

AVERY-BARTHOLOMEW PATENT RAILROAD IRON BRIDGE

(Colby's Patent Iron-Rail Bridge)

(Elm Street Extension Bridge)

New York Cast and Wrought Iron Bridges

Town Park, South of Rte. 222, West of Owasco Inlet

(Relocated from Elm Street Extension spanning Fall Creek,

Nubia, NY)

Groton

Tompkins County

New York

HAER No. NY-277

HAER  
NY  
SS-GRO,  
1-

PHOTOGRAPHS

REDUCED COPIES OF MEASURED DRAWINGS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD

National Park Service

Department of the Interior

P.O. Box 37127

Washington, D.C. 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

AVERY-BARTHOLOMEW PATENT RAILROAD-IRON BRIDGE  
(Colby's Patented Iron-Rail Bridge)  
(Elm Street Extension Bridge)

HAER  
NY  
55-GRO,  
1-

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Location:

On public display in park across from Groton Municipal Building, Town of Groton, Tompkins County, New York. Moved from village of Nubia, Town of Groton, Tompkins County, New York in 1981.

UTM: 18.387640/4716035

USGS Quadrangle: Groton, 7.5 minute

Date of Construction:

1876-1877

Designer/Builder:

Based on a patent granted in 1877 to Oliver Avery, Jr. and Caleb Bartholomew. Minor similarities to a contemporaneous bridge patent granted to Ellery Colby. Built by either Charles Perrigo & Company or its successor, the Groton Iron Bridge Company, Groton, Tompkins County, New York.

Present Owner:

Town of Groton Historical Society,  
Groton, New York

Present Use:

Public monument

Significance:

The Avery-Bartholomew Patent Railroad-Iron Bridge in Groton, New York, is a single-span tied arch iron bridge incorporating railroad rails for its upper and lower chords. The bridge is one of a very small number of patented iron bridges that survive anywhere, and one of the most unusual examples of its kind. It is also the only extant example of a bridge based on the patents of Oliver Avery, Jr. and Caleb Bartholomew,

and exemplifies the technological advances in American metal truss bridge designs during the last quarter of the nineteenth century. Though the iron-rail truss design was short-lived and rapidly succeeded by other iron and then steel designs, it was very much a part of the rapid changes in building technology following the Civil War.

The bridge utilizes one of two designs, both incorporating railroad-iron rails, that launched the prosperous bridge-building enterprise at Groton. The Groton bridge works, under several successive company names, became the leading fabricator and erector of metal truss bridges in New York State and supplied markets all over the United States in the last decades of the nineteenth century.

Retired in 1981 from active service as the Elm Street Extension bridge in nearby Nubia, the Avery-Bartholomew Patent Railroad-Iron Bridge has been reassembled in a town park, where it serves as a public reminder of a period of great innovation and change in metal bridge design technology, and the industry that once prospered in the town.

Project Information:

Documentation of the Avery-Bartholomew Patented Railroad-Iron Bridge was prepared by the Historic American Engineering Record (HAER), National Park Service, during the summer of 1994, as part of HAER's New York Cast and Wrought Iron Bridges Recording Project, with support from the New York State

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Department of Transportation. When citing this report, please credit the Historic American Engineering Record and the author.

Historian:

William P. Chamberlin, PE, Schenectady,  
New York

## I. DESCRIPTION OF THE BRIDGE

The subject of this documentation is a small, single-span bridge that was removed in 1981 from its site in the hamlet of Nubia, Town of Groton, Tompkins County, New York, where it carried Elm Street Extension over Fall Creek. The bridge's superstructure was salvaged and presently is standing erect and fully assembled about four miles west on an abandoned railroad right-of-way along Conger Boulevard, across from the Municipal Building in Groton. Currently owned by the Groton Historical Society, its future is uncertain.

The Avery-Bartholomew Patent Railroad-Iron Bridge is a six-panel, tied arch bridge without overhead bracing. It is 45'-5-1/2" in overall length and 12'-1-3/8" wide between the center lines of its two 7'-3-1/8" deep trusses. The feature that most distinguishes this bridge is the construction of its upper and lower chords. Each is fabricated from a pair of 5-5/8" deep iron railroad rails spliced together at center span. The upper-chord rail of each truss is bent at the panel points to produce an arch composed of a series of six linear segments. The two chords meet at their ends in cast-iron shoes where they are held in place with bolts and clevises.

