

### Periodicals

Gannes, Stuart, "Striking it Rich in Biotech," *Fortune*, November 9, 1987, pp. 131-142.

Kanigel, Robert, "The Genome Project," *New York Times Magazine*, December 13, 1987, p. 44.

Liversidge, Anthony, "Interview: Walter Gilbert," *Omni*, November, 1992, pp. 91-101.

—Sketch by George A. Milite

## Frank Gilbreth

1868-1924

American engineer

Frank Gilbreth, best known for his work with construction workers on the efficiency of motion, developed many of the concepts and applications that are now part of modern management techniques. With **Lillian Gilbreth**, his wife and professional partner, he introduced the application of psychology to industrial management. He also developed intricate studies of motion that he adapted for use by injured soldiers and the physically disabled, as well as laborers. His work established that psychology and education are integral parts of successful management.

Frank Bunker Gilbreth was born in Fairfield, Maine on July 7, 1868, to John and Martha Bunker Gilbreth. The Gilbreth family came from a long line of New Englanders; they all lived in the same farming community, where Gilbreth's father ran a hardware business. His father died when Gilbreth was three, and his mother's passion for education led her to move the family twice in search of the best schools, first to Andover, Massachusetts, and then to Boston. Dissatisfied with the grade school Gilbreth attended, she took him home and tutored him herself. He eventually graduated from English High School in Boston in 1885. Gilbreth passed the entrance exams to the Massachusetts Institute of Technology, but he decided not to attend college and went straight into business.

Gilbreth began his career as a bricklayer's apprentice. An attentive observer, he learned by watching the movements of veteran bricklayers that each one used motion in a different way, some more economically than others. It was here that Gilbreth became committed to his lifelong goal—finding "the one best way" of mastering any task. Gilbreth quickly learned every trade in the contracting business. Before

long he was laying stone, estimating costs, working railway construction, and supervising. Gilbreth went to night school to learn mechanical drawing; he advanced to foreman and then to superintendent without the typical three years of apprentice work.

In 1895, at the age of 27, Gilbreth started his own contracting firm. Bricklaying was then being replaced by the use of concrete, and he patented many inventions for the changing construction industry. Among his inventions was a concrete mixer that supplemented early gravity mixers and concrete conveyors. The slogan of his company was "Speed Work," and its goals were the elimination of waste, the conservation of ability, and the reduction of cost. When Gilbreth applied these ideas to the construction of the Lowell Laboratory, he made newspaper headlines with his short construction time. His projects included dams, canals, houses, factory buildings, industrial facilities, and the entire town of Woodland, Maine; he serviced clients all over the United States and eventually expanded his business to England.

### Changes Focus to Industrial Management

In 1903, in Boston, Gilbreth met Lillian Moller, a teacher with a strong professional drive that matched his. They began a twenty-year partnership with their marriage on October 19, 1904. Lillian Gilbreth was the force behind the shift in Frank Gilbreth's career from construction to management. Together they became leaders in the new field of scientific industrial management—writing books and articles, lecturing and teaching, while raising twelve children. He and his wife applied their management techniques to the running of their large household; two of their children would later write humorous accounts of their family life, *Cheaper by the Dozen* and *Belles on Their Toes*.

In 1908, Gilbreth published *Field System*, his first book. The book contained the ideas of the men he employed: he had gathered information by asking his workers to record exactly what they did during the course of the day and what they would recommend for improvement. Written for laborers, the book was the first of its kind, documenting daily organizational and functional practices in construction. It was also the first in a series of similar books by Gilbreth, in which he would provide specific information on work tasks, even using photographic details to show the positions of a worker's feet during certain tasks.

As he integrated his work on the expediency of motion with his wife's concentration on the psychology of the individual, Gilbreth grew less involved in the construction industry. He and his wife began to join their efforts in pursuit of the link between psychology and management, and together they established the fundamental place of psychology and education in effective management. In 1913 the

Gilbreths started the Summer School of Scientific Management, which for four years was attended by academic and industry professionals from around the world. Contacts developed through the school gave Gilbreth an international consulting reputation.

