

**Tivoli Island Bridge (Milford Bridge)**  
Spanning the Rock River Channel from the  
mainland to the west side of Tivoli Island  
Watertown  
Jefferson County  
Wisconsin

HAER No. WI-21

HAER  
WIS,  
28-WATO,  
5-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

REDUCED COPIES OF MEASURED DRAWINGS

Historic American Engineering Record  
National Park Service  
U. S. Department of the Interior  
P. O. Box 37127  
Washington, D. C. 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

HAER  
WIS,  
28-WATO,  
5-

Tivoli Island Bridge  
(Milford Bridge)

HAER No. WI-21

Location: Spanning the Rock River channel from the mainland to the west side of Tivoli Island, on the eastern limits of Watertown, Jefferson County, Wisconsin. (Originally located over the Crawfish River in Milford, Jefferson County, Wisconsin)

UTM: 16.423165.4783100  
Quad: Watertown

Date of Construction: c. 1877; moved to present location in 1906

Builder: King Iron & Bridge Manufacturing Company

Original Owner: Town of Milford, Jefferson County, Wisconsin

Present Owner: City of Watertown, Jefferson County, Wisconsin

Original Use: Vehicular and pedestrian traffic

Present Use: Pedestrian traffic

Significance: In 1866, Zenas King from Ohio received a patent for an innovative tubular iron-arch design. Increasing the sectional area of the top chord toward the ends of the arch, he claimed, strengthened the bridge. Built c. 1877, the Tivoli Island Bridge incorporated this design principle. The King Iron & Bridge Manufacturing Company in Cleveland, Ohio, popularized the tubular iron-arch by numerous examples throughout the United States.

Apparently, the Tivoli Island Bridge was originally part of a four-span structure over the Crawfish River in the village of Milford. In 1906, two Watertown residents arranged to have the two-span section moved to its present location at Tivoli Island. In Wisconsin, the bridge is one of only seven remaining bowstrings and the last example of a tubular arch design.

Historian: Diane Kromm  
Wisconsin Historic Bridge Recording Project  
July 1987

In 1876, the town of Milford's Board of Supervisors decided to build an iron bridge to replace an old wooden bridge that spanned the Crawfish River in the village of Milford, a small community of 300 residents. The bridge connected the transportation route between the village of Lake Mills and the city of Watertown. To defray costs, the supervisors requested that Jefferson County contribute financial assistance. In the fall, the Jefferson County Board of Supervisors acknowledged the request by appropriating \$1,400 (half of the projected cost of the bridge), "provided the Town of Milford erect, or cause to be erected a first class, iron bridge eighteen feet in width, placed upon good, substantial stone abutments and piers, laid in waterlime or cement within the coming year."<sup>1</sup> Later in the month, the County Board appointed C. N. Phillips to cooperate with the town of Milford supervisors in spending the appropriated amount.<sup>2</sup>

In March 1877, an article in the Jefferson County Union announced that Milford would "enjoy the honors of an iron bridge," the contract having been initially let to an individual in Pittsburgh, Pennsylvania.<sup>3</sup> Three months later, workmen began removing the old bridge. The problem of how to cross the river while the new bridge was to be constructed raised discussion. W. H. Gallup, a local resident, decided not to run a ferry service, but to allow people to cross the river free of charge on a gravel bar below the mill dam. Eventually, a footbridge was constructed to accommodate pedestrians. The newspaper also noted that the "new iron bridge to be erected now will probably be a little ahead of anything in the county and therefore we will try and keep our readers posted in regard to its progress..."<sup>4</sup>

By July 6, 1877, the workmen had completed the bridge, and the Board of Supervisors had issued their approval:

"It is a beautiful structure consisting of four spans each 54-1/2 feet long making 218 feet in all; it has a double driveway, separated by a strong piece of timber, and a foot walk on the upper side, guarded by a heavy iron railing. The plank on the driveway are put on slanting from the center backwards and outwards, so the wear of neither horses' shoes or wagon tire will come directly with the grain of the wood. We pride ourselves now upon possessing the "boss" bridge of the county.... It was put up by the King Bridge--Co. at a cost of about \$3,000, and weights, all told sixty tons."<sup>5</sup>

For an unexplained reason, the Pittsburgh firm did not construct the bridge. Instead, the King Iron and Bridge Manufacturing Company, based in Cleveland, Ohio, manufactured the bridge and supervised its installation.

