

George W.G. Ferris, Jr.

Mr. Ferris Wheel

By Richard G. Weingardt, P.E.



George W.G. Ferris, Jr. at age 34. Courtesy of Douglas County Historic Society.

Although much has been written about the Ferris Wheel, little is widely known about its creator. In commemorating the 150th anniversary of his birth, ASCE Press is publishing a new book about his life and times that will hopefully correct that – *Circles in the Sky* (written by this author). It reveals many secrets about Ferris and delves into his personal and engineering life, where he came from and how he came to develop the greatest wheel ever built – and how, in the end, it consumed him. The following is excerpted from the book.

Tall, handsome and dashing, Ferris was an imposing figure, a legend in his own time. He commanded attention wherever he went long before he became an international figure. As

In reporting on a the latest batch of 500-foot-plus tall Ferris wheels being built around the globe, the headline for an article in the March 2008 issue of *Popular Mechanics* read, “Big-Money Race for World’s Tallest Ferris Wheels Heats Up.” The author of the article, Erin McCarthy, reported, “When it comes to status symbols, nothing beats a circle. There is a global race to create the biggest Ferris wheel, and while these attractions are built for fun, the stakes are serious. These wheels have almost replaced the skyscraper as icons.” The race to erect the largest observation wheel began in America 115 years ago at the World’s Fair in Chicago, and the individual behind it all was a daring young engineer from western Nevada – George Washington Gale Ferris, Jr.

the creator of one of the 19th century’s most imaginative inventions, the young U.S. civil/structural engineer experienced world recognition while still in his early 30s.

A partner in one of Ferris’s two engineering firms, Gustav Kaufman, said of Ferris, “He was eminently engaging and social, an entertaining storyteller who often amused his friends with anecdotes. He was an optimist, always bright, hopeful and full of anticipation of good results from all the ventures he had at hand, convinced that he would ultimately overcome any troubles. These feelings he could always impart to whomever he addressed in a most wonderful degree, and therein lay the key to his success. Even in the darkest times, he was ever looking for the sunshine to come.”

Carl Snyder, a reporter with *The Review of Reviews: An International Magazine*, interviewed Ferris in the early 1890s and stated, “He greets you easily, his demeanor is quiet, his tones low. For a Western man, he is rather fastidious in his dress. Perhaps his most notable characteristic is his steel blue eyes of remarkable depth and clarity. After listening to his easy, unaffected talk, brilliant without effort for an hour, one feels he is in the presence of a man destined to play an important role in the industrial and mechanical advancement of his country.” Unfortunately, Ferris’s career was cut short, long before his full potential was reached. He

died on November 22, 1896, of typhoid fever and other complications.

George Ferris was born on a farm in Galesburg, Illinois, on February 14, 1859, the youngest son of George, Sr. and Martha (Hyde) Ferris. Young George had eight siblings – four brothers and four sisters, the youngest Mame, two years younger than he. When George was five, his father, a relatively wealthy farmer, moved the family to Nevada – the Wild West – during the summer of 1864 while the Civil War was at its zenith. There he bought an expansive ranch along



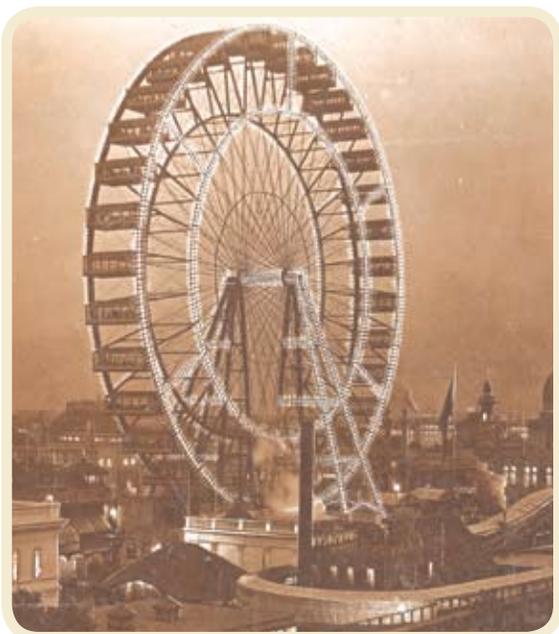
The 45-ton axle of the Ferris Wheel, the largest piece of steel ever forged at the time. Courtesy of Douglas County Historical Society.