Hangers consist of pairs of 1" diameter rods looped over the upper chords and bolted below to cast iron connection blocks that support the lower chords. The trusses are braced laterally at the second and fourth panel points by 7/8" diameter rods that extend diagonally, outside of the truss lines, from the upper chords to the bent-up ends of transverse rail segments that rest on the lower chords. The lower chord also supports a 7" deep floor beam at each panel point and upon these rest 4" deep I-beam stringers that support a wooden deck made of 2" x 4" timbers. The bridge is also braced horizontally just below the lower chord by three sets of opposing diagonal tension rods. These diagonals are pairs of 5/8" diameter rods, looped around the hangers above and bolted to the connection blocks below, except in the end panels where single diagonals are looped over the upper chords.

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Photographs taken of the bridge at the Nubia site suggest that the superstructure may have been moved from another location. The overall length of the trusses may be as much as 10' longer than the clear distance between abutment faces and the shoes at each end appear to be supported by a horizontal length of unsupported railroad rail rather than the pile and pile-cap system that was probably used originally.

## II. HISTORY OF THE BRIDGE

## A. Early Years of the Bridge Manufactory at Groton

The Town of Groton, in the northeastern portion of Tompkins County, was settled in 1783. During its earliest years, it was primarily an agricultural community with a small center that included services for those in the outlying areas. However, by 1853, the village had become a center of light industry that included three sawmills, a gristmill, five carriage shops, a furnace, a sash and blind factory, a foundry, four blacksmith shops, a shoe manufactory and a tannery. When local capital was able to attract the Southern Central Railroad to Groton in 1869, markets outside of the immediate area became more accessible. That line, which was later to become part of the Lehigh Valley Railroad, linked the coal producing region of the Lehigh Valley of Pennsylvania with the iron ore reserves of the Great Lakes through its terminal at Fair Haven, New York. Three major industries supplying national markets dominated the economic life of the town in the last quarter of the nineteenth century: the Groton Carriage Works (1866-1908); the Crandall Machine Company, an antecedent of the Smith-Corona Typewriter Company (1887-1900); and the bridge works (1877-c. 1920).<sup>1</sup>

The Groton Iron Bridge Company was formed in 1877 as a joint venture between a local farm machinery manufacturing company and an iron foundry and machine shop, establishments of long standing in Groton with close business and family ties. The farm machinery company, Perrigo & Avery, had been formed by Daniel

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<sup>1</sup>J. Selkreg, ed., "Town of Groton", Landmarks of Tompkins County (Syracuse: D. Mason & Company, 1894), 312-325; L. Court, A Salute to Groton's Heritage (Groton, NY: privately printed, 1976), unpaginated; and Pamela Jo Thurber, "A Study of the Groton Iron Bridge Company and the Preservation of America's Historic Metal Truss Bridges," (M.A. thesis, Cornell University, Ithaca, New York, 1985), 23-39.

Spencer in 1847 as the Groton Separator Works, operated by Spencer until 1859, and from that year to 1863 in partnership with William Perrigo. Perrigo purchased Spencer's shares in 1863 and, with Frederick Avery, formed a new partnership, Perrigo & Avery. In addition to proprietary separators and a washing machine, they offered a variety of woodworking services, skills possibly learned by Frederick Avery from his father who had been the village's first cabinetmaker.<sup>2</sup>

The iron foundry and machine shop, C. & L. Perrigo & Co., had been started in 1849 as the Groton Iron Works by two of William Perrigo's brothers, Charles, a founder, and Lyman, a machinist. They manufactured and sold a variety of tools and equipment used primarily by farmers and millers, including a spoke planer invented and patented by Lyman. The company continued after Lyman's death in 1870, but under the name, Charles Perrigo & Co.<sup>3</sup>

The financial resources of these businesses, together with the management experience of their owners and their knowledge of national markets, provided the basis for the early success of the bridge works. An R. G. Dun & Co. credit report made during the second year of business noted that the bridge company was able to manage with only 30 percent of its capital paid in, and that "if more cash ... was needed the parties connected with the company are fully able to supply it."<sup>4</sup>

The manufacture and sale of iron bridges was first advertised in January 1877 by the Groton Foundry and Machine

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<sup>2</sup>Selkreg, "Town of Groton," 312-325; and W. M. Baldwin, "Historical Sketch of the Town of Groton, Tompkins County, New York." Address to the Groton Library Association, 1868 (Groton, NY: H. C. Marsh, 1868), 14.