Milford's claim to have erected the most progressive bridge in the county may have been only slightly exaggerated. The newspaper journalist, unfortunately, did not elaborate on what made the Milford bridge distinctive--new material? span length? distant manufacturer? bowstring design? In February 1875, the Z. King Wrought Iron Bridge Company completed the first iron bridge in

Watertown in Jefferson County. This bridge, a Howe truss design, prompted heated controversy among members of the Watertown Common Council and local journalists, a large minority of whom initially favored a less expensive alternative. Almost immediately, however, iron became the favored building material. The King Company constructed at least two more iron bridges in Watertown during 1877. Two years later, the city added three more iron bridges. Eventually, three bowstring bridges spanned the Rock River in Watertown.<sup>6</sup> Additional evidence suggests that the Tivoli Island Bridge was the first bowstring in the area. Jefferson County townships did not begin to petition the County Board of Supervisors for funds to improve and construct bridges until 1876. In that year, appropriations for bridge projects were considerably smaller to other towns than Milford: Aztalan (\$600 toward building a 216-foot bridge and a 20-foot bridge on major public thoroughfare); Hebron (\$400), and Sullivan (\$400).<sup>7</sup> County appropriations made the more expensive iron bridges accessible to local communities. If the city of Watertown is representative, the Milford bridge was one of the earliest iron bridges in the county, and it may have been the area's first bowstring design.

The bridge underwent numerous repairs over the next several decades. In 1886, Thomas Baxter of Watertown and James Enright of Milford built new piers under the bridge. The following year, the town of Milford purchased plank and hired seven men to work on repairs. In 1900, the town board raised \$700 to pay for additional work. The bridge's condition deteriorated over the next five years. In May 1905, twelve residents of the town of Milford petitioned the board of supervisors to call a special town meeting to discuss raising funds to repair or rebuild the Milford Bridge. The following month, the supervisors agreed to replace the bridge with an iron one span structure, with a length of 200 feet or less, a 16-foot roadway, a 4-foot sidewalk, and concrete abutments. In November, the county voted to appropriate a matching \$3,200 to the project, one-half of the estimated cost of an iron bridge and abutments, since the total cost exceeded one-eighth of one percent of all the taxable property in the township.<sup>8</sup> In December, the Wisconsin Bridge and Iron Company entered into a contract with the town of Milford to construct a new bridge in Milford, a twelve-panel, Pratt through truss (190 feet by 16 feet, with one 4-foot sidewalk) on concrete abutments at a cost of \$6,500. They agreed to erect the substructure and have the superstructure ready for travel by July 1, 1906.<sup>9</sup>

Although the evidence is inconclusive, it appears that the old Milford bridge spans were sold in auction and moved to other parts of the county. Oral history accounts suggest that two spans went to Watertown, one span to Fort Atkinson, and the whereabouts of the fourth span remain unknown.<sup>10</sup> Ernest and Fred Ohm apparently acquired two of the spans. In mid-July, they erected an iron bridge in Watertown to Tivoli Island, a recreation island they had recently purchased to convert into a beer garden.<sup>11</sup>

On April 3, 1906, the town of Milford's Board of Supervisors agreed to "dispose of the Old Milford Bridge according to their best judgement."<sup>12</sup> A clause in the 1905 contract with the Wisconsin Bridge and Iron Works made the bridge

company ultimately responsible for removing the old bridge, if it were still standing at the time the new span was erected. It is possible that the supervisors chose to auction the bridge spans, a practice followed in later years. In 1908, for example, the old Hubbleton bridge in the township was sold at auction to the highest bidder, according to the "laws of 1906."<sup>13</sup>

It seems highly probable that the Tivoli Island Bridge in Watertown was originally a section of the Milford Bridge. Various design and construction features--pin connections. Cast iron pieces, non-continuous arch plates, rod extensions on lower chords of the Tivoli Island Bridge suggest it was built in the 1870s. The awkward placement of the shoes on stone shims is unusual, increasing the likelihood that the bridge was moved from another location. The Tivoli Island Bridge is similar in design to other bridges attributed to the King Iron & Bridge Manufacturing Company. Its span lengths (55 feet, 8 inches; 49 feet, 10 inches) roughly correspond to the span length of the Milford Bridge (54 feet, 10 inches). The Tivoli Island Bridge was erected one month after construction began on the new Milford bridge. Separate oral history accounts support the above conclusion.

