

**PHILOSOPHER, ENGINEER, TYCOON:
JOHN A. ROEBLING AND HIS LEGACY**

An Exhibition

September 26 – December 22, 2006

Special Collections and University Archives
Rutgers University Libraries
New Brunswick, N.J.

INTRODUCTION

John A. Roebling was an inventor, bridge-builder, and founder of the wire rope industry in the United States. In 2006, we celebrate the two-hundredth anniversary of his birth with an exhibition highlighting his achievements, the history of his family, and of the corporation that he founded. John A. Roebling was a brilliant, complex, not always likable figure. An aspiring philosopher, he left thousands of pages of unpublished writings. The bridges and aqueducts he built bear witness to his genius as an engineer, while his far-sighted decision to manufacture wire rope on his farm in Saxonburg, Pennsylvania laid the foundations of an industrial empire. John A. Roebling's greatest project, the Brooklyn Bridge, was ultimately built by his son Washington A. Roebling and Washington's wife Emily. Washington's brothers Carl and Ferdinand Roebling greatly expanded the wire-rope company and brought it into the twentieth century. With their wives and children, they became key players in the civic life of Trenton, New Jersey, the state capitol. Ultimately, competition and technological change would outpace the paternalistic company built by the Roeblings, leading to its sale in 1952 and closing in the 1970s.

The exhibition features letters, drawings, maps, photographs, and other documents from the Roebling Family Papers held by Rutgers University Libraries, which were recently organized and preserved through a grant from the U.S. Department of the Interior Save America's Treasures program. The Roebling Papers were originally donated to Rutgers University in 1952 by John A. Roebling II, son of Washington A. Roebling.

Many institutions and individuals helped make this exhibition possible. The Rensselaer Polytechnic Institute in Troy, New York, generously made available copies of many of the original drawings and photographs seen in the exhibition, as did the Trenton Public Library, the New York Municipal Archives, and the Museum of the City of New York. The Roebling Historical Society in Roebling, New Jersey, kindly loaned many of the artifacts on display in the exhibition. George Selden of the Rutgers University Geology Museum located an example of *roeblingite*, the rare mineral named after Washington Roebling, when I had completely despaired of finding one. Exhibition items are from the Special Collections and University Archives, Rutgers University Libraries, unless otherwise noted.

In researching the complicated history of the Roebling family and corporation, I received advice and encouragement from many individuals much more knowledgeable about the topic than I am. Vivian Thiele, the Project Archivist for the Roebling Family Papers Project, now with the New Jersey State Archives, gave me the benefit of her intimate knowledge of the material. Nele Guentheroth of the *Stiftung Stadtmuseum Berlin* shared with me her amazing discoveries about John Roebling's early training in Germany. Donald Sayenga, formerly of Bethlehem Wire Rope, corrected many of my errors and misconceptions about the Roeblings. George Lengel of the Roebling Historical Society shared his passion and knowledge about the history of the former company town, even giving me a personal tour!

Clifford W. Zink, the author of the definitive history of the John A. Roebling's Sons Company, from which I have liberally quoted in this catalog, made many useful suggestions, and most importantly, agreed to speak at the exhibition opening

I would like to thank the Rutgers University Libraries for supporting this exhibition and program, particularly Marianne Gaunt, University Librarian; Robert Sewell, Associate University Librarian; and Harry Glazer, Communications Coordinator, who is responsible for the publicity and the reception. Ken Kuehl of the administrative staff provided invaluable assistance in designing (and mailing!) the invitations to the opening. Mounting this exhibition would have been impossible without the patience, flexibility, and expertise of Special Collections and University Archives conservator Timothy S. Corlis, and our assistants Valerie Addonizio, Sharon Grau, Leah Gass, and Carla Zimmerman. Our undergraduate student workers have helped out in a myriad of ways with little preparation and no complaints. I would also like to thank my colleagues at Special Collections and University Archives, particularly Ronald Becker, Melissa De Fino, Bonita Grant, Albert King, David Kuzma, Nancy Martin, and Caryn Radick, who have all offered suggestions and support during the difficult process of making this exhibition a reality. Special thanks go to volunteer Christine Becker who proofread all the captions. Any remaining mistakes are mine, not hers! Finally, my Public History Intern Samantha Reynolds has played a special role in the preparation for the exhibition, most notably in the production of this catalog.

Fernanda Perrone
Exhibition Curator
September 2006

EARLY YEARS IN GERMANY

Birth of John A. Roebling

Johann August Röbling was born on June 12, 1806 in the town of Mühlhausen in the state of Thüringen in central Germany. He was the fifth child and third son of Christoph Polycarpus Röbling (1770–1847) and Friederike Dorothea Mueller (1770–1832). Christoph Polycarpus was described as a *Fabrikant* or manufacturer, as well as a retailer, of tobacco. Although not wealthy, the family was comfortable. All three sons attended the Mühlhausen *Gymnasium* or secondary school. The two oldest sons, Hermann and Carl, prepared to enter the family business, while daughter Amalia married a salesman.

Education

At the age of fifteen, John Roebling transferred from the Mühlhausen *Gymnasium* to a more technically-oriented school in the nearby town of Erfurt, where he studied with the noted mathematician Dr. Ephraim Solomon Unger. Roebling's study in Erfurt prepared him to pass the first of the state-approved examinations to become a surveyor or *Baukondukteur*, in 1823. The following year Roebling enrolled in the Berlin Building Academy to continue his preparation to become a master surveyor. At the Building Academy, Roebling attended Professor Dietlein's lectures on the construction of roads, bridges, locks, and canals, where he was exposed to French theory on suspension bridges.

Early Employment in Germany

After one year of study at the Building Academy, Roebling was required to gain work experience before taking his final examinations to become a *Baumeister*. In May 1825, he found temporary employment as a construction supervisor building roads in the administrative district of Arnsberg in Westphalia. During this period, Roebling began to experiment with plans for suspension bridges. In October 1828, his employment over, he returned to Mühlhausen to prepare for the examinations. There is no evidence, however, that Roebling ever took them; instead he became absorbed in a plan to emigrate to the United States.

IMMIGRANT

Decision to Emigrate

The July 1830 revolution in France led to unrest and political repression in the Prussian. This climate, an economic depression in Mühlhausen, and possibly disappointment in the reception of his ideas by the Prussian authorities, led John Roebling to consider emigration. Indeed, between 1831 and 1840, 150,000 Germans left for the United States. Together with his brother Carl and Johann Adolphus Etzler, an engineer and visionary from Mühlhausen who had already spent some time in America, Roebling founded an emigration society. With about fourteen subscribers and promises from several dozen others, Roebling set sail on May 23, 1831.

Saxonburg

John A. Roebling and the emigration party reached Philadelphia on August 6, 1831. After deciding that they did not want to go south because of slavery, they headed for Pittsburgh, Pennsylvania. On the way, Roebling broke with Etzler, who wanted to found a utopian community, while Carl became seriously ill with malaria. Fear of the disease led Roebling to purchase land in a "healthful location," in Butler County, about twenty-five miles north of Pittsburgh. The settlers christened their new home Germania, later changing it to Saxonburg. Roebling laid out the land in plots, then sent hundreds of letters in an effort to attract colonists from Germany. The land in Saxonburg was poor, however, and in the end only about a dozen families relocated. Among these was the Mühlhausen tailor, Ernst Herting, whose eighteen-year-old daughter Johanna married John Roebling in 1836.

Return to Engineering

In 1836, several factors led John Roebling to once again seek work as an engineer. His new wife Johanna was expecting a child, while sadly, his brother Carl died of sunstroke, leaving Roebling responsible for Carl's wife and two children. Economic conditions in Saxonburg were worsening and the community's farming and small-scale workshops had not been particularly successful. In this period of industrial development and expansion of the transportation infrastructure, John A. Roebling's skills were in demand. He soon found work as an assistant engineer on the Beaver Division of the Pennsylvania Canal.

Wire Rope

Working as an engineer in Pennsylvania, Roebling became familiar with the operation of the Allegheny Portage Railroad. Because locomotives could not generate enough steam to cross the mountains, in 1831–1834, an ingenious system of inclined planes was developed whereby the cars, as well as canal boats, could be dragged by way of ropes. These hemp ropes tended to wear out, so needed to be frequently replaced, which was costly, not to mention the danger of accidents. Familiar with the making of rope out of iron wire from trade journals, Roebling had the brilliant idea of using wire rope instead of hemp on the portage railroad. He experimented with stretching out wires and combining them into rope on his Saxonburg farm. In 1842, the Pennsylvania Board of Public Works accepted his proposal to furnish wire rope at his own risk for one of the planes on the portage railroad. The rope was successful, with a result that, in 1842, Roebling was granted his first patent for “improvement in the method and machinery for manufacturing wire rope.”

