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# TRANSACTIONS

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**EDWIN THACHER, M. Am. Soc. C. E.\***

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DIED SEPTEMBER 21ST, 1920.

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Edwin Thacher was born in De Kalb, St. Lawrence County, N. Y., on October 12th, 1840, the youngest of four children and the only son of Dr. Seymour and Elizabeth Smith Thacher. Both his parents were of English stock through Colonial New England families, his father having been one of the leading physicians of St. Lawrence County for more than forty-five years. The family moved to Hermon, in the same County and State, about 1851 or 1852, when Edwin was quite young.

After taking a preparatory course of studies at the Wesleyan Seminary, Gouverneur, N. Y., he entered the Sophomore Class of the Rensselaer Polytechnic Institute at Troy, N. Y., in September, 1860, and was graduated as a Civil Engineer, with high honors, in the Class of 1863.

Soon after graduation, Mr. Thacher was employed as Assistant Engineer of the Cedar Rapids and Missouri River Railroad, in Iowa, of which the late William W. Walker, M. Am. Soc. C. E., of the Class of 1856, Rensselaer Polytechnic Institute, was Vice-President and Chief Engineer. He resigned from this position early in 1864 to become Assistant Engineer on the United States Military Railroads, Department of the Cumberland, with headquarters at Nashville, Tenn., and continued in this Government service until the close of the Civil War in 1865. Early in 1866 he accepted a position at Louisville, Ky., as Principal Assistant Engineer under the late Gen. I. M. St. John, M. Am. Soc. C. E., Chief Engineer, Louisville, Cincinnati and Lexington Railroad, in connection with the construction of the Cincinnati Branch, running from La Grange to Cincinnati, Ohio. When this work neared completion, he resigned to accept, in 1868, a position as Assistant Engineer of the Louisville Bridge Company, which was then constructing the 14th Street Bridge, one mile in length, over the Ohio River at Louisville, Ky. (now owned and operated by the Pennsylvania Railroad Company), remaining in this capacity until the bridge was completed and opened to traffic in 1870.

After severing his connection with the Louisville Bridge Company, Mr. Thacher entered the service of the Louisville Bridge and Iron Company, at Louisville, Ky., on August 1st, 1870, as Assistant and Computing Engineer, where he remained until June 11th, 1879, when he resigned to accept an appointment as Computing Engineer of the Keystone Bridge Company, Pittsburgh, Pa. He became Chief Engineer of that Company in 1883 or 1885, in which capacity he continued until October 13th, 1887, resigning to accept the position of Chief Engineer of the Decatur Bridge and Construction Company, Decatur, Ala., to which place he removed his family from Pittsburgh, on October 30th, 1887, and immediately assumed his duties as Chief Engineer. On May 2d, 1888, he was elected Vice-President and General Manager, and, on May 15th, 1888, was made Receiver of the Company when the shops were closed.

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\* Memoir prepared by A. W. Buel, M. Am. Soc. C. E., and F. H. Vaughan, President, Louisville Bridge and Iron Company, Louisville, Ky.

In the latter part of 1889, he moved from Decatur to Louisville, Ky., having closed his business there, and established a Consulting Engineer's office. This was continued until October 25th, 1894, when he formed a partnership with Messrs. Keepers and Wynkoop at Detroit, Mich. Mr. Wynkoop dropping out of the partnership on September 3d, 1895, the business of bridge designing and contracting was thereafter continued under the name of Keepers and Thacher until October 5th, 1899, when the partnership was dissolved.

Mr. Thacher then individually conducted a bridge designing and contracting business until May 1st, 1901, when he became associated with William Mueser, M. Am. Soc. C. E., under the firm name of the Concrete Steel Engineering Company, with headquarters in the Park Row Building, New York City. His connection with this Company continued until May 1st, 1912, when he retired from the firm and active business, after forty-nine years of continuous and successful practice of his profession, forty-four years of which had been devoted, mainly, to the design and construction of large bridge structures throughout the United States and, to some extent, in Porto Rico and Canada.

During the period from the latter part of 1889 to October 25th, 1894, when he was occupied as Consulting Engineer and Bridge Contractor at Louisville, Ky., Mr. Thacher designed and constructed bridges and viaducts for some of the leading Southern railroads to a value of about \$2 000 000, and also many highway bridges, including that across the Willamette River, at Portland, Ore., the piers of which rest on piles driven and sawed off more than 100 ft. below the surface of the water.

From October 25th, 1894, to October 5th, 1899, while he was associated with Mr. W. H. Keepers at Detroit, Mich., under the firm name of Keepers and Thacher, this firm constructed the concrete steel arch bridge over the Kansas River at Topeka, Kans., at that time the largest bridge of its kind in the United States, as well as many other bridge structures of lesser note.

