

GEORGE HUNTINGTON THOMSON, M. Am. Soc. C. E.*

DIED FEBRUARY 7TH, 1910.

George Huntington Thomson was born in Syracuse, N. Y., in 1847. He first engaged in engineering work in 1865 when he became Assistant Engineer on the Oswego and Syracuse Railroad (now part of the Delaware, Lackawanna and Western Railway), in which position he remained nearly two years. He then went to New Orleans, La., where he filled a position as Assistant Engineer on Government work for about two years, and later became Resident Engineer on the New Orleans, Mobile and Texas Railroad. He was with the latter company some four years, being located in Louisiana and Mississippi, and was finally promoted to a position in charge of yards, stations, and structures.

From the South he went to the New York Central and Hudson River Railroad, and was connected with that road for twenty-one years, first as Assistant Engineer on track work, then as Engineer of Bridges, and later as Consulting Bridge Engineer. After leaving the service of the New York Central as Bridge Engineer in 1883, Mr. Thomson engaged in a consulting and contracting engineering partnership in New York City, in which he continued until 1900. During this period he was at one time Chief Engineer of the Metropolitan Traction Company, which proposed the construction of an elevated railway line in New York City, a project which was ultimately abandoned. Among his clients as Consulting Bridge Engineer were the New York Central and Hudson River, the Central Vermont, the St. Lawrence and Adirondack, and the Mohawk and Malone Railroads, and at one time he was retained on the construction of the Williamsburg Suspension Bridge over the East River between New York City and Brooklyn.

In 1900 the engineering partnership was dissolved, after which, his health being broken, due largely to severe injuries received in a railroad accident, he did little active work for several years. In 1907 he entered the service of the New York State Engineering Department in a field position on the New Barge Canal. The active, outdoor work greatly improved his health, and gave him restored confidence and vigor. He received several promotions, being placed, after about two years' service, in charge of the execution of one of the contracts on the Oswego Canal, in the vicinity of his first engineering work. His early acquaintance with the locality, combined with his ability and experience, made him of great value to his employers in the settlement of water rights and similar problems involved in the construction of the

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new canal. It seems, indeed, a pity that this reawakened career of activity could not have been continued and crowned with still greater success. The all-wise Providence ruled otherwise, however. The injuries received in the railroad accident many years before (1892) were so serious that Mr. Thomson never fully recovered, and they finally caused his death, which occurred on February 7th, 1910, at his home in Syracuse, N. Y.

During the later years of his service with the New York Central and Hudson River Railroad, and in his following consulting practice, Mr. Thomson gained great prominence as a bridge engineer. He continued the advocacy of riveted truss construction, which had been especially developed on the New York Central Railroad, and on that road, in 1883, he introduced the ballasted trough floor, this being its first use on American railways. This floor was in the form of rectangular troughs, and Mr. Thomson used it very extensively in the design of bridges on the New York Central, the St. Lawrence and Adirondack, the Mohawk and Malone, the Central Vermont, and the Rutland Railroads. He also developed a type of truss, known by his name, of which a number were built on the New York Central and other railroads and are still in service. This truss consists of a double Warren system, with subdivided panels and all connections riveted. He designed plate girders of lengths that must have seemed bold for their time, there being one span of 115 ft. 6 in., built in 1890 and still in service, and many built in the early Nineties were more than 100 ft. long.

Mr. Thomson was early in adopting steel as a substitute for iron in bridge construction; he examined very carefully into its manufacture, and prepared specifications for acid open-hearth steel for structural work, which were remarkable for their scope and thoroughness. They called for a grade of material which probably is not excelled by the best product of to-day. A prominent bridge engineer, who knew him and his work well, writes: "There were few bridges built in those times which had as good material in them as those which he put up."

