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(Illustrated articles are marked with an asterisk.)

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SCIENTIFIC AMERICAN SUPPLEMENT

No. 816.

For the Week Ending August 22, 1891.

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STRAINS ON RAILROAD BRIDGES.

The Board of Railroad Commissioners of the State of New York was established in February, 1883, and within a year from that date a thorough investigation was commenced, for the purpose of obtaining exact knowledge of the strains brought to bear upon the members of all the railroad bridges and trusses in the State. The report of this investigation has just been published and makes a volume of nearly two thousand pages.

The commissioners were moved to take this action by the occurrence of several accidents from defective bridges. On February 17, 1883, a temporary bridge or trestle over Allen's Creek, on the Genesee Valley Railroad, between Rochester and Hinsdale, gave way while a freight train was crossing which resulted in the death of the fireman and the severe bruising of the engineer. The master carpenter of the road admitted that he had recently made repairs to the bridge, but that he did not understand calculating the resistance of beams or trusses to strains. On October 22, 1883, an accident occurred on the Glens Falls branch of the Rensselaer and Saratoga Railroad, when three persons were killed and twenty-two wounded. The person in charge of the division of this road upon which the accident occurred declared that he was unable to calculate bridge strains, being merely a bridge carpenter by trade. He judged by experience as to what the different members ought to be, and the strains on the bridge had never been calculated by anybody.

At Weedsport, on the Southern Central Railroad, February 14, 1884, a train had reached the bridge over the Seneca River, when the north span gave way, and the engine, tender, and two box cars were precipitated into the river where the water was twenty-two feet deep. The engineer, fireman, and a brakeman were drowned, and the cause of the disaster was a defective truss.

An analysis of the strains upon the members of the bridges where the accidents above cited occurred disclosed the fact that in one case more than the breaking load was brought upon beams, and that in other cases strains were habitually brought upon web members, which made it a matter of astonishment that the bridges did not give way sooner than they did.

The railroad commissioners found at the very inception of their investigation that on many of the railroads of the State of New York there had been no competent calculation of the strains on the bridges for many years, if at all, the work requiring technical education, familiarity with the theory of mechanics, and a considerable knowledge of mathematics.

The commissioners, therefore, requested drawings or tracings of all the truss bridges, on all the lines, stating the location of each, and the time when built, and full descriptions. Some companies objected to this at first, but all finally complied, and the result has been that railroad managers found defects in many of their bridges of which they had no previous knowledge, and which might never have become known until revealed by some terrible accident. In a number of cases bridges were strengthened before the strain sheets were forwarded to the commissioners. After the sheets were received, they were carefully gone over and recalculated.

The number of railroad truss bridges in the State is about two thousand five hundred, not including the New York elevated roads, the strains upon which have also been calculated. Six hundred and sixty-nine truss bridges have been criticised by the board, of which five hundred and thirty-five have been repaired by the various companies, and one hundred and thirty-four entirely rebuilt. Cases have occurred, particularly in old bridges, where the iron in the suspension rods was strained at twenty thousand pounds to the square inch and more, and where three or more rods constituted the member, there being no certainty that the adjustment was such that each rod was doing its share of the work.

The commissioners accept the weight of the maximum rolling load, as furnished by each company, unless it is obvious that it is too light, in which case they assume a weight of locomotive, tender and train load likely to arise from the traffic of the road. The rules adopted by the commissioners require that iron should not be strained per square inch to a greater extent than ten thousand pounds, and wood than eight hundred pounds, in tension; nor more than ten thousand pounds or eight hundred pounds in compression, diminishing, however, as the length of the member increases in proportion to its diameter, in accordance with well regulated formulas.

There has been of late years a great increase in the weight of rolling stock. There were many bridges still standing which were built when the maximum weight of locomotives and tenders was fifty-five tons, and the maximum weight of a freight car and its load was nineteen tons. Now locomotive and tender weigh one hundred tons, and freight cars with their loads forty tons.