<sup>3</sup>Family Bible in the possession of Arlene (Perrigo) Brown, Groton, New York.

<sup>4</sup>R. G. Dun & Co., manuscript credit report, 1879.

Shop, Charles Perrigo & Company, proprietors.<sup>5</sup> Plans for the new enterprise had begun in August and September of the previous year with the filing of three patents, two by Oliver Avery, Jr. and Caleb Bartholomew, and one by Ellery Colby. The first of the Avery-Bartholomew patents was for a truss bridge of the bowstring form in which the arches were made of railroad rails.<sup>6</sup> The other was for a method of connecting the transverse ties, which secured the ends of the bridge's trusses to one another, to metal piles at each end of the bridge. The purpose of the latter invention was to enable the ties (which also served as pile caps), the cast iron shoes (which held the ends of the upper and lower chords together), and the piles themselves to act as a unit that would the piles in proper alignment.<sup>6</sup> That the two designs were intended to complement one another is made clear by a cross-reference to the connection method design in the bridge patent. The latter of the two Avery-Bartholomew designs appears to have been intended as an alternative to the pile and pile-cap system filed by Ellery Colby at about the same time.<sup>7</sup> Colby applied for a fourth patent, his second, on January 22, 1877, this time for another truss bridge that could employ railroad-iron rails but which was illustrated with upper chords fabricated from H-beams bent at the panel points. Some details of Colby's bridge resembled the earlier Avery-Bartholomew design but, in totality, it was a distinctly different bridge.<sup>8</sup>

The relationship among Ellery Colby, Oliver Avery, Jr., Caleb Bartholomew and Charles Perrigo is important to an

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<sup>5</sup>Groton Journal 11:12 (January 11, 1877): 2.

<sup>6</sup>Oliver Avery, Jr. and Caleb Bartholomew, U.S. Patent No. 189,170, and No. 189,171, April 3, 1877 (filed September 11, 1876).

<sup>7</sup>Ellery Colby, U.S. Patent No. 189,020, April 3, 1877 (filed August 11, 1876).

<sup>8</sup>Ellery Colby, U.S. Patent No. 187,513, February 20, 1877 (filed January 29, 1877).

understanding of the business arrangement that led to the formation of the bridge company and to the early years of its operation. While complete information is not available, enough is known to draw some useful inferences.

Ellery Colby, who would emerge as the chief operating officer of the of the new company, was probably the youngest of the four, only 30 years old when he filed his first patent application in 1876.<sup>9</sup> Unschooled, he had come to Groton as a young man, married a local woman, and farmed until going to work for C. & L. Perrigo.<sup>10</sup> His equity in the new bridge-building enterprise was apparently secured by assigning one-half of his patent rights to Perrigo, Avery and Bartholomew, at least two of whom were associated with one another in Perrigo's company.<sup>11</sup>

In 1876, Charles Perrigo, then 59 years old, was well-established as a successful businessman and a leading citizen of the community. A decade earlier he had been among a small number of individuals who had committed their influence and financial resources to bringing the railroad to Groton and, in 1865, were instrumental in creating the First National Bank of Groton. Charles Perrigo served as president of the Bank from its founding until 1890.<sup>12</sup> It would have been perfectly consistent with his entrepreneurial nature and his status in the community to encourage and support promising ideas for new manufacturing ventures. Thus, while Ellery Colby could run the day-to-day details of the business, Charles Perrigo's role was likely one of guiding its development and providing financial support.

Oliver Avery, Jr. was about 40 years old when he, with Caleb

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<sup>9</sup>Day Book, 1877-1885, Groton Iron Bridge Company, Groton, New York; Flora Williams Estate Papers, Account #315, Olin Graduate Library, Cornell University, Ithaca, New York.

<sup>10</sup>Obituary, Ellery Colby, Groton and Lansing Journal, April 25, 1925; and Selkreg, *ibid.*

<sup>11</sup>Baldwin, "Historical Sketch of Groton," 15-16.

<sup>12</sup>Baldwin, "Historical Sketch of Groton," 15-16.