Mr. Thacher was a pioneer in the design and construction of concrete steel bridges in the United States, having made this type of structure a specialty since 1895. The greater number of the larger concrete steel arch bridges that have been built in the United States, up to the present time, have been designed by the concerns in which he was a prominent member.

In 1900-01 he contracted with the U. S. Government for the construction of two large concrete steel bridges in Porto Rico.

Mr. Thacher contributed many valuable papers to the Society, and participated, quite frequently, in the discussions at its meetings. He also occasionally delivered lectures at Cornell University and at other institutions in the United States. He was the inventor and patentee of the "Thacher Cylindrical Slide-Rule"; "Improved Duplex Slide-Rule"; "Thacher Steel Bridge Truss"; "System of Concrete Steel Arches"; "Steel Superstructure for Concrete Steel Bridges", and the author of works on the slide rule and concrete steel construction. He was also the inventor and patentee of the "Thacher Combination Bridge Truss" (practically free from thermal stresses), of the "Thacher Deformed Bar for Reinforcing Concrete", of "Concrete Steel Sheet Piling", of "Composite Piles of Wood and Concrete", and of a "Concrete Steel Floor System".

Among the foregoing specified patents, those for the "Combination Bridge Truss"; the "Cylindrical Slide-Rule"; the "System of Concrete Steel Arches", and the "Deformed Bar for Reinforcing Concrete" have been extensively used.

Mr. Thacher was keenly interested in all things tending to the world's progress, and was identified with many societies and organizations designed to promote the world's best development. Among these may be named the American Society for Testing Materials and the Rensselaer Polytechnic Institute Alumni Association of New York City. He entertained liberal religious views, but was never identified with any church organization. In politics he was always a steadfast Republican. He was a member of the Masonic Fraternity, affiliated with Hermon Lodge, No. 500, F. and A. M., of Hermon, N. Y., and of the St. Lawrence Chapter, No. 132, R. A. M., of Canton, N. Y. He was one of the most democratic of men in character and habit and possessed a personality that drew about him, and retained, friends. Loyalty to these friends was one of his prominent characteristics which endeared him to all his associates. He had an affectionate and appreciative nature and was endowed with a strong constitution, his prominent characteristics being an indomitable will and untiring energy of purpose, with an ambition to master any proposition or problem which presented itself.

During the last years of his life Mr. Thacher was afflicted with a cataract on each eye, both of which were operated on at different times, so that he never became entirely blind, although his sight was greatly impaired. The first operation was not entirely successful, but the second afforded him quite satisfactory sight, so that he could read and write and go about unattended. He was cheerful, good company, and enjoyed his friends, to whom he was strongly devoted. Had his eyesight not been impaired he probably would have continued in active practice to the end of an even longer life.

He was vigorous in mind and body for a man of eighty, and was still enjoying life when he died suddenly at his home in New York City, of angina pectoris, on September 21st, 1920, having been in his usual state of health up to this time. He was buried in the cemetery at Flushing, N. Y.

Mr. Thacher was married on April 22d, 1872, at Indianapolis, Ind., to Anna Elbertine Bartholomew, who died in New York City, on June 2d, 1905. He is survived by one child, Bessie, the wife of John C. Sample, Civil Engineer, of Flushing, N. Y.

The following extracts have been taken from a letter by B. H. Davis, M. Am. Soc. C. E., dated November 30th, 1920:

"Late in April, 1920, Mr. Thacher and the writer made an inspection of some of his work and during the course of our trip Mr. Thacher gave testimony as an expert witness in a case in which certain facts regarding his record as a Designing and Consulting Bridge Engineer were made by him under oath, some of which facts may be of interest.

"Mr. Thacher on the witness stand gave his age as 80, and stated his business or occupation to be that of Bridge Engineer, adding that from the year 1868 to 1912, covering a period of forty-four years, he had been engaged in active professional practice. During that time Mr. Thacher stated that he had designed at least 2 000 steel bridges and perhaps 200 concrete bridges. Of the 2 000 steel bridges he had designed, he stated that at least 1 000 were built. While making it plain that he had not superintended the construction of all the structures, he gave

specific evidence in a very large number of cases to show his intimate personal relationship to them and their construction problems.

"In answer to the question: 'Who designed the first large reinforced concrete bridge in the United States?' Mr. Thacher replied that he did, and named the bridge over the Kansas River at Topeka, Kans., known as 'The Topeka-Kansas Bridge', as the largest bridge of reinforced concrete that had ever been constructed up to that time.