EARLY PROJECTS

First Suspended Structures

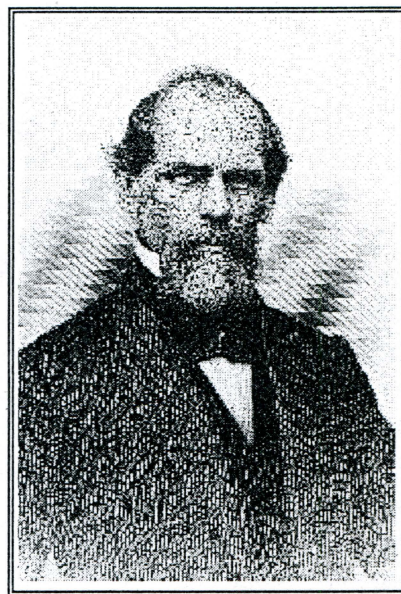
For years John Roebling had dreamed of building a suspension bridge. For him it combined “science and metaphysics, the material and the spiritual, the potential and the destiny for himself and the nation.” In 1844, Roebling won a competition held by the Pennsylvania Canal Board to replace a deteriorated wooden aqueduct over the Allegheny River in Pittsburgh. In this aqueduct, Roebling’s first suspended structure, seven-inch diameter cables carried a wooden trunk with over 2,100 tons of water over seven spans of 162 feet each. Roebling’s successful completion of this project led to the opportunity to build his first suspension bridge over the Monongahela River in Pittsburgh. The Smithfield Street Bridge, as it was called, had eight spans of about 188 feet each and short cast iron towers.

Delaware and Hudson Canal Aqueducts

In 1847, John Roebling provided wire rope to be used on the Delaware and Hudson Canal, which carried coal from the anthracite region of Pennsylvania to markets in New York. The success of this project led to a commission to enlarge and improve four aqueducts on the canal route between Lackawaxen, Pennsylvania, and Minisink Ford, New York. Of particular concern were delays at the mouth of the Lackawaxen River, where canal boats tried to cross the Delaware. The aqueducts, known as High Falls, over the Rondout Creek, near Kingston, New York; Neversink, over the Neversink River in Cuddebackville, New York; and the Lackawaxen and Delaware aqueducts in Lackawaxen, Pennsylvania, were in use for almost fifty years.

Trenton

As orders for wire rope increased, the small mill in Saxonburg soon outgrew its capacity. Shipping materials to and from the eastern markets was slow and costly. In the late 1840s, John Roebling found a new location for his business in Trenton, New Jersey, at that time a town of about 6,000 people. Centrally located between New York and Philadelphia, Trenton had excellent access to canal, river, and railroad transportation. There was no shortage of skilled labor, as several iron mills were already located there. In 1848, Roebling purchased twenty-five acres of land about one mile from the city center in what was then Hamilton Township. Away most of the time working on the High Falls Aqueduct, he instructed his trusted associate, Charles Swan, to supervise construction of a mill, rope walk, and house. His family moved to Trenton in the autumn of 1849, traveling by covered wagon.



John A. Roebling, ca. 1867

BRIDGING THE FALLS

Niagara Gorge Bridge

In November 1850, the Niagara Falls Bridge Company appointed John A. Roebling as Chief Engineer to replace Charles Ellet, Jr., who had resigned over a dispute with the stockholders. Roebling worked on the bridge for over four years, surviving an 1854 cholera epidemic in the region near the bridge site. The two-level suspension bridge, which was opened in March 1855, proved that wire rope cables could carry the immense weight of railway locomotives and cars. The drama and beauty of the bridge location did much to enhance Roebling's reputation. The bridge stood until 1897, when advances in railroad technology made it obsolete.

LATER PROJECTS

Cincinnati-Covington Bridge

In 1856, Roebling contracted for a railroad bridge over the Ohio River between Covington, Kentucky, and Cincinnati, Ohio. Like the later Brooklyn Bridge, this structure had massive stone towers, built high to raise the deck above the river; and a web of inclined stays slanting down from the towers, which crossed the suspenders attaching the cables to the roadway. The bridge was of unprecedented length, with a span of 1,057 feet, twenty-five per cent longer than the Niagara Gorge Bridge. The construction of the Cincinnati-Covington Bridge was interrupted twice, first by the financial crisis of 1857, and then by the Civil War. In 1863, John Roebling resumed work, finishing the bridge in 1867. His son Washington, who had assisted

him on the project before the war, supervised the final stages of construction.

THE ROEBLING FAMILY

John A. Roebling, the Man

John A. Roebling was a complicated and troubled figure. Fanatically devoted to his work as an engineer, he also loved music, playing the flute and piano until he badly injured his hand in the Trenton factory. He somehow found time to write philosophical treatises, including a 1,000 page manuscript, "Theory of the Universe." Few people were allowed to see Roebling's speculations on the nature of man, matter, truth, and other subjects, which were notoriously difficult to understand. He was clearly influenced by Hegel's idealist philosophy, as well as by the teachings of the eighteenth-century physicist Emanuel Swedenborg. Roebling had little time for organized religion, although he had been brought up as a Lutheran, and occasionally attended the First Presbyterian Church in Trenton. Rather, he believed that human beings could become closer to their creator through the power of reason. John Roebling tended to be more interested in humanity in the abstract than in human beings as individuals. Frequently away from home working on engineering projects, he could, according to his son Washington, be violently abusive to his children. In spite of his belief in reason, Roebling distrusted modern medicine, placing his faith instead in hydropathy, the therapeutic use of water. Late in life, he became intrigued by spiritualism, believing that Andrew Jackson Davis (1826–1910), a young clairvoyant with about five months' education, was one of the great men of his time.

Washington Roebling

John and Johanna Roebling's oldest son, Washington, was born on May 26, 1837 in Saxonburg, Pennsylvania. At the age of twelve, he moved with his family to Trenton, New Jersey, where he attended the prestigious Trenton Academy. In 1854, he entered the Rensselaer Polytechnic Academy in Troy, New York, the premier institution in the country for the study of engineering. He later wrote that at Rensselaer, "the boys were ground down and crammed with knowledge and mathematics that their poor young brains could not make use of.....the few who graduated left the school as mental wrecks."

Washington Roebling's Civil War

Washington Roebling enlisted as a private in Company A of the New Jersey State Militia in April 1861, resigning a few months later to enlist in the 6th New York Independent Battery. He was later promoted to the rank of sergeant, and then to second lieutenant in January, 1862. During the war, he built suspension bridges, made maps, and did reconnaissance from a hot-air balloon. He saw action at the battles of Second Bull Run, Antietam, Chancellorsville, and Gettysburg, where he helped to secure Little Round Top, as well as the Battle of the Wilderness, Spotsylvania Court House, and the Crater. In 1865, he was commissioned

Colonel, U.S. Volunteers, by brevet for "gallant and meritorious services during the war."

Emily Warren Roebling

Emily Warren Roebling was born on September 23, 1843, in Cold Spring, New York, a hamlet on the Hudson River in Putnam County. She came from a distinguished New York family which could trace its roots back to the *Mayflower*. Her father, Sylvanus Warren, was a New York State Assemblyman and supervisor of the town of Philipstown, which included Cold Spring. Although not Roman Catholic, from 1858 to 1860, Emily Warren attended Georgetown Visitation Convent in Washington, D.C., an elite girls' academy where she probably received a good education. As well as the female accomplishments of embroidery, watercolors, and domestic economy, Emily studied history, geography, algebra, geometry, book-keeping, astronomy, meteorology, chemistry, and geology. In February 1864, she met Washington Roebling at a military ball given by General Gouverneur Warren, her elder brother and Washington's commanding officer. After an intense courtship, the couple married in Cold Spring on January 18, 1865.



Wedding Photograph, Washington A. & Emily W. Roebling, 1865.