### Innovative Work for the Physically Challenged

The early months of World War I found Gilbreth in Germany, visiting industrial plants, teaching, testing, installing new machines, and establishing laboratories. As injured soldiers began returning to Germany, Gilbreth worked to improve surgical procedures, and he was the first to use motion-picture photography in the operating room for the education of surgeons. He also became an expert in the rehabilitation of injured soldiers. He visited hospitals throughout Europe, watching the motions of the injured soldiers, and developed ways to teach them to manage their daily activities. His paper on this subject, "Motion Study for the Handicapped," was written with his wife and presented at the Tenth Sagamore Sociological Conference in 1917. It included ideas such as a typewriter with all capital letters, eliminating the need for a shift key, which requires two-handed operation. But perhaps the most interesting aspect of Gilbreth's work during this period was the study of the seventeen fundamental motions used to perform physical tasks, such as search, find, select, grasp, and position. He created a visual chart, used to adapt jobs to injured soldiers, that illustrated each fundamental motion, thereby enabling the visual dissection of tasks and the substitution of motions from one task to another.

The increasing intensity of World War I slowed Gilbreth's work abroad, so he concentrated on building a consulting business that catered to the firms he felt most needed his expertise. He shunned companies that treated their employees poorly, believing that bad treatment of the consultant would follow. Gilbreth loathed companies that benefited from his time-saving methods to increase profits only to keep them from their employees, and contracted with companies that promised to increase wages as sales increased, among them Eastman Kodak, U.S. Rubber, and Pierce Arrow. When the United States entered the war, Gilbreth enlisted and received a commission in the Engineers Officers Reserve Corps. He reported to the War College in Washington to prepare educational films for soldier training, but a heart ailment ended his service shortly thereafter. The Gilbreth family bought a small house in Nantucket, Massachusetts, to facilitate his recovery, but from that time on he would carry heart medication with him at all times.

Gilbreth's consulting business thrived after the war. In 1920, the American Society of Mechanical Engineers instituted its Management Division, something Gilbreth had been working to establish for many

years. He was now one of the most widely known American engineers in the United States and Europe, reaping financial rewards and many professional honors. He suggested the first international management congress in history to the American Society of Mechanical Engineers, and it was held in Prague in 1924. He died suddenly of a heart attack shortly afterwards, on June 14, 1924, while traveling from his home in Montclair, New Jersey, to New York City. He was posthumously honored with the Gantt Gold Medal in 1944 from the American Society of Engineers and the American Management Association. The honor was shared and received by his wife.

### SELECTED WRITINGS BY GILBRETH:

#### Books

- Field System*, Myron C. Clark, 1908.  
*Concrete System*, Engineering News, 1908.  
*Bricklaying System*, Myron C. Clark, 1909.  
*Motion Study*, Nostrand, 1911.  
*Primer of Scientific Management*, Nostrand, 1914.  
 (With L. M. Gilbreth) *Fatigue Study: The Elimination of Humanity's Greatest Unnecessary Waste*, Sturgis and Walton, 1916.  
 (With L. M. Gilbreth) *Applied Motion Study*, Sturgis and Walton, 1917.

### SOURCES:

#### Books

- Carey, Ernestine G., and Frank B. Gilbreth, Jr., *Cheaper by the Dozen*, Crowell, 1948, expanded edition, 1963.  
 Carey, Ernestine G., and Frank B. Gilbreth, Jr., *Belles on Their Toes*, Crowell, 1950.  
 Gilbreth, Lillian M., *The Quest of the One Best Way: A Sketch of the Life of Frank Bunker Gilbreth*, Society of Industrial Engineers, 1926.  
 Spriegel, W. R. and C. E. Meyers, editors, *The Writings of the Gilbreths*, Richard D. Irwin, Inc., 1953.  
 Yost, Edna, *Frank and Lillian Gilbreth, Partners for Life*, Rutgers University Press, 1949.

—Sketch by David N. Ford



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