"In answer to the question: 'Who made the first elastic theory design of a reinforced concrete bridge actually built in the United States?', Mr. Thacher replied that he believed he did, and again named the Topeka, Kans., structure, qualifying his remark by saying that some professors had gotten out some theories that could not be followed, and stating that he developed a really practical theory and made the first practical application of the elastic theory to reinforced concrete bridge design in the United States.

"As an active, busy, practical Bridge Engineer and Constructor of wide experience and great capacity for concentration and hard work, Mr. Thacher, in my opinion, stands quite alone in a class by himself as an instructor and developer of practical and efficient bridge engineers and designers. All engineers, young and old, who were ever associated with Mr. Thacher or sufficiently acquainted with him to consult and counsel with him, will unquestionably acknowledge a deep and lasting debt of gratitude. No problem or perplexity, no matter how trivial or how serious, was ever brought to his attention without receiving his very courteous, honest and careful consideration. His sympathetic appreciation of the cares and worries of other engineers, who without hesitation brought their troubles to him, will long be remembered by the host of friends who have received comfort and advice freely and without stint from his wide and rich experience covering practically every conceivable problem encountered in the practice of bridge engineering.

"Mr. Thacher's appreciation of materials of construction, their strength and durability might well be emulated by every engineer and designer. It grieved him sorely to see a splendid structure neglected and deteriorating through lack of ordinary care in keeping the structure clean or painted, and his satisfaction and delight in finding structures that he had built 30 to 40 years ago still in good condition and showing every indication of capacity and excellence of construction was beautiful to behold, and an inspiration. Neglect and misuse of materials of construction were, in his opinion, equivalent to abuse and cruelty to the same extent that such terms are applied to flesh and blood.

"The frankness, candor and point blank honesty of the great engineer and gentleman that he was, under any and all conditions and circumstances, always contending for the absolute truth with all the enthusiasm of the scientist and scholar, marked Edwin Thacher, at least in the hearts of all who had the pleasure and rare opportunity of knowing him, as one of the truly great and accomplished members of the American Society of Civil Engineers, and a very great credit and honor to the Society and to the Profession of Engineering."

The following tribute was contained in a letter from C. L. Strobel, M. Am. Soc. C. E., under date of October 9th, 1920:

"Mr. Thacher was well liked by his associates for his genial and kindly qualities, and he was very competent in his work. He had a special fondness and aptitude for calculations and tabular work, and he was very quick and reliable."

Frank C. Osborn, M. Am. Soc. C. E., in a letter dated October 19th, 1920, writes as follows:

"While I had corresponded with Mr. Thacher for several years, my first meeting with him was in March, 1885, when I assumed the position of Assistant Engineer under him as Chief of the old Keystone Bridge Company. I remained with him two years, learning more and more to admire him as an engineer, and to love him as a

man. He was kindness itself, always considerate, and enjoyed assisting deserving young engineers. During my many years acquaintance and association with him, there was never an unpleasant word between us."

Mr. Mueser, who was associated with Mr. Thacher in the Concrete Steel Engineering Company, contributes the following:

"Edwin Thacher was a fine mathematician; extremely thorough and careful in his calculations and conclusions. He loved to solve practical mathematical problems related to engineering, and would often sit nights until the early hours of the morning to find the solution of a problem, rather than lay the matter over for another day. It is not surprising, therefore, that early fame came to him through the invention and perfection of the Thacher Cylindrical Slide Rule, which he patented under date of November 1st, 1881, and which, to the present day, is extensively used in many engineering offices.

"He originated the Thacher Reinforcing Bar—the first mechanical bond bar proposed, made into final shape by direct rolling process.

"While a man of scientific thoroughness in engineering matters, Mr. Thacher was unpretentious, modest and almost shy in disposition. He was a generous friend at all times and ever willing to be helpful to those who came to him for assistance."

Mr. Thacher had the devoted attachment of those of his friends and associates who knew him well, on account of his sterling character, and received the admiration of those who were acquainted with his professional attainments. No one could see much of him without noting the fine characteristics of the man and his talents, as he was absolutely frank.

With a high sense of honor and straightforwardness, he seemed to be naturally endowed with a most charitable disposition, in the broadest sense of the term. He was generous to a fault, and never even complained of or resented the occasional impositions of acquaintances of weaker mould. He was very democratic and liberal in his opinions. Although an indefatigable worker, he enjoyed recreation and the society of his friends. He seemed to prefer to be the friend, companion, and co-worker of his subordinates and engineering employees, as far as practicable, rather than the "boss" or "chief."