#### TIVOLI ISLAND SITE

Tivoli Island is a four acre island located on the far east side of Watertown, in between the Rock River and its channel. The Concordia Musical Society purchased the island in 1874 and named it the Concordia Island. They established a park open to the public, constructing a pavilion, bandstand, and fountain. In addition, they constructed the first bridge, a wooden structure built in 1874, leading to the island. In 1906, the Ohm brothers purchased the island. They enclosed the pavilion and opened a bowling and beer parlor. In addition to other changes, they renamed the island "Tivoli," after a pleasure resort in Italy. With the beginning of prohibition, the Ohm brothers sold the island, including the iron bridge, to Carl Wolf. He, in turn, sold it to W. F. Reichardt. In 1941, the island was lost to the county for back taxes. Flora Gerbitz purchased it from the county and resold it to Henry Schol in 1946. In 1961, the city of Watertown purchased the island and established it as a city park.<sup>14</sup>

The bridge has undergone several modifications since its move to the Tivoli Island site. The most obvious change in its re-adaptation to a pedestrian bridge was the elimination of the footwalk with iron railings and the double driveway, the extra length of the cross beams being allowed to extend symmetrically beyond both sides of the bridge. An early photograph of the bridge also shows the addition of a large decorative portal attached to the bridge's entrance. In 1926, W. F. Reichardt encased the piers in concrete, "placed many nine-inch iron beams," and rebuilt the floor. When the city of Watertown bought the bridge, they redecked the surface before opening it for foot travel. More recently, the Watertown city engineering department has conducted maintenance on the structure. During the winter of 1985-1986, an ice flow pressed into the bridge, twisting and breaking several rods in the

side panels and bottom lateral bracing. The excessive pressure temporarily lifted one shoe of the bridge off its base.<sup>15</sup> The replacement rods and bolts are clearly distinguishable from the originals. The bridge is in good condition. The surface is pitted and corroded. The iron plates have buckled in between the rivets.

#### PATENTS

In October 1861, the United States Patent Office issued a patent (No. 33,384) to Zenas King and Peter Frees, both of Ohio, for an improvement in trussed beams for bridges, specifically for tubular arch bridges. Their invention related to the tubular construction of the arch top chord. By increasing the section area of the arch toward center, and correspondingly decreasing it toward the ends, they could supposedly strengthen the structure by reinforcing the areas under the most stress. The primary objective was to design a bridge of the same strength with less metal or, as they indicated, make a stronger bridge, using the same amount of metal. The increase in sectional area was usually limited to the vertical dimensions, and did not ordinarily include the width or lateral measurements. Although they based their improvement on a rectilinear cross-section, they claimed it was also suitable for tubular wrought-iron arches in other forms. To prevent problems of decay, they inserted a cast-iron washer or plate into the recess of the top channel; the bottom of the washer or plate was grooved to allow rain to pass over the top of the arch to the ground.<sup>16</sup>

Six years later, King received another patent (No. 58,266) for an improvement on his earlier design. Although his claim rested primarily on a unique bottom chord connection, it included a reference to the top chord sectional area. Ironically, the top chord was designed wider at the ends than in the center, exactly the opposite configuration as in the earlier patent. The justification, however, remained the same: to give the bridge more strength. The design of the Milford Bridge top chord is based upon this principle.<sup>17</sup> In another patent revision received the following year, King completely eliminated the varied sections of the tube.

#### KING IRON & BRIDGE MANUFACTURING COMPANY

Zenas King first became involved with the bridge building industry in 1858, when he started working as an agent for the Moseley Bridge Company in Cincinnati. Thomas Moseley invented the first practical tubular arch bridge in America made from wrought iron boiler plate. Within several years, King and Frees started their own bridge building firm in Cleveland, Ohio, an operation that also included a boiler works. In 1864, they dissolved their partnership, allowing King to devote himself full-time to bridge construction. King established an enormously successful business. He chose to concentrate heavily on the bowstring and swing designs prior to 1880. The bowstring was lighter than other iron bridges and, therefore, less expensive to manufacture. In addition, his use of standardized, prefabricated parts in the manufacturing

process gave him a competitive edge in the market. His firm could produce large quantities of bridges (200 feet of bridges daily). His use of agents and subsidiary companies throughout the country allowed him to distribute his bridges over a geographic area. The size of the Cleveland firm increased rapidly in the 1880s, from 40 to 360 workers. Although King died in 1892, the firm continued into the twentieth century.<sup>18</sup>