Bartholomew, applied for the first of their two patents. Oliver was the younger brother of Frederick Avery, who ran the farm machinery business with Charles Perrigo's brother, William. He was an excellent machinist in his own right and well acquainted with the manufacture of hardware and equipment.<sup>13</sup> Avery had initially been employed by C. & L. Perrigo, continued when the firm became Charles Perrigo & Co., and superintended the manufacture of bridges during the early years.<sup>14</sup>

In contrast to the other patent beneficiaries, Caleb Bartholomew did not live in Groton and may not have otherwise been associated with either of the founding companies. However, a surviving day book that covers the first nine years of the bridge company's business does suggest that he was a major investor in addition to the equity that would have accrued to his patent rights alone.<sup>15</sup> One possibility is that the original ideas were Bartholomew's, that he brought them to Perrigo, who then had two of his mechanics, Avery and Colby, put them to paper, and that out of this collaboration came the idea for the new company.

The earliest bridges were built by Charles Perrigo & Co., but on March 10, 1877 the Groton Iron Bridge Company was incorporated with a capitalization of \$20,000 divided into 200 shares of \$100 each.<sup>16</sup> Its trustees were Charles Perrigo, Ellery Colby, Caleb Bartholomew, Henry Y. Cornwell, Oliver Avery, Jr.

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<sup>13</sup>Groton Journal, March 8, 1877.

<sup>14</sup>Baldwin, "Historical Sketch of Groton, 14.; and E. M. and C. H. Avery, The Groton Avery Clan, 2 vols. (Cleveland, Ohio: Privately printed, 1912), 741-742.

<sup>15</sup>Avery, Groton Avery Clan, 741-742; and Letters Patent 189,170 and 189,171. Bartholomew filed his patents respectively from Etna and Dryden, N.Y., about 4 miles south of the village of Groton. Between May 9, 1877 and December 31, 1878, \$1,050 was disbursed to Caleb Bartholomew, mostly in \$100 installments.

<sup>16</sup>Selkreg, "Town of Groton," 322.

and Artemus Backus.<sup>17</sup> At the organizational meeting on March 5, 1877, the following officers were elected: Charles Perrigo, president; Ellery Colby, vice president; William Williams, Secretary-Treasurer; and Oliver Avery, Jr., superintendent.<sup>18</sup>

The company's market in the early years was primarily within New York State. Of the approximately twenty-five bridges produced each of the first five years, only two were sold outside of New York. In the next three years, during which production quadrupled, only five out-of-state sales were recorded. The bridges were fabricated in Groton, hauled by wagon, rail and canal to the sites of use and erected either by local contractors or workmen employed by the purchasing jurisdiction, and in some instances by the men from Groton.<sup>19</sup>

In 1887, a new corporate body, the Groton Bridge and Manufacturing Company, was formed. To the existing product line of iron bridges and iron bridge pilings was added steam engines, grain separators, and hot air and steam heaters. Charles Perrigo, Oliver Avery, Jr., and Ellery Colby were among the eleven trustees and stockholders of the new company and Ellery Colby was its first president.<sup>20</sup> However, Colby left Groton in 1890. In 1893 with his brothers Henry P. and Luther S. Colby, and his son Ray M. Colby, all former employees of the Groton Iron Bridge Company, he organized the Owego Bridge Company thirty-five miles south of Groton in the Susquehanna River community of Owego, New York.<sup>21</sup>

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<sup>17</sup>Certificate of Incorporation, Groton Iron Bridge Company, filed March 10, 1877.

<sup>18</sup>Groton Journal, March 8, 1877.

<sup>19</sup>Day Book, Groton Iron Bridge Company, 1877-1885.

<sup>20</sup>Certificate of Incorporation, The Groton Bridge and Manufacturing Company, filed May 28, 1887.

<sup>21</sup>Certificate of Incorporation, Owego Bridge Company, filed January 12, 1893.

The company at Groton prospered. By 1888, 150 men were employed and branch offices were opened as far south as Knoxville, Tennessee and Houston, Texas and as far west as San Francisco, California. The facilities grew from Charles Perrigo's original foundry and machine shop to include seventeen buildings and a railroad station. In October 1894, annual business had reached \$500,000 and in 1895, the firm reported that 360 bridges had been contracted that year. Despite the company's notable successes in other parts of the country, most of its business remained in the mid-Atlantic states of New York, Pennsylvania and New Jersey. Its particular success in New York State was due as much to the large volume of its business there as to large commissions.<sup>22</sup>

