designs promoting traveling shows, literary works, and theatrical performances (Fig. 9–50) engaged viewers. Compared to contemporary posters, these advertisements were designed for greater viewing time because of the slower pace of nineteenth-century life and the relative lack of competition from other colorful images.

Labels and packages became important areas for chromolithography (Fig. 9–51). Lithographing on tin sheets to make packages posed significant technical difficulties. Nonporous metal could not absorb printing inks, and sheet-metal and stone printing surfaces were equally hard and inflexible. At midcentury, transfer printing processes were developed. Reversed images were printed onto thin paper, then transferred onto sheet metal under great pressure. The paper backing was soaked off, leaving printed images on the tin plate. In 1875 Englishman Robert Barclay received a patent for offset lithographic printing on tin. Ink applied to an image drawn on a stone was picked up by a nonabsorbent cardboard impression cylinder, then immediately offset onto the sheet metal. Later Barclay used a rubber-coated cylinder to imprint the metal. Printed tin packages for food and tobacco products were widely used throughout Europe and North America during the late nineteenth and early twentieth centuries.

By century's end, the golden era of chromolithography was coming to a close. Changing public tastes and the development of photoengraving were making the use of chromolithography from hand-prepared stones obsolete. The decline can be marked by the year 1897, when Prang—mindful of the revolution in design sensibilities and technology—merged his firm with Clark Taber & Company, a printing firm specializing in the new photographic-process reproduction of artwork. Also, the famous lithographic art reproduction firm of Currier & Ives went bankrupt shortly after the turn of the century.

The battle on the signboards

The letterpress poster and broadsheet were challenged in the middle of the nineteenth century by a more visual and pictorial poster. Lithography was the graphic medium allowing a more illustrative approach to public communication.

The letterpress printers responded to competition from the fluid and colorful lithographs being pasted on the signboards by midcentury with heroic and ingenious efforts to extend their medium. Witness, for

example, the enormous multicolored woodcut poster designed by Joseph Morse of New York for the Sands, Nathan and Company Circus in 1856 (Fig. 9–52). Large woodblocks were printed in sections to be assembled by the poster hangers.

9–50. W. J. Morgan and Co., Cleveland, lithographic theater poster, 1884. Montaged illustrations become overlapping planes with varied scale and spatial depth.

9–51. Package designs chromolithographed on tin for food and tobacco products used bright flat colors, elaborate lettering, and iconic images to create an emblematic presence for the product.

9–52. Joseph Morse, multicolored woodcut poster, 1856. The heroic scale—262 by 344 centimeters (8.5 by 11 feet)—permitted life-sized figures to tower before the headline "Five Celebrated Clowns Attached to Sands, Nathan Co.'s Circus."

9–53. Morris Pére et Fils (letterpress printers) and Emile Levy (lithographer), "Cirque d'hiver" poster, 1871. Performers are presented as surreal butterfly women.

9–54. Walter Crane, page from Walter Crane's Absurd A.B.C., 1874. Animated figures are placed against a black background; large letterforms are integrated with the imagery.

In his work from the 1860s, James Reilley of New York designed ingenious ways to increase the pictorial impact of the letterpress poster. The 1866 poster for John O'Brien's Consolidated Six Shows is an excellent example of Reilley's imaginative design solutions. In France, letterpress poster houses and lithographers collaborated as colorful lithographic illustrations were pasted onto large wood-type posters. A masterpiece of this genre is the 1871 "Cirque d'hiver" (Winter Circus) poster (Fig. 9–53). The Morris Père et Fils printing firm commissioned a lithographer, Emile Levy, to illustrate an acrobatic dance act called Les Papillons (The Butterflies). The spectacular finale of this crowd-thrilling act featured two young female performers, one black and one white, being hurled through the air. Levy illustrated them as surreal butterfly women.

Images for children

Before the Victorian era, Western countries had a tendency to treat children as "little adults." The Victorians developed a more tender attitude, and this was expressed through the development of *toy books*, colorful picture books for preschool children. Several English artists produced books that were well designed and illustrated, with a restrained use of color, establishing an approach to children's graphics that is still in use today.