#### BRIDGE CONSTRUCTION

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#### BRIDGE CONSTRUCTION

The two bridge spans vary in length (5 feet) and slightly in height (4 inches). The top chord is constructed of two side and parallel plates. They are connected by an upper and lower plate running the entire length of the arch, the edges turned at right angles so they could be riveted to the side plates, a design forming recessed channels on the top and bottom. If the section area had been increased to accommodate a longer span, a third channel plate would have been riveted to the middle of the tube for additional stiffness. Another innovation on King bridges was the use of continuous wrought iron plates. For short spans, the company usually used a single piece to make the sides, top and bottom of the tube. For longer spans, the plates were not continuous, but bolted together with splice plates.<sup>19</sup> The Tivoli Island Bridge uses non-continuous plates.

The bottom chord consists of two parallel flat iron bars forged from large rods, the rod shape still evident at the ends of the bars. Except for the riveted plates of the upper chord, pin-connections secure the joints. The cruciform posts extend through holes in the upper chord with nuts and cast iron washers fastening the ends. The diagonals and bottom lateral bracing consist of cylindrical rods with threaded ends. U-bolts hold deck beams against the

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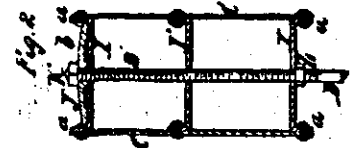
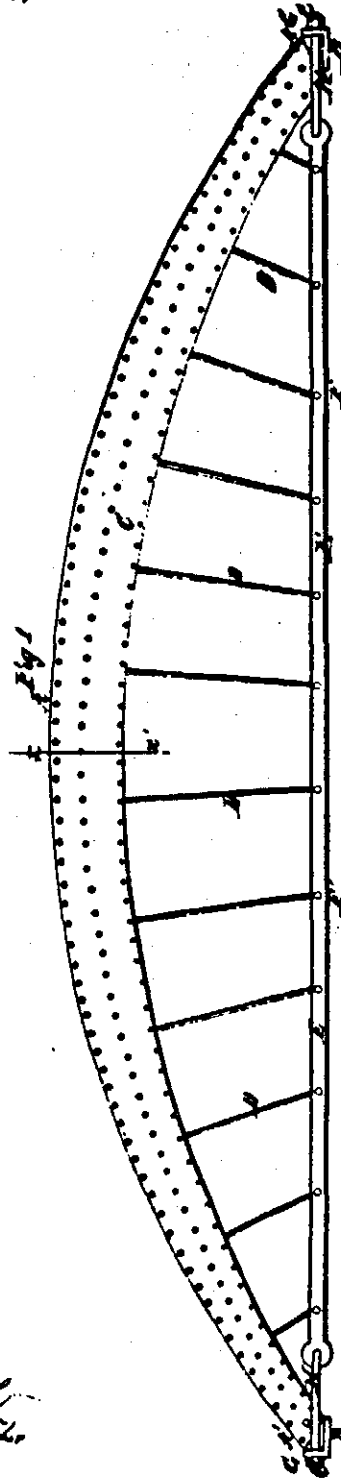
lower chord. Extending beyond the sides of the bridge, cross beams support longitudinal, rolled I-beams. A broken piece of wrought iron that extends from a pinned connection near the top of the arch was apparently part of an apparatus holding a decorative portal installed at the bridge entrance after its relocation to Tivoli Island.



*Frees & King*  
*Truss Bridge.*

*No. 2,380.*  
*33,384.*

*Patented Oct. 1, 1861.*



*Witness,*  
*H. Blough*  
*Charles E. Felt.*

*Inventors*  
*J. King*  
*P. M. Frees*

# UNITED STATES PATENT OFFICE.

ZEN'S KING, OF MILAN, AND PETER M. FREES, OF CINCINNATI, OHIO.

## IMPROVEMENT IN TRUSSED BEAMS FOR BRIDGES, &c.

Specification forming part of Letters Patent No. 33,341, dated October 1, 1861.