View through the Ferris Wheel’s structural framework, overlooking the surrounding countryside. Passengers were able to experience panoramas never before imagined from the Wheel. Courtesy of Douglas County Historic Society.



Ferris Wheel at Chicago World’s Fair, 1893. Courtesy of Douglas County Historic Society.



Ferris Wheel at night, illuminated with 3,000 incandescent lights. Courtesy of Douglas County Historic Society.

After graduating from RPI in 1881, with a degree in civil engineering, Ferris went to work for a consulting engineering and construction firm headquartered in New York City (NYC) – General James Ledlie’s company. Ledlie had played a major role in the construction of the Union Pacific section of the transcontinental railroad and was prominent in railroad circles. While with Ledlie, Ferris worked on bridges, tunnels and railroad trestles throughout West Virginia.

In 1883, Ferris secured a position as assistant engineer with the Louisville Bridge and Iron Company in Louisville, Kentucky, to work on the design and construction of the Henderson Bridge. It was a tall, 27,995-foot-long structure crossing

the Ohio River between Evansville, Indiana, and Henderson, Kentucky. The \$2 million, record-setting bridge’s longest clear span was 525 feet, which made it the longest trestle span in the world at the time.

Once the Henderson was completed in early 1885, Ferris relocated to Pittsburgh, Pennsylvania, where the 26-year-old founded G.W.G. Ferris and Company, a steel inspection and consulting engineering firm. The following year, he married Margaret Ann Beatty of Canton, Ohio. They would never have children.

One year later, he founded another engineering company with old RPI pal Gustav Kaufman – Ferris, Kaufman and Company (FKC) – mainly to design bridges and supplement the services of G.W. Ferris and Company. Among FKC’s main projects were the Ninth Street Bridge over the Allegheny River in Pittsburgh and the Central Bridge over the Ohio River between Cincinnati, Ohio, and Newport, Kentucky. Both were record-setting bridges when opened.

By the early 1890s, Ferris had major offices in NYC, Philadelphia, Pittsburgh and Chicago, Illinois. Chicago had secured the 1893 World’s Columbian Exposition (Fair), and Ferris and many of his colleagues were involved in testing and inspecting structural steel for the massive buildings planned for the event. Many considered the architectural designs for these structures to be outstanding. All of their facades were white stucco, which resulted in the complex of buildings being labeled the “White City.”

The organizers for the Fair, however, were not impressed with the event’s facilities. They expressed great disappointment that American engineers had not come up with anything

the Carson River next to the imposing Sierra Nevada Mountains and near Carson City, soon to be named the state capital.

Young Ferris grew up on the family ranch; happy and carefree with plenty of time and open space to roam, ride horses, hunt and fish. It is rumored that he developed his inspiration for the Ferris Wheel during these idyllic years. He was fascinated by – and spent countless hours observing – the large water wheel at Cradlebaugh Bridge over the Carson River on a nearby ranch, imagining what it would feel like to ride such a moving structure.

The Ferrises moved into Carson City in 1868, when George was nine. By then, the U.S. transcontinental railroad was well on its way to connecting the country from east to west, and many young Americans, including Ferris, dreamed of how exciting it would be to become a railroad engineer. After receiving his early education in Carson City schools, 14-year-old George left home to attend the California Military Academy in Oakland.