The Brooklyn Bridge

People had dreamed for years of a great bridge which would unite the cities of New York and Brooklyn. John Roebling himself had made a proposal as early as 1857. In 1866, a group of prominent members of the Brooklyn community formed the New York Bridge Company, a private venture which was approved by an act of the state legislature. The following year, the company appointed Roebling Chief Engineer, and he set to work planning the ambitious structure. Roebling would, however, never see what would become his most famous work. On June 28, 1869, while surveying the foundations for the Brooklyn tower, his foot was crushed by a returning ferry. Trusting in hydropathy rather than the advice of his doctors, Roebling died from tetanus a few weeks later. Almost immediately, his son Washington was appointed Chief Engineer of the project. Although John Roebling had completed the drawings for the bridge, Washington had to significantly adapt them in order to actually build the structure. During the next fourteen years, Washington coped with serious illness, accidents, cost overruns, political corruption, and loss of public confidence. That the bridge was successfully completed in 1883 and still stands today is a tribute to the creativity and dedication of Washington Roebling, his wife Emily, the engineering staff, and the thousands of laborers who toiled on the site.

Washington, Emily, and the Bridge

In 1871, Washington fell ill after an extended stay fighting a fire in the Brooklyn caisson. At that time little was known about decompression sickness, or the bends, caused by a too rapid decrease in air pressure after a stay in compressed atmosphere. The initial stage of decompression sickness is characterized by extreme pain, vomiting, paralysis, and sometimes, death; indeed, several men died while working in the Brooklyn Bridge caissons. The following year Washington nearly died while supervising work in the even deeper New York caisson. In the summer of 1873, Washington and Emily went abroad to the spas of Wiesbaden, Germany, trying to no avail to find a cure. The lingering effects of the disease, combined with the financial, political, and psychological strain of the bridge project, would make Roebling a virtual invalid for the next ten years. Emily acted as Washington's emissary to the outside world, copying and transmitting his instructions from the family's home in Columbia Heights, Brooklyn, where Washington could see the bridge site from the window. Although her actual influence on the design and construction of the bridge is unknown, she skillfully served as her husband's spokeswoman and public face. When the bridge was dedicated with much fanfare in 1883, Emily Warren Roebling was the first person to drive across it.

After the Bridge

In the years after the completion of the Brooklyn Bridge, Emily Roebling devoted herself to the women's club movement, charitable causes, and her interests in history and genealogy. She became a prominent Trenton hostess; indeed her frugal husband often complained about her expenditures. She traveled to Europe twice, visiting Moscow in 1896, where she was one of the few Americans present at the coronation of Czar Nicholas and Empress Alexandra. Probably her greatest accomplishment during this period was completing the special New York University Woman's Law Course in 1899. At the graduation ceremony in Madison Square Garden, Emily read her prize-winning essay on "A Wife's Disabilities," which was later published in *The Albany Law Journal*. In the last years of her life, she edited the diary of a Putnam County preacher, Silas Constant, writing an additional chapter about her family. Emily Warren Roebling died, probably of stomach cancer, on February 28, 1903, and is buried in Cold Spring, New York.

The John A. Roebling's Sons Company

John Roebling left his wire rope mill to his four sons, Washington, Ferdinand, Charles, and Edmund. His 1867 will requested that they continue the company under the name John A. Roebling's Sons, and take his long-time manager Charles Swan as a partner. His three daughters received bequests, but no part of the business. Roebling deducted from his children's inheritance the money he had spent on them during his lifetime, which he had carefully recorded in his private ledgers. Friction soon developed between the brothers, particularly Charles, and the older Swan. Charles Swan resigned in 1872, was persuaded to return, but left for good a few years later with no pension. In 1876, the company incorporated

under the name John A. Roebling's Sons Corporation (JARSCO).

Charles G. Roebling

Like his older brother Washington, Charles Roebling (1849-1918) graduated from the Rensselaer Polytechnic Institute, joining the family firm in 1871. Starting in the engineering and manufacturing department, Charles became president in 1877, serving in this capacity until his death in 1918. During this period he expanded the main plant in the Chambersburg section of Trenton, as well as developing another facility on the old site of the Buckthorn Fence Company on Jersey Avenue, which became known as the Lower Works. Charles also revived the engineering division of the company, designing and building the Oil City Suspension Bridge in Pennsylvania, among other projects. Reportedly shy and reserved, Charles was elected to the New Jersey state legislature in 1893, but after one term declined to run for re-election, preferring to pursue his interests in music and the cultivation of orchids. Charles Roebling's personal life was tinged with sadness. In 1877, he married Sarah Mahon Ormsby of Pittsburgh, and had five children, three of whom would die prematurely. Sadly, Sarah herself only lived until 1887. After her death, Emily Roebling's sister, Eliza Warren Hook, moved in to help care for the children, remaining as lady of the house for over thirty years.

Roebling, New Jersey

By the early twentieth century, JARSCO had run out of space to expand in Trenton. Since importing iron from Europe was costly and unreliable, the Roeblings made the momentous decision to manufacture their own open-hearth steel rather than relying on suppliers. This decision led to Charles G. Roebling's greatest accomplishment, the foundation in 1905 of a steel plant and company town at Kinkora in Burlington County, about ten miles south of Trenton. Because there was a limited local labor force in this rural area, Charles designed housing for workers and community institutions, as well as building modern one-story factory buildings. Soon, Roebling, New Jersey, was hailed as a model industrial town.

Life in Roebling

Charles Roebling viewed the new industrial town as a practical venture rather than an experimental community. He planned 750 houses, a post office, a hotel with a bar, a drug store, a grocery, a bakery, a barber shop, a firehouse, a hospital, a jail, and a bank. Although all the houses were sturdily built with the latest modern conveniences, Charles designed several different sizes, meant to correspond to the status of the worker in the plant. The community was settled by a diverse group, including many recent immigrants from Eastern Europe, as well as more established families of Swedish, English, Irish, and German origin. Roebling developed a thriving civic life, based around ethnic churches, clubs, and athletic teams, which were encouraged by the company to promote solidarity.

Ferdinand W. Roebling

John A. Roebling's second son, Ferdinand W. Roebling (1842–1917), focused on the financial and marketing side of the business. After studying at Columbian College, now George Washington University, he entered the family firm in 1859. Upon JARSCO's incorporation, Ferdinand assumed the position of Secretary-Treasurer, which he would hold until his death in 1917. In the face of growing competition, he diversified operations, producing more of the materials the company needed, and increasing the variety of finished products. Ferdinand invested widely, both for himself and family members, holding directorships in corporations for which JARSCO made wire rope, such as the hugely successful Otis Elevator Company. Ferdinand's projects occasionally led to conflict with his brothers Washington and Charles, such as his ill-fated attempt to enter the construction industry. Ferdinand and his wife Margaret G. Allison became leaders in Trenton society. Of the couple's four children--Karl, Ferdinand, Jr., Margaret, and Augusta Henrietta--both sons would become presidents of the family company.

Washington Roebling's Later Years

In the years following the completion of the Brooklyn Bridge, Washington Roebling's health gradually improved, although he remained irascible and eccentric. In 1884, Washington and Emily moved to Troy, New York, while their son attended the Rensselaer Polytechnic Institute. They returned to Trenton in 1888, when Emily began planning the State Street mansion where Washington would live for the rest of his days. He pursued many interests, including bird-watching, astronomy, botany, and, of course, building his world-class collection of minerals. He struggled to come to terms with the character of his father, writing a three-hundred page biography, which he finished in 1907. In 1921, at the age of eighty-four, Washington was forced to assume the presidency of JARSCO upon the sudden death of his nephew, Karl G. Roebling. Under Washington's reluctant leadership, the company prospered, and he won several lucrative contracts to provide wire rope cables for major bridges. Washington Roebling died peacefully on July 21, 1926, at the age of eighty-nine.

Beyond Bridge Cable

On display are trade catalogs illustrating some of the wire rope products made by the John A. Roebling's Sons Company in the 1920s and 1930s. The company made good use of attractive designs, colors, and other marketing techniques to communicate its message.

Mary G. Roebling

The daughter of a telephone company executive and a music teacher, Mary Gindhart Roebling was born in West Collingswood, New Jersey, in 1905. By the age of twenty, she was a widow with a young child. While working in a Philadelphia brokerage house, she met Washington

Roebbling's grandson, Siegfried, who ran one of the family's businesses, the Trenton Trust Company. He and Mary married in 1933, and had a son, Paul, the following year. Tragically, Siegfried died in 1936. As executor of her husband's estate, she was urged by her father-in-law, John A. Roebbling II, to become president of the Trenton Trust Company, although it was questionable whether the bank would succeed in the economic climate of the Depression. To everyone's surprise, Mary Roebbling quickly became a success, establishing innovative practices of public relations and merchandising. Under her leadership, Trenton Trust's assets increased from seventeen to 137 million in a twenty-eight year period. As well as being the first woman in the United States to serve as president of a major commercial bank, Mary Roebbling was appointed the first female governor of the American Stock Exchange in 1958.