It is generally acknowledged that Walter Crane (1845–1915) was one of the earliest and the most influential designers of children's picture books (Fig. 9–54). Apprenticed as a wood engraver as a teenager, Crane was twenty years old in 1865 when his *Railroad Alphabet* was published. A long series of his toy books broke with the traditions of printed material for children. Earlier graphics for children insisted on a didactic or moral purpose, and always taught or preached to the young; Crane sought only to entertain. He was the first to be influenced by the Japanese woodblock and introduced it into Western art. After acquiring some Japanese prints from a British sailor in the late 1860s, Crane drew inspiration from the flat color and flowing contours. His unprecedented designs prompted numerous commissions for tapestries, stained-glass windows, wallpaper, and fabrics. Crane remained active into the twentieth century. He played an important role in the Arts and Crafts movement, discussed in chapter 10, and had a significant impact on art and design education.

9–55. Randolph Caldecott, illustration from Hey Diddle Diddle, c. 1880. Oblivious to the outlandish elopement, Caldecott's dancing dinnerware moves to a driving musical rhythm.

9–56. Kate Greenaway, page from Under the Window, 1879. By leaving out the background, Greenaway simplified her page designs and focused on the figures.

9–57. Joseph A. Adams, page from Harper's Illuminated and New Pictorial Bible, 1846. In the first page of the Old and the New Testaments, the two-column format with a central margin for annotation was disrupted by centering the first few verses.

As a bank clerk in his twenties, Randolph Caldecott (1846–86) developed a passion for drawing and took evening lessons in painting, sketching, and modeling. A steady stream of freelance assignments encouraged him to move to London and turn professional at the age of twenty-six. He possessed a unique sense of the absurd, and his ability to exaggerate movement and facial expressions of both people and animals brought his work to life. Caldecott created a world where dishes and plates are personified, cats make music, children are at the center of society, and adults become servants. His humorous drawing style became a prototype for children's books and later for animated films. (Fig. 9–55).

Kate Greenaway's (1846–1901) expressions of the childhood experience captured the imagination of the Victorian era. As a poet and illustrator, Greenaway created a modest, small world of childhood happiness; as a book designer, she sometimes pushed her graceful sense of page layout to innovative levels (Fig. 9–56). Silhouetted images and soft colors created pages of great charm, while the use of white space and asymmetrical balance broke with the Victorian tendency for clutter.

The clothes Greenaway designed for her models had a major influence on children's fashion design. Walter Crane, however, complained that Greenaway "overdid the big bonnet, and her little people are almost lost in their clothes." For Greenaway, childhood became an idealized fantasy world, and the Victorian love of sentiment and idealization made her an internationally renowned graphic artist whose books are still in print.

The rise of American editorial and advertising design

James (1795–1869) and John (1797–1875) Harper used modest savings—and their father's offer to mortgage the family farm if necessary—to launch a New York printing firm in 1817. Their younger brothers Wesley (1801–70) and Fletcher (1807–77) joined the firm in 1823 and 1825 respectively. Eighteen-year-old Fletcher Harper became the firm's editor when he became a partner, and the company's own publishing ventures grew dramatically over the decades. By midcentury, Harper and Brothers had become the largest printing and publishing firm in the world. In the role of senior editor and manager of publishing activities, Fletcher Harper shaped graphic communications in America for half a century.

Inventive book design was not a concern for most publishing firms in America and Europe, including Harper and Brothers, during most of the nineteenth century. With the rapid expansion of the reading public, and the economies resulting from new technologies, publishers focused on large press runs and modest prices. Modern-style fonts, often second-rate derivatives of Bodoni and Didot designs, were composed in workaday page layouts.

During the 1840s Harper and Brothers launched a monumental project that became the young nation's finest achievement of graphic design and book production to date. *Harper's Illuminated and New Pictorial Bible,* printed on presses specially designed and built for its production, contained 1,600 wood engravings from illustrations by Joseph A. Adams (Fig. 9–57). Its publication in fifty-four installments of twenty-eight pages each was heralded by a carefully orchestrated advertising campaign. Each segment was hand-sewn and hand-bound in heavy paper covers printed in two colors.