By then, he had decided to become an engineer – and when he graduated in the spring of 1876, 17-year-old Ferris had set his sights high. He planned to attend Rensselaer Polytechnic Institute (RPI) in Troy, New York, the most respected and prestigious private engineering college in the nation. While there, his willingness to take on challenges and accept difficult assignments was manifested, both in the classroom and on the sports field. Said RPI Professor Larry Feeser, “Ferris had an admired reputation for invariably winning footraces and being able to throw a ball farther than anyone on campus.”

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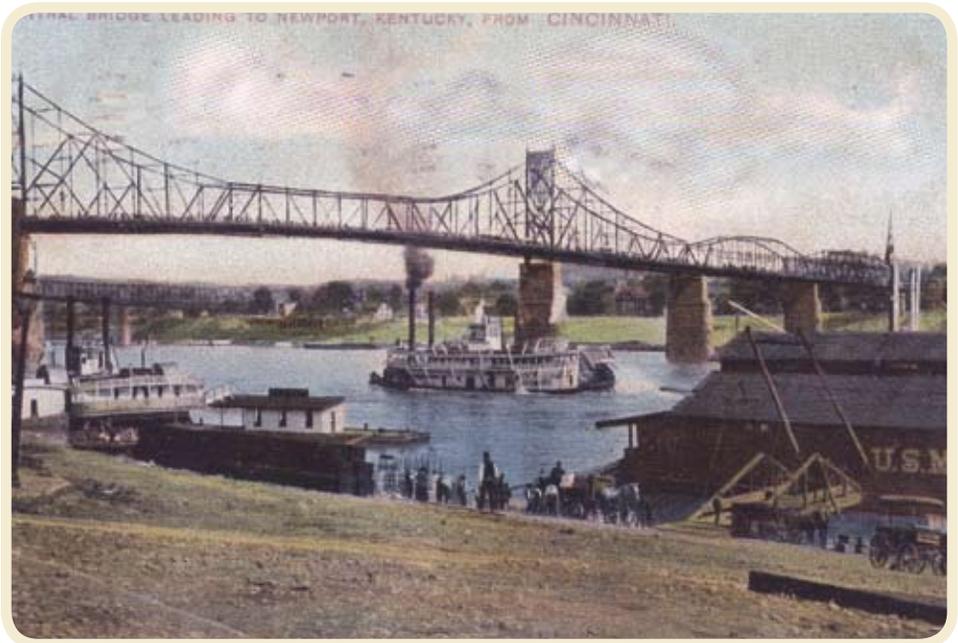
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“novel and original” to equal the Paris Exposition’s Eiffel Tower of 1889. Architect Daniel H. Burnham, head of the Fair committee and in charge of selecting its showcase projects, complained at an engineers’ banquet in 1891 that although American architects had come up with great designs, nothing that the nation’s engineers had proposed would “meet the expectations of the people.” He said that what was needed was something to out-Eiffel Gustav Eiffel. Burnham’s motto was, “Make no little plans; they have no magic to stir men’s minds.”

Shortly after Burnham’s taunting speech, a personable, confident, well-dressed 33-year-old engineer from Pittsburgh – George Ferris – stepped forward with an out-Eiffel proposal, and his was “no little plan.” George Ferris proposed building an enormous, revolving wheel – higher than Chicago’s tallest building, an awesome device that would carry passengers to breathtaking heights and yet be absolutely safe.

Ferris said that he struck upon his idea one night after an engineering society dinner, saying, “I got out some paper and began sketching it out. I fixed the size, determined



Postcard of the Central Bridge over the Ohio River. Designed by Ferris, the Central was the first major “standard” cantilever truss bridge ever built. In the late 1800s, postcards featuring famous bridges were popular with the public. Courtesy of Peggy W. Holliday Collection.

the construction, the number of cars we would run, the number of people it would hold, what we would charge, the plan of stopping six times during the first revolution for loading, and then making a complete turn. In short, before the evening was over, I had sketched out almost the entire detail and my plan never varied an item from that day on.”