Last Years of JARSCO

In 1952, faced with escalating costs, competition, and labor demands, Charles Roebbling Tyson was instructed by the board to sell John A. Roebbling's Sons Company. The manufacturing plants were sold to Colorado Fuel & Iron on January 1, 1953. For a while, JARSCO operated as a successful subsidiary of CF&I, while life continued as usual in Roebbling and Chambersburg. By the 1960s, however, faced with over-capacity in the wire rope business, CF&I could no longer afford to maintain the aging plants. In 1969, the Crane Corporation purchased CF&I, closing the Trenton plant in 1973, and the Kinkora works in 1974. The legacy lives on, however, in efforts to preserve the industrial sites and remaining historic buildings in Trenton and Roebbling, New Jersey.

EXHIBITION CHECKLIST

John A. Roebling, ca. 1867, engraving from photograph.

Preliminary drawing for Brooklyn Bridge, John A. Roebling engineering notebook, 1867.

Stay-painting, Brooklyn Bridge, ca. 1883. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

The bridge supports had to be regularly painted to protect them from the elements.

Heinrich Wilhelm Röbling house on the Untermarkt in Mühlhausen. Photograph by Frieda Röbling, 1929.

This house belonged to John A. Roebling's uncle, who amassed a fortune of 500,000 *thalers* and was known as the "rich Röbling."

House and street in Mühlhausen where John A. Roebling was born. Photograph by Frieda Röbling, 1929.

Photograph, entrance to the Röbling family house, 2 Erfurt Street, Mühlhausen, 1931.

Built in 1587, this house was occupied by earlier generations of the family, which could trace its ancestry to 1560.

Hermann Christian Röbling (1800-1859), Mühlhausen, undated. H. Edelmann, Photographer. Hermann would take over his father's tobacco business.

Hand-colored postcard, Mühlhausen, Thuringen, 1908.

The ancient walled town of Mühlhausen in the state of Thuringen was in John A. Roebling's time part of Prussia.

John A. Roebling student notebook, Berlin Building Academy, 1825.

These are Roebling's notes from Professor Rabe's lectures on General Architecture and Building Construction during the winter semester of 1824-1825. Students were required to hand in their lecture notes.

John A. Roebling bridge design, Eslohe Highway (Nordrhein-Westfalen), Germany, ca. 1827.

John A. Roebling to Karl Friedrich Röbling, March 24, 1823.

At this time Karl was serving as an apprentice to a tobacconist in Friedberg. In this letter, John urges his brother to secretly take notes on the types of machines used by his employer before leaving the apprenticeship.

Illustration from *Gemeinnützige Unterhaltungsblatt* 35, August 28, 1830. Published Mühlhausen.

This public interest newsletter, edited by John A. Roebling's cousin and friend Ernst Wilhelm Röbling, included an article on Kashmir goats. Roebling would later attempt to raise sheep in Pennsylvania.

Georg Wilhelm Friedrich Hegel, *Georg Wilhelm Friedrich Hegel's Vorlesungen über die Aesthetik*. Herausgegeben von D.H.G. Hotho. Berlin: Duncker & Humblot, 1835–1838.

Georg Wilhelm Friedrich Hegel, undated. Engraved by Bollinger after a painting by Xeller. Published in Berlin by C. A. Wolff.

John A. Roebling first encountered Hegel's work as a student in Erfurt.

John Augustus Roebling, *Diary of My Journey from Muhlhausen in Thuringia via Bremen to the United States of North America in the year 1831, written for my friends....* translated with occasional notes from the original German by Edward Underwood; with a foreword by Hamilton Schuyler. Trenton, N. J.: The Roebling Press, 1931.

This account of Roebling's sea voyage was originally published privately in Germany in 1832.

"Sachsenburg, Colonie von Thuringern und Sachsen bei Pittsburg," ca. 1835. Drawn from nature by T. Gesewisch and lithographed by Ernst W. Röbling.

This print was made in Germany to attract settlers to the village of Saxonburg. The names of the colonists are listed at the bottom.

Certificate of Baptism, Johanna Herting, May 22, 1831.

John A. Roebling's future wife, Johanna Herting, was baptized before leaving Germany.

Certificate of Naturalization, John A. Roebling, 1837.

Upon becoming a United States citizen, Johann Röbling Anglicized his name to Roebling.

Contract, 1831.

This draft contract between the Roebling brothers and one Augustus Grabe from Kaysershausen binds Grabe and his family to work for the Roeblings for three years in exchange for payment of their passage. There is no evidence that the Grabes joined the colony in Saxonburg.

Design for a locomotive boiler, from copy book, 1837.

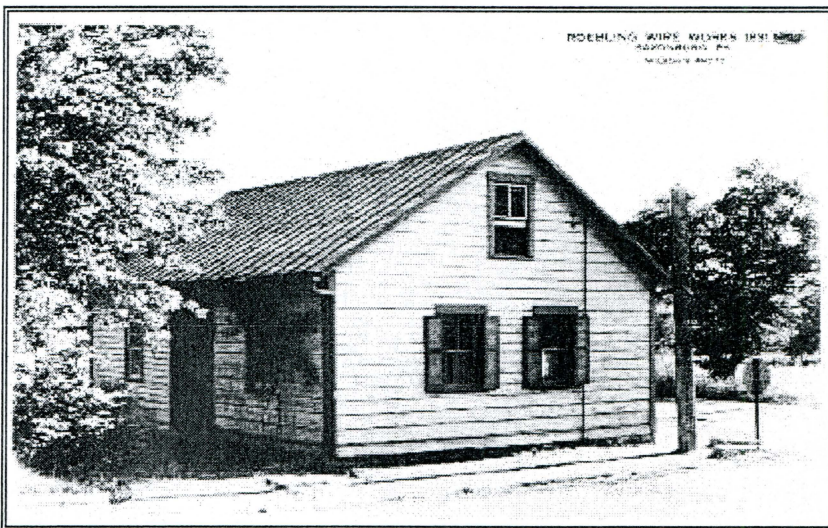
This notebook contained sketches for various technical devices designed by Roebling while living in Saxonburg.

Roebing Wire Works,
Saxonburg, Pennsylvania,
ca. 1841.

Roebing constructed this
small building to splice wire
and wind it on large reels.

John A. Roebing, Railroad
Surveys Notebook, ca.
1839–1842.

John A. Roebing
maintained this notebook
while surveying canals and
railroads for the
Pennsylvania Public Works.



Roebing Wire Works, ca. 1841.

At left is Roebing's analysis of the cost of rope used on the Allegheny Portage Railroad. At right is a drawing of an incline on the Morris Canal, for which Roebing also supplied wire rope. The Morris Canal overcame more elevation change than any other transportation canal in the world, using twenty-three locks and twenty-three inclined planes to raise and lower boats over the Western Highlands of northern New Jersey.

William A. Morris to John A. Roebing, January 12, 1841.

In this letter, Morris, an engineer for the Allegheny Portage Railroad, expresses interest in Roebing's idea to substitute wire for hemp cables on the inclined planes of the railroad. He was concerned, however, that wire might not be as flexible or stretchable as hemp, and might be adversely affected by bad weather.

Delaware Aqueduct, ca. 1934.

Built by John A. Roebing in 1847–1848 to carry the Delaware and Hudson Canal across the Delaware River at Lackawaxen, Pennsylvania, this aqueduct was later used as a highway bridge. Now designated a National Civil Engineering Landmark, it is the oldest standing wire suspension bridge in the United States

Lackawaxen Suspension Bridge, Lackawaxen, Pennsylvania, undated.

This suspension aqueduct, which carried the Delaware and Hudson Canal over the Lackawaxen River, stood derelict for many years after the canal was abandoned in 1898.

Sketch, Delaware Aqueduct, ca. 1847–1848 [fragment].

Design for Lackawaxen Aqueduct in "Notebook, Suspension Bridges," December, 1847.

Charles Ellet to John A. Roebing, February 8, 1840.

Charles Ellet, Jr. (1810–1862) was, like John A. Roebling, a European-educated surveyor and engineer. In 1842, Ellet created America's first successful wire rope bridge over the Schuylkill River in Philadelphia. Before the two men became rivals, they enjoyed a brief correspondence. Here Ellet writes, "it has given me much pleasure to learn that you have not neglected the subject of suspension bridges...."

