

Bags to Bridges: From Brooklyn to Manhattan, a bridge spanning the East River seemed daring and impossible in 1865. But Emily Roebling's father-in-law drew the plans and lobbied four years for government approval, only to die a month later. It befell Washington, his son, to superintend construction but challenges regarding his abilities arose. Emily, the first woman to do so, addressed the American Society of Civil Engineers to keep the project in the Roebling family. Skilled in mathematics, material strengths, catenary curves, and cable construction, it was rumored that Emily was the brains behind the civil engineering of the Brooklyn Bridge.

She became the "man on the job" just three years into the eleven-year construction project when a decompression disease left Washington partially paralyzed, deaf, unable to speak, and confined to bed. Every day she inspected the work and dispatched construction questions from bridge officials, representatives, and contractors. Many thought she was the Chief Engineer, but she didn't have the title. Washington monitored progress from his window afar, as Emily oversaw the actual construction project. The most adroit architectural drawings do not morph into monumental structures without equally adroit civil engineering.

When the bridge opened in 1883, Emily and Washington were cited equally for its construction by Honorable Abram S. Hewitt. Plaques in both bridge towers honor her skills. Still, Emily's name is sparsely, if at all, included in most references to the Brooklyn Bridge, a bridge John Roebling put on paper and Emily Roebling put over water.

Margaret Knight, recognized as the "female Edison" holds 87 U.S. patents. Her interest in machines and natural ability to create was evidenced early. Born into a poor New England family in 1838, she worked in the cotton mills when nine. At age twelve, after watching a spindle spin off its moorings and horrifyingly injure a little girl, she invented a safety device. It shut down machines to prevent injuries, was installed on all looms in Manchester, New Hampshire, and is standard use today.

Her inventions include the window frame and sash, a spinning and a sewing machine, a machine for cutting shoe soles and five others for shoe manufacturing, a boring tool; and a compound rotary engine, whose rights she handed to the Knight-Davidson Motor Company in New York. But her greatest invention that impacted all our lives is the machine that folds and glues paper into the square bottom paper bag. Until her invention of 1868, paper bags were envelope v-shaped and made by machine. Flat-bottom bags were made by hand and very costly.

During her first week of work in a paper bag company, Knight thought it unusual there was not a machine to fold and glue the flat-bottom bags which functioned better than v-shaped bags. Knight made machine drawings, performed experiments, and built a wooden model which produced thousands of flat-bottom bags. She hired a machinist to cast the iron model needed to apply for a patent. Charles Annan saw her machine being cast into iron, copied it and received its patent. Knight, the first woman to appear before the commissioner of patents in Washington, D.C. fought for her invention evidencing her drawings, records, photos, models, folded bags, and witnesses. The ruling came in her favor.

Founder of the Eastern Paper Bag Company in 1870, workmen installing her equipment reportedly refused her advice griping, “What does a woman know about machines?” Even the Smithsonian did not include “her” models for preservation in the early 1900’s, however, in 1979, seeking original inventions of women, her patent model was found and is now included. Knight is one of twelve women honorably inducted into The National Inventors Hall of Fame which has honorably inducted 316 men.

Sources: www.pausingtoremember.net/Emily's_Bridge.html, *Girls Think of Everything*, Catherine Thimmesch;

<http://inventors.about.com/library/inventors/blknight.htm>

http://www.asme.org/Communities/History/Resources/Knight_Margaret_E.cfm

http://www.bookpage.com/0603bp/children/marvelous_mattie.html