With growing competition from an increasingly greater number of bridge builders with aggressive national sales networks, it became more difficult for smaller regional companies to survive. In 1899, the Groton Bridge and Manufacturing Company was purchased by J. P. Morgan, along with twenty-two other regional bridge companies, and merged into the new American Bridge Company. In the fall of 1901, the bridge plant at Groton was closed and its machinery dismantled. However, in 1902, Groton interests repurchased the plant, and with new equipment, established business under the name of the Groton Bridge Company. That firm continued to build bridges but also expanded its operations into the more general field of steel fabrication and erection, as well as the manufacture of road-building and highway maintenance equipment. The business of the new company had decreased significantly from the peak period of 1894-99, and after 1914, it began to deteriorate rapidly. The company survived by renting its buildings and facilities to other businesses until about 1920, when the remaining equipment was sold and the office closed permanently.<sup>23</sup>

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<sup>22</sup>Thurber, "A Study of Groton Iron Bridge Company," 30-39.

<sup>23</sup>Thurber, "A Study of Groton Iron Bridge Company," 30-39.

B. The Avery-Bartholomew and Colby Patents

The Avery-Bartholomew Patent Railroad-Iron bridge that now stands in the Village of Groton is, without question, associated with the early years of the bridge company at that location. However, no direct evidence linking the two has been found, including that which might be expected from surviving records of the Town of Groton or the bridge company, or from contemporaneous newspaper accounts. What evidence does exist is entirely circumstantial, but eminently convincing. It includes: structural details that are in common with elements of the Avery-Bartholomew and Colby patents, and stylistic similarities to contemporaneous illustrations depicting bridges that the company intended to manufacture.

On March 5, 1877, the principals of the soon to be incorporated Groton Iron Bridge Company formally declared their intent to manufacture iron bridges under their several patents, either granted or applied for.<sup>24</sup> While all four of these patents related to bridges, two were specific to the superstructure. Six months earlier, on September 11, 1876, Oliver Avery, Jr. and Caleb Bartholomew had filed to patent a bowstring truss that incorporated several of the distinctive elements of the Groton bridge. These elements included: upper and lower chords fabricated of railroad rail spliced at center span (though laid on their side), similarly configured cast iron shoes, and bracing outside the truss lines supported by bent-up lateral bars.<sup>25</sup>

On January 22, 1877, Colby filed to patent what appears to have been a second iteration of the earlier design. The upper chords, fabricated from bent railroad rails in the first patent, were replaced with H-beams or I-beams, though a variety of other sections including railroad rails were allowed. In recognition of the greater lateral stiffness of the redesigned upper chords, the lateral bracing of the first patent was omitted. The Colby patent emphasized the bending of the upper chords at regular

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<sup>24</sup>Certificate of Incorporation, Groton Iron Bridge Company.

<sup>25</sup>Avery and Bartholomew, U.S. Patent No. 189,170.

intervals, seen in both the earlier patent and the Groton bridge, as well as a redesigned shoe that appears to be less similar to that found on the Groton bridge than the shoe depicted in the first patent. It also detailed devices used to connect the verticals and diagonals to the lower chord that are conceptually similar, though not identical, to those found on the Groton bridge.<sup>26</sup>

It is the Avery-Bartholomew patent, the first of the two to be filed, that most closely resembles the Groton bridge. In fact, when the patent drawing is compared with two illustrations of the bridge that the company planned to build, a chronological sequence of developmental stages can be seen that clearly links the Avery-Bartholomew patent to the Groton bridge.

On January 11, 1877, six months after Avery and Bartholomew had applied for their patent, the Groton Journal ran an advertisement for products manufactured by the Groton Foundry & Machine Shop, Charles Perrigo & Co., proprietors, that included:

Railway Iron Bridges, Made Wholly of Railroad Iron. The Best and the Cheapest Bridges in the Market.<sup>27</sup>

The ad prominently featured a 7" x 2" woodcut illustration depicting the profile of an 8-panel bowstring truss bridge beneath which the following caption appeared:

The above is the Railroad-Iron Bridge, to be Manufactured in this Place.<sup>28</sup>

While the Avery-Bartholomew patent drawing includes elements common to the Groton bridge, the newspaper illustration actually resembles the bridge itself. The upper chords are clearly made of railroad rail, now turned upright; opposing diagonals are

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<sup>26</sup>Colby, U.S. Patent No. 187,513.