Drawing for the Smithfield Street Bridge towers, Pittsburgh, Pennsylvania, 1845–1846. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Drawing for the Smithfield Street Bridge, Pittsburgh, Pennsylvania, 1845–1846. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Stereograph, Blondin's tightrope feat, crossing the Niagara River, ca. 1860 [facsimile]. George Parker, Photographer. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*
Jean François Gravelet (1824–1897), the great Blondin, was the first tightrope walker to cross Niagara Falls. Here Washington A. Roebling gives the date as 1853, but Blondin actually made the crossing several times, beginning on June 30, 1859. The Niagara Gorge Bridge can be seen in the background.

Niagara Gorge Bridge, 1855. Lithograph by M. H. Traubel [facsimile]. Published Philadelphia. Before the completion of the Brooklyn Bridge in 1883, this image was used by the John A. Roebling Sons Company for publicity purposes.

Niagara Gorge Bridge towers. Drawing by John A. Roebling. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Roebling chose an Egyptian-revival design for the Niagara bridge's towers.

Niagara Gorge Bridge trusses, 1851. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Strong enough to carry a freight train, the Niagara Gorge Bridge proved the theory that the stiffer and heavier the roadway, the more stable the bridge. This drawing shows Roebling's signature diagonal stays which he used to produce stiffness.

"500 tons of wire wanted," Niagara Railway Bridge, August 5, 1852.
Not surprisingly, John A. Roebling's own company in Trenton won the contract to supply the wire rope for the bridge cables.

Statement of receipts and disbursements, of the Niagara Falls International and Suspension Bridge Companies, June 1860.

John Roebling accepted partial payment of his engineering fees in stock in the bridges he built, which contributed to his wealth.

John A. Roebling to Charles Swan, January 6, 1854.

Writing from the Niagara Gorge bridge site, Roebling expresses astonishment at the birth of his son Edmund. "You say in your last, that Mrs. Roebling & the child are pretty well. This takes me by surprise not having been informed at all of the delivery of Mrs. R. Of what do you mean?" Edmund would suffer in later years from his father's neglect and cruelty.

John A. Roebling to Charles Swan, May 21, 1854.

"The destruction of the Wheeling Bridge is a fact," Roebling writes to his Trenton plant manager Charles Swan from the Niagara Falls bridge site. Charles Ellet's bridge over the Ohio River in Virginia was destroyed by the momentum of its dead weight in a wind storm. Roebling added extra stiffness to the Niagara bridge to protect against just this sort of occurrence.

Report of John A. Roebling...to the Directors of the Niagara Falls International and Suspension Bridge Companies (Buffalo, N.Y.: Steam Press of Jewett, Thomas & Co., 1852).

John A. Roebling to Charles Swan, July 27, 1863.

In 1863, Roebling returned to Covington, Kentucky to continue the work on the bridge that had been interrupted by war. "I have some trouble here with my laborers who struck this morning for a rise. I have paid them so far 1.25 and do not feel inclined to raise their wages....I want to get rid of the Cinc. Wharf rats at any rate, and engage Germans in their places."

Cincinnati-Covington Bridge ca. 1856. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Here John Roebling illustrates the angle by which the giant cables pass over the bridge towers. Moveable saddles atop the towers carried the weight of the cables.

Allegheny River Bridge, Sixth Street, Pittsburgh, Pennsylvania, 1860. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

After his triumph at Niagara Falls, Roebling was asked to replace a wooden bridge over the Allegheny River in Pittsburgh. This was the first time he was directly commissioned rather than having to take part in a competition.

Cincinnati-Covington Bridge, ca. 1867.

"Armor Clad Vessels," ca. 1861.

During the Civil War, Roebling applied his fertile imagination to military engineering problems, as seen in these sketches of armor clad vessels and harbor defenses.

Architectural Detail, Allegheny Bridge, Sixth Street, Pittsburgh, Pennsylvania, ca. 1857. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Architectural Detail, Allegheny Bridge, Sixth Street, Pittsburgh, Pennsylvania, ca. 1857. *Institute*

Archives and Special Collections, Rensselaer Polytechnic Institute

This drawing displays John A. Roebling's superb draftsmanship. While studying in Berlin, he took drawing lessons in architecture and perspective at the Academy of Art.

Cable-making at the Cincinnati-Covington Bridge, ca. 1866. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

In 1846, John Roebling patented the process of "cable spinning," fabricating cables in place by stringing wire rope between the bridge towers using a traveling wheel, thus maintaining uniform tension. When complete, the wires were consolidated into a solid iron cylinder. Here the two main cables are completed but the mechanism remains in place.

Manuscript Map of the Battlefield of Antietam, drawn in graphite, showing landmarks, residents, road, and fords across Antietam Creek, movements of Hooker's advance and placement of Union forces, ca. September 18, 1862.

Notations in Washington's handwriting read "cornfield," and "place where Hooker was shot in the foot." Washington served as an Engineer Officer on General Hooker's staff during this battle.

General Warren's staff, Petersburg, Virginia, Winter, 1864-1865.

General Warren is seventh from left; Washington Roebling is not pictured.

"Fort Hell," ca. 1865.

Washington Roebling helped build Fort Sedgwick, popularly known as "Fort Hell," which was occupied by Union soldiers during the siege of Petersburg, Virginia.

Drawing for bridge over the Rappahannock River, Fredericksburg, Virginia, Summer 1862. This bridge was over a thousand feet long, divided into fourteen short spans. Washington Roebling had some rolls of wire rope sent down from Trenton to enable him to complete the project.

Washington Roebling at Rensselaer, ca. 1856. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Washington A. Roebling to Emily Warren, June 23, 1864.

Washington Roebling's mood approached despair during the seemingly endless siege of Petersburg. "People talk about getting used to fighting and to battles, but I don't see it in that light, and the more experience I have the worse it gets.... They must put fresh steam on the man factories up North; the demand down here for killing purposes is far ahead of the supply; thank God however for this consolation that when the last man is killed the war will be over."

Washington A. Roebling as a private in the Civil War, 1861. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Reconnaissance and Memoranda Notebook, ca. November 1863 to April 1864.

This notebook includes Washington's notes on enemy strengths and movements, prisoner interrogations, and several hand-drawn maps, such as this untitled sketch showing the road to Warrenton, Virginia.

Washington A. Roebling, Diary, June 1862 to January 1864.

Not really a diary, this notebook documents the building of bridges at Fredericksburg, Virginia in summer 1862, and Harper's Ferry between October 1863 and January 1864. In this entry, Washington notes that a "heavy storm—shook the bridge very much—thought it would go down."

John A. Roebling, *Long and Short Railway Span Bridges*. New York: Van Nostrand, 1869.

John A. Roebling was working on this book shortly before his death; it was finished by Washington Roebling and published posthumously.

Spiritualism Notes, 1867. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

John A. Roebling prepared a list of questions in advance for this seance, when he was visited by the ghost of his dead wife Johanna. His cousin Edwards Riedel served as the medium and other family members were in attendance. Note that Roebling asks the ghost's opinion of celebrated clairvoyant Andrew Jackson Davis.

John A. Roebling, "The Harmonies of Creation," March 1856.

"It is a want of my intellectual nature, to bring in harmony all that surrounds me. Every new harmony I discover, is to me another messenger of peace, another pledge of my redemption."

John A. Roebling to Washington A. Roebling, March 30, 1864.

In a rare display of warmth, John Roebling congratulates his son on his engagement. "I take it for granted, that love is the motive, which actuates you, because a matrimonial union without love is no better than suicide. I also take it for granted, that the lady of your choice is deserving of your attachment....you and your young bride, as you know beforehand, will be wellcome [sic] in the paternal house in Trenton. Our house will always be open to you and yours, and if there is not room enough, a new one can be built on adjoining ground...."

John A. Roebling to Washington A. Roebling, November 17, 1864.

Johanna Roebling fell seriously ill in 1864. Her husband insisted on having her undergo water treatments. "I left her in the care of Dr. Brinkman of Ph, a hydrop Physician of much experience & intelligence. Dr. Coleman is not competent to manage her case and knows too little about water at any rate." Mrs. Roebling died on November 22, 1864 at the age of forty-five. In 1867, John Roebling married Lucia W. Cooper of Trenton, who, according to Washington, was never really accepted by the family.