During the preliminary preparations for this work, Adams invented an electrotyping process. This involved pressing the wood engraving into wax to make a mold, which was dusted with graphite to make it electroconductive. Then an electrodeposit of metal (usually copper) was made in the mold. The resulting thin shell was backed with lead, and this harder printing surface enabled Harper to publish fifty thousand copies in installments. A hardbound edition of twenty-five thousand copies with hand-tooled gold gilding on morocco leather binding was sold after the series of installments was completed. The format consisted of two columns of text with a central margin bearing annotations. Illustrations included large images two columns wide, contained in ornate Victorian frames, and hundreds of spot illustrations dropped into the text. Every chapter opened with an illuminated initial.

The firm opened the era of the pictorial magazine in 1850 when the 144-page *Harper's New Monthly Magazine* (Fig. 9–58) began publication with serialized English fiction and numerous woodcut illustrations created for each issue by the art staff. The monthly magazine was joined by a weekly periodical that functioned as a newsmagazine, *Harper's Weekly*, in 1857. *Harper's Bazar* [sic] for women was founded in 1867, and the youth audience was addressed by *Harper's Young People* in 1879. *Harper's Weekly* billed itself as "a journal of civilization" and developed an elaborate division of shop labor for the rapid production of woodblocks for printing cartoons and graphic reportage (Fig. 9–59) based on drawings from artist/correspondents, including Thomas Nast (1840–1902).

Nast, a precociously talented artist, had switched from public school to art school after the sixth grade and began his career as a four-dollar-per-week staff illustrator for *Leslie's Weekly* when he was fifteen years old. Fletcher Harper hired him when he was twenty-two to make battlefield sketches during the Civil War. The power of his work was such that President Abraham Lincoln called Nast "the best recruiting sergeant" and General Ulysses S. Grant declared that Nast had done as much as anyone to bring the conflict to a close. Public response to Nast's work was a major factor in propelling *Harper's Weekly*'s circulation from one hundred thousand to three hundred thousand copies per issue.

After the war Nast remained with *Harper's Weekly*, where he drew his images directly on the woodblock in reverse for the craftsmen to cut. His deep social and political concerns led him to strip away detail and introduce symbols and labels for increased communicative effectiveness in his work. He has been called the father of American political cartooning. The graphic symbols Nast popularized and focused include a number of important images: Santa Claus, John Bull (as a symbol for England), the Democratic donkey, the Republican elephant, Uncle Sam, and Columbia (a symbolic female signifying democracy that became the prototype for the Statue of Liberty).

Nast also took on the governmental corruption of the political boss William Marcy Tweed, who controlled New York politics from infamous Tammany Hall. Tweed claimed that he did not care what the papers wrote because voters couldn't read, but "they could sure see them damn pictures." Nast's relentless graphic attack culminated on election day in a double-page cartoon of the "Tammany tiger" loose in the Roman Colosseum, devouring liberty, while Tweed as the Roman emperor surrounded by his elected officials presided over the slaughter (Fig. 9–60). The opposition won the election.

After Fletcher Harper died in 1877, a more conservative editorial staff took over the magazine, leading Nast to declare that "policy always strangles individuals." President Theodore Roosevelt recognized the effectiveness of Nast's graphics for the Republican Party by appointing him consul general to Ecuador, where he died of yellow fever six months after his arrival.

Charles Parsons became the art editor of Harper and Brothers in 1863, and he helped raise the standard of pictorial images in the company's publications. Parsons had a superb eye for young talent, and one illustrator he brought along was Charles Dana Gibson (1867–1944), whose images of young women (Fig.

9–61) and square-jawed men established a canon of physical beauty in the mass media that endured for decades.

9–58. Richard G. Tietze, poster for Harper's Magazine, 1883. An impressionistic quality is achieved in an illustration divided into three zones, with the middle holly area providing a background for the message while separating the images.

9–59. After A. H. Wald, cover for Harper's Weekly, 1864. Engraved after a sketch by a "visual journalist" in the field, this cover is a forerunner of newsmagazine coverage of current events.

9–60. Thomas Nast, political cartoon from Harper's Weekly, 1871. This double-page image was posted all over New York City on
election day.