<sup>27</sup>Groton Journal, January 11, 1877.

<sup>28</sup>Groton Journal, January 11, 1877.

clipped together where they intersect; and the trusses are braced laterally at the next-to-center panel points. Differences are apparent, primarily in the deck, which seems to be a system of timber floor beams and longitudinal planks, and in the diagonal and single hanger rods which appear to pass through the upper chord to bolt and washer connections. The details of the lower chord are obscure in the illustration.

Two months later, the first letterhead of the new company included a bi-colored engraving that resembles the Groton bridge even more closely. Identical features include details of the upper and lower chords, cast-iron shoes, diagonals and hangers, and the manner of connecting the latter to the chords. Only the deck is different; as in the earlier illustration, it appears to be a beam and plank system.<sup>29</sup>

The patent drawing, followed by the newspaper illustration six months later, and the letterhead engraving two months after that, suggest an evolution in design that, while undoubtedly common in the chain of events between idea and reality, is rarely visible with the same clarity as it is in this instance. The Colby patent, filed four months later than the Avery-Bartholomew patent, is less visible in the Groton bridge than in three small bowstring truss bridges that still survived on roads in New York State as late as 1982. Two of these bridges were built in July 1877 in the Town of Deruyter, Madison County, and one in August 1878 in the Town of Carleton, Orleans County.<sup>30</sup> It is likely that the Avery-Bartholomew railroad-iron truss design was abandoned early in favor of the Colby style because of the Colby design's greater simplicity and lateral stiffness. This would account for the higher survival rate among the latter and the fact that the Colby design appeared to be the Groton Iron Bridge Company's low truss of choice well into 1878.

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<sup>29</sup>Ellery Colby to Hon. Ellis Spear, Commissioner of Patents, letter dated March 16, 1877; Patent Application File, National Archives, Washington D. C.

<sup>30</sup>All three of these bridges have since been replaced and no longer survive.

### III. SIGNIFICANCE OF THE BRIDGE

The Avery-Bartholomew Patent Railroad-Iron Bridge in Groton is the only example extant of bridges based on the patents of Oliver Avery, Jr. and Caleb Bartholomew and is one of two designs that launched the bridge-building enterprise at Groton. Salvaged in 1981 from active service, it has been reassembled in the Village of Groton where it now serves as a visual reminder of the vernacular designs that sought a niche in the highway bridge market following the Civil War, and of the bridge building company that once prospered in that town.

Formed in 1877 by the merger of an agricultural machine manufacturing company and an iron foundry and machine shop, the Groton Iron Bridge Company and its successor, the Groton Bridge and Manufacturing Company, became the leading fabricator/erector of metal truss bridges in New York State, from where it supplied markets in all parts of the country. With twenty-four other companies, it was included in the American Bridge Company merger of 1900 and was closed in 1901. It reopened in 1902 as the Groton Bridge Company under which name it continued until about 1920.

In spite of its importance to the founding of the Groton Iron Bridge Company, the railroad-iron bridge type made at Groton was apparently short-lived, yielding soon to more conventional and, likely, more reliable designs. It was conceived and built toward the end of a period of great experimentation and diversity in American bridge-building. This was also a time of technological change as iron was yielding to steel as the structural metal of choice and designs were converging on a few standard forms. The brief tenure of the railroad-iron bridge made at Groton reflects this trend. The extant example at Groton is one of a very small number of patented iron bridges that survive anywhere, and one of the most unusual.

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Avery, Oliver, Jr., and Bartholomew, Caleb. U.S. Patent No. 189,171, dated April 3, 1877 (filed August 11, 1876).

Colby, Ellery. U.S. Patent No. 187,513, dated February 20, 1877 (filed January 29, 1877).

Colby, Ellery. U.S. Patent No. 189,020, dated April 3, 1877 (filed August 11, 1876).

Colby, Ellery to Hon. Ellis Spear, U.S. Commissioner of Patents,  
letter dated March 16, 1877.

BRIDGE COMPANY DOCUMENTATION

Certificate of Incorporation, Groton Iron Bridge Company, Groton,  
NY. Filed March 10, 1877.

BRIDGE COMPANY DOCUMENTATION, continued

Certificate of Incorporation, The Groton Bridge and Manufacturing  
Company, Groton, NY. Filed May 28, 1887.

Certificate of Incorporation, Owego Bridge Company, Owego, NY.  
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