"Bridge Party," Niagara Falls, New York. Stereograph [facsimile]. Charles Bierstadt, Photographer. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

In 1869, in an effort to gain congressional approval for his proposed bridge over the East River, John Roebling led a group of engineers, businessmen, and politicians on a tour of his bridges. Roebling can be seen at the far right in one of only two known photographs of the enigmatic bridge-builder.

John A. Roebling, Sketch of spans and towers for the proposed East River bridge, Engineering Notebook, June to October 1867.

John A. Roebling, *Report of the Board of Consulting Engineers to the Directors of the New York Bridge Company*. Brooklyn: Printed by the Standard Press, 1869.

East River Bridge foundation, New York side, September 5, 1867. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

John Roebling realized that the greatest challenge in the construction of the bridge would be sinking the foundations of the towers into the bed of the East River. His solution was to use pneumatic caissons, underwater chambers of compressed air, which kept out the river water, and allowed workmen to excavate the riverbed as the tower masonry was erected on the caisson roof.

John A. and Washington A. Roebling, Brooklyn Bridge Notebook, 1867–1873. On page ninety-one, the shift from John to Washington's handwriting is clearly visible.

Deathbed notes, July 1869.

In the days before his death, John Roebling, his face frozen with lockjaw, could no longer speak. He communicated with his family on scraps of paper. Here he suggests the appropriate temperature for a hot bath.

Funeral Services of John A. Roebling... Address by Rev. John Hall; sermon by Rev. John C. Brown. Trenton, N.J.: Murphy & Bechtel, Printers, 1870.

Reportedly the funeral was attended by thousands of mourners, including hundreds of mill workers and a special train with five carloads of friends and acquaintances from New York and Brooklyn. Originally interred at Mercer Cemetery, Roebling was later moved to the Roebling family plot at Riverview Cemetery in Trenton.

Plate, Arrangement of Excavating Machinery, Brooklyn Caisson from Washington A. Roebling, *Pneumatic Tower Foundations of the East River Suspension Bridge*. New York: Averell & Peckett, Printers, 1873.

Washington Roebling spent two years in England, France, and Germany studying the latest methods in bridge construction. He became an authority on pneumatic caissons.

Tests for steel wire manufactured by the John A. Roebling Sons Company, Brooklyn Bridge. Early in designing the bridge, John Roebling decided to use steel instead of wrought-iron wire, the first time steel was used in bridge cables.

Washington A. Roebling to Ferdinand Roebling, October 23, 1870.

In the first serious accident at the bridge, two derricks fell from the Brooklyn tower. "The accident we had yesterday was very dreadful. Three men are dead, and the rest are so scared."

Washington A. Roebling to Ferdinand Roebling, June 28, 1869.

"Father met with an accident today at the ferry...."

"Inside Views of the East River Bridge Caisson in Brooklyn, New York," *Scientific American*. November 12, 1870.

The *Scientific American* artist bravely descended into the Brooklyn caisson to make these drawings.

Caisson construction, Brooklyn Bridge. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Anchorage construction, Brooklyn Bridge. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Anchorage construction, Brooklyn Bridge. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Cable connections with anchor chains, Brooklyn Bridge. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

John Roebling devised a method where the bridge cables were anchored to iron plates under tons of masonry.

Brooklyn Bridge towers. Brown Brothers Photography. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

The granite towers rise to a height of 276 feet

Brooklyn Bridge showing cables. Brown Brothers Photography. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

The four famous cables are just under sixteen inches in diameter and 3, 578 feet long. There are over 5,400 wires in each cable.

Brooklyn Bridge scene, Gunn Studios. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Color Lithograph, Brooklyn Bridge, undated. Drawing by F.H. Bonwill; lithograph by C. Hart.

Emily Warren Roebling as a young adult, ca. 1864–1865.

Washington A. Roebling to Elvira Roebling, February 26, 1863 [sic].

In this letter, Washington Roebling describes his meeting with Emily Warren at a military ball in 1864. "It was the first time I ever saw her and I am very much of the opinion that she has captured your brother Washy's heart at last."

Washington and Emily Roebling, ca. February 1865.

Emily Roebling with infant John A. Roebling II, ca. 1868.

Emily and Washington Roebling's only child was born in Mühlhausen, while Washington was studying bridge-construction in Europe. Suffering from bad fall shortly before the birth, Emily was told that she could have no more children.

Washington A. Roebling with the Brooklyn Bridge in the background, ca. 1907.

This photograph, taken from a painting, depicts Washington Roebling confined to his home in Brooklyn, with the Great Bridge visible through the window.

Board of Trustees of the New York and Brooklyn Bridge to Emily Roebling, February 11, 1878.

Addressed to Emily Roebling, this letter discusses water measurements at the bridge. The note on the back of the letter, "Speak about gauge of track on approach," is written in Washington's hand. This letter demonstrates the collaborative effort between Washington and Emily to construct the bridge.

Washington Roebling to Ferdinand Roebling. May 23, 1872.

While working on the New York caisson, Washington Roebling experienced another severe attack of the bends or decompression sickness. As he explains to his brother, the pains were intense, but "by the plentiful use of morphine however, I was finally stupefied sufficiently not to feel them for a time."

Personal Invitation to the Opening Ceremony of the East River Bridge. Tiffany and Company Engraving, 1883.

Engraved by Tiffany and Company, this invitation was remarkable in that guests were invited to the home of Washington and Emily Roebling for a small reception after the opening ceremony. Since Washington Roebling did not attend the opening ceremony, this reception was his opportunity to meet President Chester A. Arthur and Governor Grover Cleveland.

Emily Roebling Plaque, Brooklyn Bridge, 1954.

This bronze plaque acknowledging Emily Roebling's contribution to the construction of the Brooklyn Bridge was placed on the east tower by the Brooklyn Engineers Club on May 24, 1953, the seventieth anniversary of the opening of the bridge.

Ticket to the Opening Ceremony of the New York and Brooklyn Bridge. Tiffany and Company Engraving, 1883.

Thirteen thousand tickets were issued for the opening ceremony. Six thousand of these were white tickets like this one, which permitted the bearer to attend the ceremony inside the Brooklyn terminal.

Program for the Opening Ceremony of the New York and Brooklyn Bridge. Eagle Printing, 1883.

Lasting nearly three hours, the opening ceremony on May 24, 1883, featured a speech by Congressman Abram. S. Hewitt, praising Emily Roebling's contribution to the project.

The Journal of the Reverend Silas Constant, Pastor of the Presbyterian Church at Yorktown, New York; with some of the records of the church and a list of his marriages, 1784-1825, together with notes on the Nelson, Van Cortlandt, Warren, and some other families mentioned in the journal, by Emily Warren Roebling; ed. by Josiah Granville Leach, LL. B. Philadelphia: Printed for private circulation by J. B. Lippincott company, 1903.

Emily Roebling in academic dress, ca. 1899

Emily to John A. Roebling II, June 26, 1896.

Program, New York University Woman's Law Class, 1899.

Examination, New York University Woman's Law Class, March 24, 1899

Circular, Women's National War Relief Association, 1898.

Emily Roebling, ca. 1899.

Roebling's Wire Rope Mills, Trenton, N.J. New York, N.Y.: Leighton & Valentine Company, ca. 1900.

Elvira Roebling, undated. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Charming and high-spirited, Elvira (1844–1871) was John Roebling's favorite daughter. She married John H. Stewart a few weeks before her father's death.

John A. Roebling Monument, Trenton, New Jersey.

This bronze sculpture of John Roebling is located in Trenton's Cadwalader Park. Designed by William Couper (1853–1942) of Montclair, it was unveiled on June 30, 1908.

John A. Roebling Sons Company Exhibit, Chicago World's Fair, 1892.



Emily Roebling, ca. 1899

Charles Swan from Hamilton Schuyler, *The Roeblings*. Princeton, N.J.: Princeton University Press, 1931.

Born in Breslau in Silesia, Charles Swan (1822–1897) emigrated to the United States at the age of ten. John Roebling first hired him to work as a carpenter on the Allegheny aqueduct in 1844–1845, and was so impressed with his abilities that he made him superintendent of the Trenton wire rope mill. For the next twenty years, Swan was Roebling's most trusted lieutenant, as well as a friend and confidant to the Roebling children.

Roebling Wire Rope Mills from the Delaware & Raritan Canal, Trenton, N.J., 1913. *Trenton Public Library*

John A. Roebling's Sons. Trenton, N.J. Trade catalog, April 19, 1874.