9–61. Charles Dana Gibson, poster for Scribner's, 1895. Although the exquisite beauty of the "Gibson Girls" was captured with facility and control, Gibson was unconcerned with the design of type and image as a cohesive whole. In this poster the printer added text in incompatible typefaces.

Among the many illustrators encouraged by Parsons, Howard Pyle (1853–1911) had the broadest influence. Pyle's own work and remarkable gifts as a teacher made him the major force that launched the period called the Golden Age of American Illustration. Spanning the decades from the 1890s until the 1940s, this period in the history of visual communications in America was largely dominated by the illustrator. Magazine art editors selected the illustrators, whose work overshadowed rather routine typographic formats. Advertising layouts often served as guides for the illustrator, indicating how much room to leave for the type.

Pyle published over 3,300 illustrations and two hundred texts ranging from simple children's fables to his monumental four-volume *The Story of King Arthur and His Knights.* The meticulous research, elaborate staging, and historical accuracy of Pyle's work (Fig. 9–62) inspired a younger generation of graphic artists to carry forward the tradition of realism in America. The impact of photography, the new communications tool, on graphic illustration can be traced in Howard Pyle's career, which evolved with the new reproduction technologies. He was twenty-three years old when he received his first illustration commission from *Scribner's Monthly* in 1876. As with most magazine and newspaper illustration of the time, this ink-line drawing was turned over to a wood engraver to be cut into a relief block that could be locked in place with type and printed by letterpress.

A decade later, in 1887, Pyle was thirty-four years old when he received his first commission for a tonal illustration. The new photomechanical halftone process made possible the conversion of the blacks, whites, and grays in Pyle's oil and gouache painting into minute black dots that were blended by the human eye to produce the illusion of continuous tone. In addition to this process's impact upon engravers, illustrators were faced with the need either to shift from pen-and-ink art to tonal, painted illustrations or to face a dwindling market for their work.

Another advance occurred for Pyle in 1893, when the forty-year-old illustrator created his first two-color illustration. The image was printed from two halftone plates. One impression was in black ink and the other—shot with a filter—separated the red tones from the blacks and grays. This plate was inked with a red ink closely matched to Pyle's red paint. Four years later, in 1897, Pyle had a first opportunity to apply his spectacular sense of color to a full-color illustration assignment. This image was printed by the developing four-color process system. All of Pyle's full-color illustrations were painted during the fourteen years from 1897 until his death at age fifty-eight in 1911.

Harper's Weekly's leading competitors in the magazine field were the *Century* magazine (1881–1930) and *Scribner's Monthly* (1887–1939). All three of these major periodicals were printed by the printing firm of Theodore Low De Vinne (1824–1914). De Vinne and his staff gave a quiet, dignified, but rather dry layout to all three. In the *Century*, for example, text was set in two columns of ten-point type, and the wood engravings were dropped in adjacent to the appropriate copy. Article titles were merely set in twelve-point all capitals, and centered above the beginning page of the article. De Vinne was dissatisfied with the thin modern typefaces first used in this magazine, so he commissioned type designer Linn Boyd Benton to cut a blacker, more readable face, slightly extended with thicker thin strokes and short slab serifs. Now called Century, this unusually legible style is still widely used today. Its large x-height and slightly expanded characters have made it very popular for children's reading matter.

The rising tide of literacy, plunging production costs, and the growth of advertising revenues pushed the number of newspapers and magazines published in the United States from eight hundred to five thousand between 1830 and 1860. During the 1870s magazines were used extensively for general advertising.

Closely bound to the growth of magazines was the development of advertising agencies. In 1841 Volney Palmer of Philadelphia opened what is considered the first advertising agency. The advertising agency as a consulting firm with an array of specialized skills was pioneered by another Philadelphia advertising agent, N. W. Ayer and Son. In 1875 Ayer gave his clients an open contract that allowed them access to the real rates publications were charging the agencies. Then he received an additional percentage for placing the advertisements. In the 1880s Ayer provided services clients were not equipped to perform and publishers did not offer, such as copywriting. By the end of the century he was well on the way toward offering a complete spectrum of services: copywriting, art direction, production, and media selection.