At first, everyone thought Ferris’s proposal for such a colossal people-carrying, steel-tension wheel outrageous – and him to be a wild man – especially when he stated that he could not only design but build the huge contraption in the short time left before the Exposition’s opening. Some called him “the man with wheels in his head.”

Bruce Geno, a Pennsylvania civil engineer and Ferris historian, was quoted in the *Pittsburgh Post-Gazette* as saying that it was truly amazing that Ferris got the Wheel “designed and fabricated in such a short time. He used his connections in the steel industry to get steel. Just as impressive, though, was that he was able to convince people it was a good idea to build this monster.”

The charismatic Ferris proved that he had not only an inventive mind, but also the ability to engineer and build. The Ferris Wheel was completed on time and within its \$400,000 budget – and it indeed proved to be the high-light of the Exposition. As the icon of the Fair, it was America’s answer to France’s Eiffel Tower.

The Ferris Wheel, along with the Brooklyn and Eads bridges, showed that American civil/

structural engineering had arrived. American engineers were seen as a force to be reckoned with worldwide. Ferris had pushed the envelope on how high moving structures could reach and opened the public’s mind to the versatility and capabilities of steel, the newly emerging structural material of the future.

Ferris’s wheel, which had a diameter of 250 feet, was raised 15 feet off the ground and stood 265 feet tall. It was supported by two 140-foot steel towers connected by a 45-ton axle – the largest single piece of forged steel in the world at the time. Thirty-six streetcar-sized cabins – with plush, crushed velvet interiors – held 60 people each. A 1,000-horsepower reversible engine provided the power. Fully loaded, the 1,200-ton Ferris Wheel could carry 2,000-plus people, a passenger capacity still not exceeded even by today’s mammoth wheels.

Upon the Wheel’s debut in June 1893, reporters and many notables took the first rides, several highly apprehensive at being so far above the ground. They were put at ease soon after the festivities began. At the top of the ride, as reported in the *Pittsburgh Commercial Gazette*, a “little woman, looking wonderfully pretty in a dainty gown of black trimmed in gold stood on a chair in a car swaying 265 feet above earth, raised a glass of champagne to the others in the car and toasted her husband.” In this toast, a beaming Margaret Ferris said, “To the health of my husband and the success of the Ferris Wheel.”

Over the years, Ferris’s invention has been replicated often and everywhere. Currently,



The 200-foot-diameter Ferris wheel in Prater Park, Vienna, Austria. Built in 1897, it is the world’s oldest continuously operated observation/pleasure wheel and a tribute to the ingenuity of George Ferris. Courtesy of Larry Feeser.



The 541-foot-tall Singapore Flyer, currently the tallest Ferris wheel in the world. Courtesy of Singapore Flyer Pte Ltd.

Richard G. Weingardt, P.E., is the CEO of Richard Weingardt Consultants, Inc. in Denver, Colorado. He is the author of nine books; the latest, *Circles in the Sky: The Life and Times of George Ferris*, is scheduled for publication by ASCE Press in late 2008. Weingardt's other recent book, *Engineering Legends*, features numerous great American structural engineers. He can be reached at rweingardt@aol.com.

the largest Ferris wheel is the 541-foot-tall Singapore Flyer. Prior to 2008, the 443-foot tall, \$56.5 million London Eye, opened in 2001 and turning above the Thames River, held the record. A number of wheels in the 600-foot range are opening in places like Dubai; Berlin, Germany; and Orlando, Florida. Next year, the Beijing Great Wheel in China will become the world record holder at 682 feet.

Ferris gained much fame but little fortune with his Wheel. Its notoriety, unfortunately, so overshadowed the rest of his engineering career that he has only been remembered as the inventor of one thing and not for his many other accomplishments. However, his ingenuity and daring are confirmed and honored every time a new tension-wheel is built anywhere. ■



British Airways London Eye. From 2001 until 2008, it was the world's tallest observation wheel at 443 feet. Courtesy of British Airways London Eye.



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