### *To all whom it may concern:*

Be it known that we, ZEN'S KING, of Milan, in the county of Erie and State of Ohio, and PETER M. FREES, of Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Improvement in Iron Bridges; and we do hereby declare that the following is a full and exact description of the same, reference being had to the accompanying drawings and the letters of reference marked thereon, making part of this specification.

Our invention relates to that class of bridges which have tubular iron arches, and in which the roadway is supported by a tie-beam attached to each end or foot of the arch, and connected to the arch by radial rods passing at various points from one to the other.

Our invention consists in the construction of these arches, which we make with a gradually-increasing sectional area from each foot toward the center or crown of the arch, so as to make the arch proportionately more resistant to deflection at all the points where an increase of deflection would naturally take place, and, vice versa, diminishing the sectional area of the arch as the deflection would naturally decrease from the ends receiving more directly (from their contiguity) the vertical support of the abutments, when a weight of any kind passed over the bridge, thus making each section equally strong in proportion to the deflection which it has to resist, and thereby insuring an extremely stable structure. This increase in the sectional area of the arch is generally confined to its vertical dimensions and does not ordinarily include its width or lateral measurement. All structures of this kind are really stronger and more capable of enduring the wear and tear or resisting any accident to which they are liable when they are equally rigid and equally flexible at all points in proportion to the amount of resistance which each point has to exert to the work or weight which tends to injure or destroy it, and this desideratum is fully attained by this method of constructing bridges.

The object of our invention is to make a bridge of the same strength with less metal than is now employed by distributing the metal in proportion to the strain it has to

bear, and thus lightening the bridge, or to make a much stronger bridge by employing the same amount of metal now employed. These are of course great advantages.

In the drawings, Figure 1 is a side elevation of the whole bridge, and Fig. 2 is a cross-section taken through the line *x x'* in Fig. 1.

The same letters of reference indicate similar parts in each.

A is the arch, extending from pier to pier and resting on each pier in a suitable and proper bearing, as at B. This arch is constructed of two side and parallel plates C, which are connected together by an upper and lower plate I, running the whole length of the arch and having their edges turned at right angles in order to allow of their being riveted to the side plates, and so forming a hollow-arched girder. Between these two plates I a stay-plate I' is placed and riveted to the side plates C to give rigidity and strength to the structure. These angles and rivets are seen at *a*, Fig. 2. As will be seen in Fig. 1, the arch gradually increases in sectional area vertically from the point A'—one foot of the arch—in the point *c*—the center or crown of the arch—and gradually diminishes in sectional area vertically from the point *c* to the other foot of the arch A". Each foot of the arch rests in a suitable step G, to which the tie-beam E is also secured by stirrups H, whose ends are threaded and pass through holes in the back of the step on each side of the arch, where they are secured by nuts *e*. This tie-beam is constructed of two parallel plates or bars connected by eyes or in any other suitable way.

Connected to the tie-beam by pins F are one series of radial rods D, which pass upward to the arch above them, where they are secured in the following way: In the upper and lower plates I, which connect the side plates horizontally, and in the central stay plate a hole or aperture is cut large enough to admit of the radial rod D passing through it, and on the upper end of the radial rod a screw-thread is cut. Fitting in the recess formed by the top plate I and its junction with C by means of the portion turned up at right angles to it, to be riveted to C, is a vast-iron washer or plate J, whose under side is channeled by grooves *k* to prevent of any rain passing through

33,794

over the top of the arch to the ground which would otherwise lodge on the top and tend to rust the bridge, and thus cause premature decay. Through this passes also the end of the radial rod D and on it the nut K, which secures the rod in its place, rests. By having the nut rest on this plate the strain of the radial rod is distributed equally over all parts of the arch, which naturally belong to it. A nut J is also screwed around the rod D up to the lower horizontal plate I to prevent any vibration of the rod, and thereby prevents the rod wearing out the holes through which it passes, and thus becoming loose.

We have described our improvement as applied to tubular arches having a rectangular cross-section. It is, however, equally appli-

cable to tubular wrought-iron arches made in other forms.

Having thus described our improvement in the construction of tubular metallic bridges, what we claim as new, and desire to secure by Letters Patent, is—

The peculiar formation or configuration of the arch A, the same being made to increase gradually in its vertical and lateral dimensions from the ends A' A'' of the arch to its center or crown, in the manner as described, for the purposes set forth.