Many of the conventions of persuasive selling were developed during the last two decades of the nineteenth century. Advertisements from the English and American magazines of the period demonstrate some of these techniques (Fig. 9–63). The design of these pages demonstrate the makeup of Victorian advertising pages with little concern for a total design. By the end of the century, magazines, including *Cosmopolitan* and *McClure's*, were carrying over a hundred pages of advertisements in each monthly issue. Frequently an engraved illustration would have type set above or below it, and often the prevalent practice of chromolithography, superimposing lettering on top of a pictorial image, was adopted by engravers.

On 20 June 1877 the Pictorial Printing Company of Chicago launched a new graphic format when the first issue of *The Nickel Library* hit newsstands throughout America. Called nickel novels or story papers, the weekly publications in this series had action-filled covers interpreting tales of the Civil War and the Western frontier. The typical format was sixteen to thirty-two pages, set with two to four type columns per page. The 20.3 by 30.5–centimeter (8 by 12–inch) page size allowed the artists to create pictures that made a strong visual impact on the news dealer's shelf.

9–62. Howard Pyle, illustration from The Merry Adventures of Robin Hood, 1883. Pyle sought authenticity in every detail of setting, props, costume, and characterization.

9–63. Victorian advertisements, 1880–90. This potpourri ranges from small typographic ads to full-page ads with dominant illustrations.

Victorian typography

As the Victorian era progressed, the taste for ornate elaboration became a major influence on typeface and lettering design. Early nineteenth-century elaborated types were based on letterforms with traditional structure. Shadows, outlines, and embellishments were applied while retaining the classical letter structure (see Fig. 9–49). In the second half of the century, advances in industrial technology permitted metal-type foundries to push elaboration, including the fanciful distortion of basic letterforms, to an extreme degree. To produce more intricate types, punch cutters cut their designs in soft metal, then electroplated them to make a harder punch able to stamp the design into a brass matrix. Chromolithography, with its uninhibited lettering, was a major source of inspiration for foundries and letterpress printers seeking to maintain their share of a fiercely competitive graphic-arts industry.

Berlin-born Herman Ihlenburg (b. 1843) was a major Victorian typeface designer who spent most of his career from 1866 until after the turn of the century with the MacKellar, Smiths & Jordan foundry in Philadelphia, which became a major component of the American Type Founders Company when the monopoly was formed in 1892. MacKellar, Smiths & Jordan played a significant role in the design and production of Victorian display typefaces, and Ihlenburg was a leading member of their design staff. Before the end of the century he designed over eighty display typefaces and cut punches for over thirty-two thousand typographic characters. This is all the more remarkable in light of the extreme complexity of many of his designs (Fig. 9–64).

9–64. Herman Ihlenburg, typeface designs.

9–65. John F. Cumming, typeface designs. The bottom two typefaces show a marked shift in Cumming's design approach under the influence of the Kelmscott Press, which is discussed in chapter 10.

9–66. Trademark for Moss Engraving Company, 1872. Graphic complexity and slogans often embellished Victorian trademarks.

John F. Cumming (b. 1852) designed numerous elaborated typefaces for the Dickinson Type Foundry in Boston (Fig. 9–65), but the passion for ornate Victorian typefaces began to decline in the 1890s, yielding to the revival of classical typography, inspired by the English Arts and Crafts movement (see chapter 10). Cumming rode the tides of change and designed faces derivative of Arts and Crafts designs.

Outlandish and fantasy lettering enjoyed great popularity, and many trademarks of the era reflect the Victorian love of ornamental complexity (Fig. 9–66). Typographic purists view the typeface designs of Ihlenburg, Cumming, and their contemporaries as aberrations in the evolution of typography, a commercial venture intended to give advertisers novel visual expressions to garner attention for their messages while providing foundries with a constant stream of original new typefaces to sell to printers.

The popular graphics of the Victorian era stemmed not from a design philosophy or artistic convictions but from the prevalent attitudes and sensibilities of the period. Many Victorian design conventions could still be found during the early decades of the twentieth century, particularly in commercial promotion.