This catalog was published before the company incorporated in 1876. Note that John Roebling's Cincinnati-Covington Bridge is used as the cover illustration.

Elmer Street Wire Mill, ca. 1890. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

On view at the Elmer Street Wire Mill is a huge spool of street car cable for the Pennsylvania Railroad.

Charles G. Roebling, ca. 1908

Washington A. Roebling III, ca. 1910.

Charles G. Roebling's second son Washington A. Roebling III drowned in the Titanic disaster in 1912. It was erroneously reported that his uncle, the famous builder of the Brooklyn Bridge, had died in the tragedy.

Charles G. Roebling Residence at 333 West State Street, Trenton, 1891. *Trenton Public Library*
Charles Roebling's home had an attached conservatory where he grew his prize-winning orchids. The house was torn down after the Second World War and replaced by the high-rise Carteret Arms Apartments.

Williamsburg Bridge, 1903. *Department of Plants and Structures Collection, NYC Municipal Archives*
In 1899, Charles was responsible for the manufacture and placement of the cables on the Williamsburg Bridge, the second bridge to span New York's East River.

Fire, Elmer Street Rope Shop, February, 1908. *Trenton Public Library*

The first of many fires at the Roebling factory totally destroyed the four-story Elmer Street Wire Mill, built in 1888.

Fire, Roebling's Lower Works, 1915.

This conflagration at the Roebling Buckthorn plant was one of two deliberately set fires which followed the national machinists strike in 1914. Between 1910 and 1917, there were seventeen strikes against the company, which successfully thwarted attempts by its workers to unionize until the 1940s.

Obelisk with Metropolitan Museum of Art, Central Park, New York, ca. 1890. *Museum of the City of New York*

According to Hamilton Schuyler, the Roebling family biographer, Charles Roebling advised the U.S. Navy on transporting the Egyptian obelisk, popularly known as Cleopatra's Needle, from Alexandria to New York, and erecting it in Central Park. The obelisk, which was given to the city in 1880 by the Khedive of Egypt, had to be unloaded at Staten Island, sent on pontoons up the Hudson River, and then rolled on cannonballs to its present site near the Metropolitan Museum.

Pattern wheel, 20th century. *Roebling Historical Society*

Mechanics at the Roebling factories used wooden patterns like this one to create replacement parts.

John A. Roebling's Sons Company Kinkora Works. Roebling, N.J. Survey December 5, 1938 by K.M. Lyons. Associated Factory Mutual Fire Insurance Companies, Sheets 28838 and 28839.

Aerial view, Roebling, New Jersey, undated. *Roebling Historical Society*

Construction of the rod mill, Roebling, New Jersey, ca. 1907. *Roebling Historical Society*

Washington Roebling referred to the rod mill at Roebling as Charles' greatest achievement.

General store and bakery building, Roebling, New Jersey, ca. 1908. *Roebling Historical Society*

Unlike some company stores, the Roebling general store was operated on a cash basis, and workers were free to shop elsewhere.

Ladle man pouring killed molten steel into hot-topped ingot molds, either high or low carbon steel, 1956. *Roebling Historical Society*

Broadside, Vitrite Electrical Fittings, London, undated.

While Ferdinand Roebling's investments were generally successful, he did lose a substantial amount of money in Vitrite and Luminoid, an early electric lighting company that faced competition from Thomas Edison's enterprises.

Ferdinand W. Roebling, 1913.

Ferdinand Roebling home, 222 West State Street, Trenton, N.J., 1946. *Trenton Public Library*

The most modest of the Roebling family mansions, Ferdinand's house is the only one which is still standing. It is now under renovation.

Seven Residences for F.W. Roebling, Esq., West State Street, Trenton, N.J., ca. 1900.

Advertisement for W. A. Poland, Architect. *Trenton Public Library*

In 1885, Ferdinand W. Roebling built these Trenton row houses as an investment. The Romanesque Revival brownstones are now home to various organizations, including the League of Women Voters of New Jersey.

Dedication, Trenton City Hall, 1909. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

Ferdinand Roebling served as chairman of the building commission for the Trenton City Hall, completed in 1910.

Seattle office, John A. Roebling's Sons Company, undated.

Under Ferdinand Roebling's leadership, JARSCO set up sales offices in major cities throughout the country such as San Francisco, Chicago, and Seattle, pictured here.



Washington A. Roebling, 1908.

Roebling company flyer, ca. 1913.

Trenton City Hall, 1920s.

Free Public Library, Trenton, N.J., undated.

Ferdinand Roebling served as an original trustee and first president of the board of the Trenton Free Public Library, founded in 1900.

Catalogue de John A. Roebling's Sons Co. Trenton, N.J. Edition Française, 1900.

Trade catalog. John A. Roebling's Sons Co., Fabricante de Cable de Alambre. Trenton, N.J., 1892.

In the late nineteenth century, JARSCO expanded internationally, as can be seen by these French and Spanish-language editions of the company's catalog.

Ferdinand Roebling to Charles Swan, November 21, 1858.

As a college student, Ferdinand Roebling already showed an entrepreneurial spirit, as seen in this letter to Charles Swan. "I am sorry to hear that the old cow is dead.....I hope you have made a compost heap out of her remains one made out of her would be worth at least \$20."

Portrait, Washington A. Roebling, 1908.

Cornelia Witsell Farrow, ca. 1908, from Hamilton Schuyler, *The Roeblings*. Princeton, N.J.: Princeton University Press, 1931.

On April 21, 1908, Washington Roebling married Mrs. Cornelia Witsell Farrow, a widow from Charleston, South Carolina. Significantly younger than Washington, Cornelia introduced him to an expanded social network.

Washington A. Roebling home, 131 West State Street, Trenton, N.J., ca. 1900.

In the 1890s, Emily Roebling hired New York architect G.E. Harney to create a Tudor manor of cream-colored sandstone. She oversaw the design, construction and furnishing of the home, which became known as the grandest house in Trenton. When the mansion was completed, Emily commissioned a series of photographs on glass plate negatives to document its appearance.

Washington A. Roebling home interiors, ca. 1900.

The most famous feature of the Washington Roebling home was the Tiffany stained glass window of the Brooklyn Bridge. When the house was demolished in 1946, the window was rescued by Washington Roebling's grandson Donald, but eventually disappeared. Emily Roebling can be seen on the staircase.

Minerals Wanted by Washington A. Roebling, Trenton, N.J., November, 1901.

An avid mineral collector, Washington Roebling prided himself on the breadth of his holdings. After his father's death, John A. Roebling II donated the collection of 16,000 specimens to the Smithsonian Institution with an endowment for its upkeep.

Mineral Sample, *Roeblingite*. *Rowe Collection, Rutgers University Geology Museum*.

As a preeminent mineral collector, Washington A. Roebling earned the respect of many mineralogists, who in turn named this rare crystal after him in 1931. The mineral is found only in two places in the world: at the Franklin Mine in Sussex County, New Jersey, and in Långban, Sweden.

E.B. Cope to Washington Roebling, 1893.

As a participant on the Battle of Gettysburg, Washington Roebling served as an advisor on the creation of the Gettysburg National Military Park. He recommended fellow veteran E.B. Cope for the position of Chief Engineer at the site.

Calling cards for Washington A. Roebling.

Washington A. Roebling, John A. Roebling II, Siegfried Roebling and Dog, ca. 1917.

Washington Roebling is pictured here with his son John A. Roebling II and grandson Siegfried (in uniform). The Airedale Billy Sunday often accompanied Washington Roebling on his trolley trips through the city of Trenton, reputedly the only dog allowed this privilege.

Charles C. Martin to Washington A. Roebling, December 7, 1898. *Institute Archives and Special Collections, Rensselaer Polytechnic Institute*

After the completion of the Brooklyn Bridge, Washington's associate C.C. Martin remained in charge of the operation and maintenance of the structure. In this letter, he thanks Washington for responding to his concerns about the strength of the bridge. Roebling's sarcastic note at the bottom shows the political pressures behind Martin's attempts to ensure the bridge's safety.

Construction of the Bear Mountain-Hudson River Bridge, 1923–1924, in *Construction of Parallel Wire Cables for Suspension Bridges*. Trenton, N.J.: John A. Roebling's Sons Company, 1925. During the 1920s, the demands of the growing highway system led to the construction of several new bridges. Under Washington Roebling, JARSCO supplied cable wires for the dramatic Bear Mountain Bridge over the Hudson River near West Point (1924), pictured in this company publication.