Z. KING,  
P. M. FREES.

Witnesses:

WM. CLOUGH,  
CHARLES L. FISHER.

# Z. King. Truss Bridge.

N<sup>o</sup> 58,266. Patented Sep. 25, 1866.

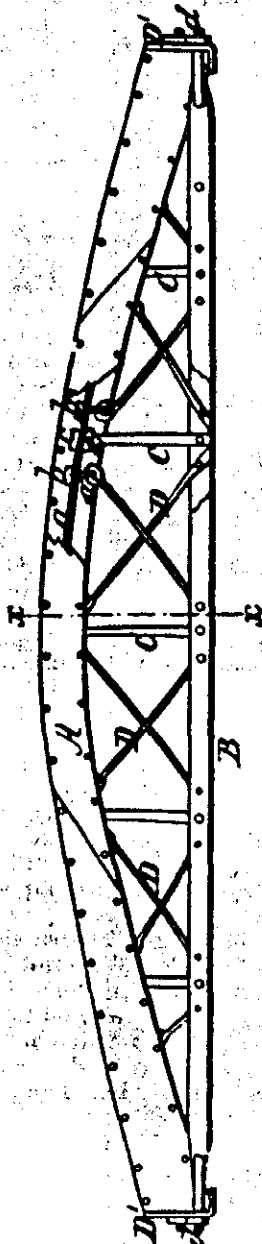


Fig. 1



Fig. 2

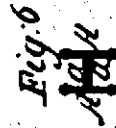
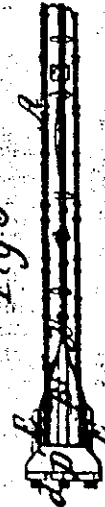


Fig. 3



Fig. 4



Inventor,  
Zenas K.

Witnesses:  
W. H. Burroughs  
E. E. White

# UNITED STATES PATENT OFFICE.

ZENAS KING, OF CLEVELAND, OHIO.

## IMPROVEMENT IN BRIDGES.

Specification forming part of Letters Patent No. 38,266, dated September 25, 1861.

To all whom it may concern:

Be it known that I, Z. KING, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful improvements in bridges, being an improvement on a patent granted to P. M. Frees and myself October 1, 1846; and I do hereby declare that the following is a full and complete description of the construction of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 is a side view. Fig. 2 is a top view. Fig. 3 is a view of a portion of the under side. Fig. 4 is a transverse section in the direction of the line *x x*. Fig. 5 is an end view. Fig. 6 is a detached section, that will be referred to in the description.

Like letters of reference refer to like parts in the several views.

My improvement relates to the manner of constructing bridges, as hereinafter described.

In the drawings, A represents the upper chord, and B the lower chord or stringer. To these chords are connected suspension-rods C and braces D.

The upper chord, A, is formed of sections, the inside pieces, *a a*, being of a rectangular form, as shown in Fig. 6, which is a cross-section of the chord A. These pieces abut together, and the sides of the chord are lapped close to the piece *a* and riveted to said pieces, as shown.

It is designed to have the bridge made up of sections formed of plates firmly secured and riveted together, so as to form a span of any practical length.

The cord or stringer B is composed of two pieces. The ends of the rods C and braces D are flattened and riveted between these pieces, the rivets passing through the chord, or braces and chord. The upper end of these braces is connected to the upper chord by means of an eye *a'*, that is attached to said chord by means of the nut *b*, and the end of the braces hook into the eyes *a*, forming a hook and eye, the rods C being connected to the chord by means of nuts *c*, one above and one below the part *a* of the chord, a portion of

the chord being broken away in Fig. 1 to show the connection.

The chord A is wider at the ends than in the center, as shown, thus giving it more strength; or the arch may be of the same width at the ends as at the center. The ends abut against the foot-plate D', which is of the shape shown. To the plate D' is connected the chord or stringer B by means of nuts *d*. The ends of the upper chord are curved down, as shown, and come against the foot-plate D', as stated.

The two pieces of the stringer B part, and one passes over the side of the chord A to the plate, and the other piece passes round the other side, each terminating in bolts E E, and is connected to said plate by nuts *d*, as before stated, and shown in Fig. 3, being a view of a portion of the under side.