His life and the vigor he still possessed in his eighty-first year is a good demonstration that hard work does not injure a man, since Edwin Thacher did not seem to think he was working unless he was strenuously occupied for more than 72 hours a week—week in and week out. One thing, however, he never did, and that was to worry about his work or business; for one reason, no doubt, because he never let it get behind.

As a Civil Engineer, Mr. Thacher was very talented and a clever designer. He was often quite ingenious, as is attested by his numerous patents, a number of which came into general use. Probably he will be longer remembered in connection with "Thacher's Calculating Instrument or Cylindrical Slide Rule" than by any of his other works.

He expended great amounts of labor and money in the preparation of tables for estimating standard structures during a period of over twenty-five years. Most of these became obsolete, from one cause or another, others he revised at later periods, only to see them again go out of date. One set of tables, however, entitled "Panel Weight Multiples or Stress Coefficients" consists of nineteen large sheets and is a set of influence tables for some thirty-four forms of fixed trusses (with the

shear multiples given for trusses with parallel chords, permitting the use of the tables for varying proportionate depths), plate girder swing spans without floor-beams and with two to seven panels each side of the center, nine forms of trusses, for swing spans with three to ten panels each side of the center, and for both center and rim-bearing spans, and two forms of "bob-tail" swing spans. This set of tables still retains its value.

As has been the case so often, it is quite probable that the most important and far-reaching work of Mr. Thacher has been that almost intangible but very real and powerful personal influence on younger engineers with whom he came in contact, many of whom have had a keen appreciation of an inspiration of high standards and have passed on to others, often anonymously, some of that received from him. Examples of such influence are difficult to segregate and defy evaluation, but many engineers of distinction would testify to its existence as a live force.

Specifically, this influence made, and still makes, for systematic methods and forms for calculations and estimates, every item in order and intelligibly recorded, with computations reduced to progressive tabular forms wherever possible, and for rational design in which each detail, however small, is subjected to the same rigid analysis and careful consideration as the larger problems of the structure or truss as a whole.

During all the successive periods when the timber Howe truss, the combination truss (wood in compression and wrought iron in tension), cast and wrought iron in combination, all wrought iron, structural steel and reinforced concrete were the available materials for the bridge builder, Edwin Thacher was actively engaged in designing and constructing bridges and exerted a much greater influence on the development of American bridge building practice than is generally appreciated. His influence has always been for rational and scientific design, combined with practical methods and details. No complete history of bridge building in America can fail to give him a large and important place.

Mr. Thacher was elected a Member of the American Society of Civil Engineers on February 17th, 1869.



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BIOGRAPHY

BEING THE  
HISTORY OF THE UNITED STATES

AS ILLUSTRATED IN THE LIVES OF THE FOUNDERS, BUILDERS, AND DEFENDERS  
OF THE REPUBLIC, AND OF THE MEN AND WOMEN WHO ARE  
DOING THE WORK AND MOULDING THE  
THOUGHT OF THE PRE-  
SENT TIME

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1897

quently studied at the Chicago Law School, at the law department of the University of Virginia, and at the Chicago College of Physicians and Surgeons. When he had finished his studies he began the practice of medicine in company with his father, but later devoted himself chiefly to literary work. He was the author of various essays and reviews and of numerous poems. A collection of the latter he published in 1897 under the title "Margins." The strain of literary work impaired his mind, and while a patient at a sanitarium he drowned himself at Lake Geneva, Wis., April 13, 1898, at a time which seemed to be the beginning of his true career. In 1898 was published posthumously a complete collection of his poems, edited by William Rice.

**THACHER, Edwin**, civil engineer, was born at De Kalb, N. Y., Oct. 12, 1839, son of Seymour and Elizabeth Thacher, of English descent. His father, a physician, practiced for forty-five years in St. Lawrence co., N. Y. He was graduated as civil engineer at the Rensselaer Polytechnic Institute at Troy, N. Y., in 1863, becoming shortly after graduation assistant engineer on the U. S. military railroads, which position he held until 1865, when he became assistant engineer for the Louisiana Bridge and Iron Co.; in 1882 chief engineer Keystone Bridge Co.; in 1887 chief engineer and receiver of the Decatur Iron Bridge and Construction Co., and in 1889-94 engaged in business for himself as consulting engineer and bridge contractor. He is the inventor of a concrete steel bridge, and has constructed bridges on this patent at Albion and Tecumseh, Mich.; at Louisville, Ky., and at Zanesville, O., beside two structures on this plan, one over the Jacaguas river and another over the Guayo river for the U. S. government in Porto Rico. They have three spans each, and the former has a total length of 404 feet, while the latter has a total length of 270 feet. A concrete steel bridge is a construction of concrete and steel, in which steel in any form is rigidly imbedded in concrete,