Washington A. Roebling to Edmund Roebling, February 18, 1924. John A. Roebling's youngest son, Edmund (1854–1930), probably suffered from mental or physical disability. Washington, who served as his guardian, felt that his brother's afflictions stemmed from their father's brutal treatment. After working for a few years at JARSCO as an assistant bookkeeper, Edmund moved to New York City, where he remained for the rest of his life, living off his stock in the company. In this letter, Washington asks his brother to use his inheritance to help some of the younger family members. Edmund Roebling died in 1930, leaving his estate of fourteen million dollars to his twelve nieces and nephews.

George Washington Bridge, undated.

In 1927, John A. Roebling's Sons Company won the contract to furnish and install cables and suspender ropes on the Hudson River (later the George Washington) Bridge, which opened in 1932. At a span of 3,500 feet, the new structure was over twice as long as the Brooklyn Bridge.

Golden Gate Bridge. Gabriel Moulin Photo, San Francisco, 1937.

At 4,200 feet, the Golden Gate Bridge was even longer than the George Washington Bridge. The contract to supply the cables for this colossus kept the Roebling company operating for much of the Depression.

New Tacoma-Narrows Bridge, ca. 1950.

In 1948, the Roebling company won a \$3,000,000 contract for the cables, suspender ropes, and anchorage steel for the Tacoma Narrows Bridge in Washington. An earlier bridge at the site collapsed in 1940.

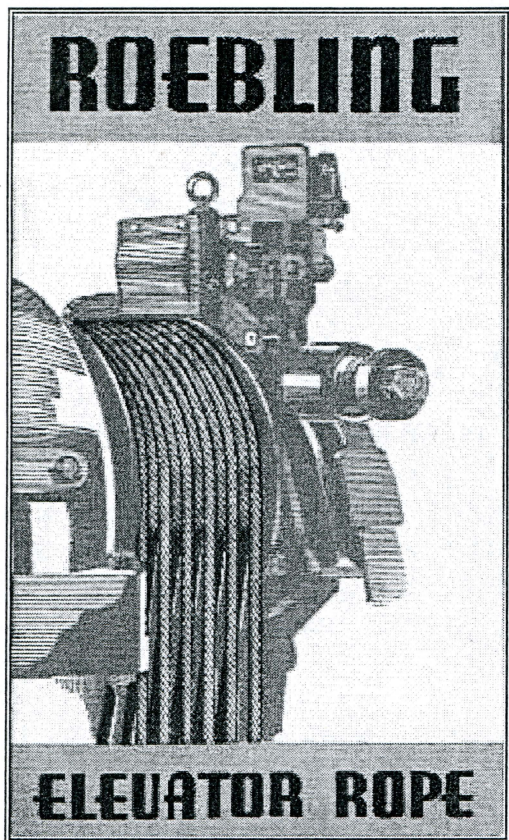
View of Construction of Lock, Panama Canal, ca. 1900.

In the early twentieth century, the John A. Roebling's Sons company expanded into the international area, supplying the wire rope used in constructing the Panama Canal.

John A. Roebling II, Christmas, 1949.

After working briefly at the company, Washington and Emily Roebling's only son John A. Roebling II (1867–1952) devoted himself to the role of gentleman amateur scientist,

performing chemical experiments in his private laboratory. In 1889, he married Margaret Shippen McIlvaine of Trenton, and had three sons: Siegfried, Donald, and Paul. The family lived for some years in Asheville, North Carolina, and later lived in "Boulderwood," an estate in Bernardsville, New Jersey. Margaret McIlvaine Roebling died in 1930; John remarried, to Helen Price of England in 1931. Throughout his life, John A. Roebling II supported the arts, international charities, and maintained a keen interest in his family's legacy.



Roebling Elevator Rope, 1936.

Ferdinand W. Roebling III, ca. 1940.

Ferdinand W. Roebling III (1911–2005) was the last surviving member of the Roebling family to be actively involved in the manufacturing company. A great-grandson of John A. Roebling, Ferdinand served as Senior Vice President and Chief of Engineering until the Roebling company was sold in 1953, and remained as Senior Vice President in charge of engineering at Colorado Fuel & Oil until 1965.

Roebling Pistol League, 1957. *Trenton Public Library*

Fifth Annual Banquet of the Superintendents and Foremen, Roebling Inn, Roebling, N.J., 1914.

Superintendent's house at Roebling, N.J., ca. 1920s. *Roebling Historical Society*.

Foremen's houses, Fifth Avenue north of Knickerbocker, Roebling, N.J., ca. 1920s. *Roebling Historical Society*.

Workmen's row houses, South Fifth Avenue, Roebling, N.J., ca. 1920s. *Roebling Historical Society*

Hard hat, mid-20th century. *Roebling Historical Society*

Alligator wrench. *Roebling Historical Society*

Roebling Office Girls Bowling League Banquet, 1957. *Trenton Public Library*

Roebling Wire Rope. Trenton, N.J.: John A. Roebling's Sons Company, 1920.

Roebling Wire Rope and Wire. Pacific Coast Edition. Trenton, N.J.: John A. Roebling's Sons Company, 1931.

Roebling Welding Wire: Electric and Gas. Trenton, N.J.: John A. Roebling's Sons Company, 1938.

Roebling Elevator Wire Rope and Cables. Trenton, N.J.: John A. Roebling's Sons Company, 1934.

Roebling Elevator Rope. Trenton, N.J.: John A. Roebling's Sons Company, 1936.

Jersey Straight-Line Poultry Fencing. Trenton, N.J.: John A. Roebling's Sons Company Woven Wire Fabrics Division, 1933.

The wire cloth division was the only manufacturing area at JARSCO which had a female labor force. In 1899, twenty women in this division struck to protest being forced to work thirteen hour days to meet orders. Apparently the striking women never returned to work.

'Zintex': Superior New Zinc Coated Insect Screen Cloth. Trenton, N.J.: John A. Roebling's Sons Company Woven Wire Fabrics Division, 1936.

Elevator cable length. *Roebling Historical Society*

Ravine Bridge at Douglass College, New Brunswick, N.J., 1948. *Rutgers University Archives*
In addition to building giant bridges, JARSCO undertook small projects. JARSCO engineers were responsible for the suspension system of this small bridge on the Douglass College campus of Rutgers University, although the bridge itself was designed by Alexander Merchant & Son, and constructed by the Highland Park Building Company in 1927.

Wrench. *Roebling Historical Society*

Wire gauges. *Roebling Historical Society*

John A. Roebling II, Paul Roebling, Siegfried Roebling, Margaret Shippen McIlvaine Roebling and Washington A. Roebling, 1903.

Mary G. Roebling at work, ca. 1940. *Mary G. Roebling Papers, Special Collections and University Archives, Rutgers University Libraries*

Scrapbook, 1942–1945. *Mary G. Roebling Papers, Special Collections and University Archives, Rutgers University Libraries*

Statement of Condition. Trenton, N.J.: Trenton Trust Company, December 31, 1956. *Trenton Trust Company Records, Special Collections and University Archives, Rutgers University Libraries*

Mary G. Roebling also capitalized on the Roebling name, using an image of the bridge designed by her late husband's grandfather on her company's publications.

Trenton Trust Company, 1960s. *Trenton Trust Company Records, Special Collections and University Archives, Rutgers University Libraries*

The Alligator, Amphibian Tractor of Proved Ability. Built by Donald Roebling, Clearwater, Florida, 1940.

John A. Roebling II's youngest son Donald (1908–1959) invented the "amphtrack" an award-winning amphibious vehicle which was used during the Second World War.

Here it is! the New Roebling Rotary Power Mower. Trenton, N.J.: John A. Roebling's Sons Company, ca. 1946.

After the Second World War, JARSCO attempted to diversify its product line, for example, introducing this lawn mower in 1946.

Roebling, Aggregate Wire Screens. Roebling, N.J.: John A. Roebling's Sons Company Woven Wire Fabrics Division, ca. 1950.

Roebling, Building for Tomorrow. Reprinted from May issue of *Roebling* employee magazine.

John A. Roebling's Sons Company, Subsidiary of Colorado Fuel and Iron Corporation, 1953.

Carving set, ca. 1960. *Roebling Historical Society*

This carving set was made as a promotional piece for Charles Roebling Tyson (1914–1999). Tyson, Charles G. Roebling's grandson, stayed on as executive vice president after the company was sold to Colorado Fuel & Iron.

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