The largest and most striking structures designed by Mr. Thomson or under his direction are the Park Avenue Viaduct and the Harlem River four-track draw-bridge of the New York Central and Hudson River Railroad in New York City. The former is a four-track elevated structure of plate girders with a ballasted trough floor, about 1½ miles long, and the latter is probably the heaviest and perhaps the most important draw-span in the world, being 398 ft. long, carrying four tracks on a solid trough floor (not ballasted), containing 2,300 tons of steel, and controlling the traffic of the railroad company into its New York terminal.

Mr. Thomson, as before suggested, was a strong advocate of riveted *versus* pin-connected trusses, and he may be said to have been a violent

opponent of the latter. He designed and built riveted lattice trusses up to 230 ft. span (single-track, Bridge No. 31, Central Vermont Railroad, Thomson-type trusses), advocated their construction to 250 ft. span, and is said to have designed a single-track riveted truss of 500 ft. span, which, however, was not built. Examples of his designs have been reproduced and commended in prominent textbooks on bridge design, and many were described and illustrated in the technical magazines of his time.

In his designing, Mr. Thomson gave a great deal of thought to the action of metal in bridge members under stress, "structural motion," as he called it, and he attempted to proportion bridge members with such action in view. He studied closely the action of bridges under live loads; he was not satisfied to follow the ordinary "strain sheet" practice, but sought to provide additional methods of gaining rigidity and permanence, accompanied with economy, in structures. Some of the important things he recognized in the early Nineties were the effect of time in loading members, and the unequal distortion of members of equal section but varying length.

In his "structural motion" theory, which was given considerable attention at one time, he recognized the distortion of members under stress as changing the conditions of static computations, and considered the effect of frequency of loading to be, even with moderate live loads, a leading factor, as well as the application of the maximum live load. Vibratory effects were also considered. This theory, which Mr. Thomson did not develop as clearly as might be desired, did not lead directly to any well-defined rules or specifications for designing of which there is any record, but it appears to have in it the elements of the present impact and secondary stress conceptions, which it probably assisted to develop. It shows, at least, Mr. Thomson's originality of thought, and his characteristic of searching deep below the surface.

Mr. Thomson was known and honored as a bridge engineer abroad as well as in his own country. His papers show that, in connection with the design and fabrication of the steel for the Forth Bridge, he was consulted by the late Sir Benjamin Baker, Hon. M. Am. Soc. C. E., with whom he contracted a warm friendship. In 1838 he visited England, and, at the request of Sir Benjamin Baker, read a paper before the British Association for the Advancement of Science, at Bath. This paper, entitled "Mechanical Pathology in its Relation to Bridge Design," attracted much attention, and was published in full, with illustrations, in *Engineering*, under the title "American Bridge Failures." It contains a great deal of valuable information in connection with the design of bridges, as derived from Mr. Thomson's long experience, and sets forth his principles of design. The latter are certainly in remarkably close agreement with the most approved practice of to-day, and show the advanced professional position of the man.

The engineering journals received many articles from Mr. Thomson's pen, and published many descriptions of his designs. Most of these are in the issues of the years 1838 to 1894, inclusive. His most recent contribution was a paper published in *Engineering News*, January 23d, 1908, entitled "Riveted Lattice for Railroad Bridges of Maximum Span: A Plea for a Return to Rational Design." He contributed freely to discussions of papers to this Society between 1887 and 1899, generally in connection with the design and construction of bridges.

Mr. Thomson was a man having a brilliant intellect, of the analytical type. He had a pleasing personality, and was a captivating conversationalist. His honesty was unquestioned. Frank and outspoken in his opinions, likes, and dislikes, he may have antagonized some, but he made many warm friends, and they were of the kind that stood by him through fortune and adversity. His wife, six daughters, and a son, the latter a junior of this Society, survive him.

Mr. Thomson was elected a Member of the American Society of Civil Engineers on February 2d, 1837. He was also a Member of the British Institution of Civil Engineers, to which he was elected on May 7th, 1839, being one of the earliest American engineers to be thus honored.