*Edwin Thacher*

the concrete stiffening the steel and the steel reinforcing the concrete. As the concrete and steel have a continuous adhesive connection, and have practically the same co-efficient of expansion, the relative stress borne by each will be in direct ratio to their modulus of elasticity and inversely as their moments of inertia. His masterpiece built on the concrete plan is the bridge over the Kansas river at Topeka, Kan., at that time the largest of its class in the world. He also patented a combination wood and iron bridge which has been extensively adopted for railways and highways in America. He is also the inventor and patentee of Thacher's cylindrical slide rule or calculating machine. The rule has a graduated length of eighteen inches, and is equivalent to an ordinary slide rule having a length of sixty feet. In 1896 he patented an improvement in masonry or concrete bridges where metal posts or bents are used in the spandrel spaces instead of earth filling or masonry walls or arches as usually employed, greatly reducing the weight and cost. In 1900 Mr. Thacher patented a flat slide rule which is a marked improvement on any slide rule in use. He was married, in 1872, to Anna E., daughter of Harris Bartholomew, of Indianapolis, and has one child.

**SMITH, Persifer Frazer**, soldier, was born in Philadelphia, Pa., Nov. 16, 1798, son of Jonathan and Mary Anne (Frazer) Smith, and grandson of

Robert and Margaret (Vaughan) Smith. Robert Smith (1720-1808), the son of John and Susanna Smith, held several offices of trust under the revolutionary authorities; attained the rank of colonel in the Pennsylvania militia, and was a member of the committee which on Sept. 28, 1776, adopted the first state constitution of Pennsylvania. Persifer Frazer Smith received his education at Princeton College, where he was graduated at the age of seventeen. He subsequently read law with Charles Chauncey, and settling in New Orleans, La., became adjutant general of the state. On the outbreak of the Florida war he became colonel of Louisiana volunteers under Gen. Edmund P. Gaines, and took part in the campaigns of 1836 and 1838. At the beginning of the war with Mexico he again entered the field of active service; was commissioned colonel of a rifle regiment in May, 1846, and from September of that year until the end of hostilities he commanded a brigade of infantry. He was brevetted brigadier-general for his service at Monterey, and especially distinguished himself at Churubusco and Contreras, Aug. 20, 1847, receiving for his conduct in the latter action the brevet of major-general. He also participated in the battles of Chapultepec and at the Belen gate; was appointed in October, 1847, commissioner of armistice with Mexico, and was afterward assigned to the command of the 2d division of the U. S. army. In May, 1848, Gen. Smith was made military and civil governor of Vera Cruz, and was later placed in command of the departments of California and Texas. In 1849 he was brevetted major-general, U. S. army, and on Dec. 30, 1856, received the commission of brigadier-general. He was then assigned to duty in Kansas, and two years later was given charge of the Utah expedition, but he did not live to assume command, and died in Leavenworth, Kan., May 17, 1858. Gen. Smith was married to Frances Jeannette Burian, in New Orleans, La., Jan. 19, 1822. His only child, Howard Smith (1823-92), was a surgeon who held the chair of materia medica in the New Orleans School of Medicine, served in the civil war and practiced in New Orleans.

**CHILCOTT, George Miles**, senator, was born at Trough Creek, Huntington co., Pa., Jan. 28, 1828. He attended the district schools when not assisting on his father's farm until 1844, when the family removed to Iowa. He began the study of medicine under the supervision of his brother-in-law, but not finding it congenial engaged in school teaching until 1850, when he entered the office of James F. Wilson to study law. He was admitted to the bar in 1863, and to the supreme court of the United States in 1866. He was instrumental in the organization of the Republican party in Jefferson county, Ia., and was elected sheriff. In 1856, removing to Burt county, Neb., he was there elected to the house of the territorial legislature, and, emigrating to the Pike's Peak gold regions three years later, he was elected a delegate from Denver to the convention which framed the state constitution. In 1860 he removed to Pueblo, and engaged in farming and stock raising, and in the following year was elected to the first territorial legislature. He was appointed register of the U. S. land office for Colorado in 1863, and established his office at Golden, which was then the territorial capital. In 1865, when the second movement for state organization under the enabling act of 1864 resulted in the formation of a new constitution and the selection of candidates, he was elected for representative in congress, but the project failed, through the persistent opposition of Pres. Johnson, and the representatives were not admitted. However, he became a territorial delegate to congress in the following year, and served until 1868, during which he secured large appropriations for surveys and drafted a successful bill