Between the pieces of the stringer B is a rod, B', that is united at *d* to the stringer and passes along to the foot-plate, to which it is connected by means of a screw-nut.

The braces D, being connected by a hook and eye, allow the truss or bridge thus connected to expand or contract, according to the changes of the weather. The joints being loose, they can expand without breaking, and the nuts at the end of the plate D', that connect the stringer B and bolt B', can be loosened or tightened, according to the changes of the weather. If the chord A contracts it can be loosened by means of said nuts, or it can be tightened, if desired; and if more tension is desired to be given to the truss, it can be given by means of the nuts, and by this means the floor can be raised if it sinks.

What I claim as my improvement, and desire to secure by Letters Patent, is—

The chord B, with the rod B', so that the point of connection *d'* of said chord and rod, the chord shall enter the plate D' at an angle, in combination with the counter and main braces, thereby rendering the structure less liable to fracture, the whole being constructed as and for the purpose as herein described.

Witnesses: ZENAS KING,  
W. H. HURRIDGE,  
E. E. WAITE.

FOOTNOTES

- 1 Jefferson County, Board of Supervisors, Proceedings, 1876, pp. 7, 20.
- 2 Ibid., p. 30.
- 3 Jefferson County Union, March 23, 1877, p. 3, col. 4.
- 4 Ibid., May 11, 1877, p. 3, col. 6; Ibid., June 8, 1877, p. 3, col. 5-6.
- 5 Ibid., July 7, 1877, p. 3, col. 4; references to the bridge construction also appear in Ibid., June 22, 1877, p. 3, col. 6, and June 29, 1877, p., col. 6.
- 6 City of Watertown, Common Council, Proceedings, 1874, p. 384; Ibid., 1877, p. 526, 550; Ibid., 1879, pp. 46, 48. Milwaukee Sentinel, February 6, 1875, p. 3, col. 3, Ibid., September 24, 1879, p. 2, col. 2; Ibid., September 6, 1879, p. 3 col. 2; 1885 bird's eye view map of Watertown (State Historical Society of Wisconsin-Archives).
- 7 Jefferson County, Proceedings, 1876, pp. 6, 28, 30-31.
- 8 Town of Holland, Board of Supervisors, Proceedings, June 28, 1886, June 27, 1887, April 3, 1900, May 5, 1905, June 10, 1905, March 27, 1906; Jefferson County, Proceedings, 1905, pp. 13-14, 52. A discrepancy appears in the county Proceedings; the proposed bridge is recorded as replacing the "present iron bridge of three spans," (p. 13) instead of four spans.
- 9 Contract between the Wisconsin Bridge and Iron Company and the town of Milford, Jefferson County, Wisconsin, December 4, 1905 (Town Hall, Town of Milford).
- 10 George Wendt (Lake Mills, Wisconsin), telephone conversation with Tom Schultz, July 2, 1987; Edwin Wollins, interview with author, Milford, Wisconsin, July 16, 1987. According to Mr. Wollins, the third span went to Fort Atkinson, where it spanned the Bark River south of the local hospital. A bridge of this type is no longer at that location.
- 11 Watertown Gazette, July 13, 1906, p. 5, col. 2; Tivoli Island Title Abstract (Watertown Municipal Building, City Clerk's office).
- 12 Town of Holland, Proceedings, April 3, 1906.
- 13 Ibid., April 7, 1908.

- 14 Tivoli Island Title Abstract; Rose, Evelyn, "Tivoli Island Has Had an Active History," Watertown Daily Times, February 7, 1981, p. 2; "Tivoli Island in Watertown Had Rich History," Watertown Daily Times, June 12, 1976, Sec. 6, p. 19; photograph, private collection of Margaret Kreitzmann, Watertown, Wisconsin.
- 15 Letter to the Editor, Watertown Daily Times, March 20, 1941; Ibid., June 12, 1976, Sec. 6, p. 19; John Dammon, interview with author, City Engineering Department, Municipal Building, Watertown, Wisconsin, June 23, 1987.
- 16 United States Patent Office, Patent No. 33,384.
- 17 Ibid., Patent No. 58,266; Simmons, David A., "Zenas King: A Bridge Builder of National Proportions," manuscript article to be published by the Western Reserve Historical Society, p. 5.
- 18 Simmons, pp. 9, 18-19.
- 19 Ibid., p. 4-5.