In regard to improvements in modern engineering, the commissioners say that in the early days of bridge building, particularly of iron bridges, it was the custom to construct trusses of complicated forms, the accurate calculation of the strains on which it is very difficult, in some cases impossible, to compute. An approximation close enough for practical purposes is always reached, however, but a better practice now prevails, and trusses of simple form, admitting of no ambiguity, are alone accepted by the best engineers. In exceptional cases complex trusses have to be resorted to, but they are avoided as much as possible.

The report gives an accurate record of the dimensions of every member of every truss railroad bridge in New York State, and of the strains thereon, as shown by the plans and strain sheets filed in the office of the commissioners.

If the same carefulinvestigation and correction could be made of the bridges of all railroads in the country, the dangers from accidents would be very much reduced.

GEORGE JONES OF THE NEW YORK "TIMES."

We record with much regret the decease of Mr. George Jones, of the New York *Times* newspaper, which took place at Poland Springs, Me., on the 12th inst. Mr. Jones, although for many years an invalid, reached the good old age of 80, his mind and faculties clear and active to the very last. He was in all respects an admirable man. His aspirations were plain, simple, and practical. As a manager he was unequaled. He aimed to produce a substantial, reliable newspaper. From this objective nothing diverted his attention, and a splendid success crowned his efforts. Under his direction the New York *Times* reached and maintained the highest position in the esteem and confidence of the public. No paper enjoys a better reputation for excellence in all its departments; while from a pecuniary point of view it is one of the most valuable newspaper properties in the world. George Jones was born in 1811, at Poultney, Vt. His father was a Welshman and worked at slate mining in Poultney. The father and mother both died when George was 13 years old, and from that time on he had to shift for himself. He and Horace Greeley were boys together, and great cronies. Greeley came to New York in 1831 as a printer, and Jones followed him soon after, and became a dry goods clerk. In 1841, when the New York *Tribune* was started by Greeley, young Jones joined him as manager of the publishing department; but Greeley was too wild in his business notions to suit the staid and steady mind of Mr. Jones, who soon left Greeley and set up a newspaper stand at Albany, N. Y. The new business from a very humble beginning soon increased, and in a few years, by dint of hard work and perseverance, Mr. Jones was the possessor of a few thousand dollars in ready money. In 1851, in conjunction with the late Henry J. Raymond, he began the publication of the New York *Times*, Mr. Raymond as editor, Mr. Jones publisher and business manager. The enterprise proved successful. In 1869 Mr. Raymond died, and the entire responsibility of the establishment from that time onward fell upon Mr. Jones.

His successor in the direction of the paper is his son Mr. Gilbert E. Jones, a young man of high character and superior abilities. Added to great wealth he inherits from his distinguished father many sterling qualities of mind, such as strong common sense, steadiness of purpose, habits of industry, and the desire to do in the best manner whatever he undertakes. Under his guidance the New York *Times* will lose none of its brilliant prestige.

DR. C. V. RILEY.

Dr. C. V. Riley, entomologist of the Department of Agriculture, was lately made the subject of a most unjust personal attack by the New York *Sun*, on the alleged ground that the doctor was engaged in using the publications of the department as vehicles for advertising and selling his patented devices for destroying insects; the implication being that the doctor had a pecuniary interest in the devices from which he derived profit, while at the same time he was receiving a regular salary from the government as entomologist.

The facts are that Dr. Riley, in the course of his many efforts to save the country from the immense losses annually occasioned by destructive insects, designed a peculiar form of nozzle by which the poisonous liquids used are sprayed to the best advantage upon trees and plants. This device is now everywhere known as the Riley nozzle; and when directions are given as to the best means of applying the protecting solutions to plants, it is common and natural for the most intelligent writers, Dr. Riley among them, to name the Riley nozzle as the distinctive thing that will give the best results. Now, there is no patent upon the device, it was given to the public freely by its author long ago, he derives not one penny of profit from it, and there was no occasion for the *Sun's* personal assault. This the *Sun* tacitly admitted in a subsequent number, in connection with a protesting letter from Dr. Riley, in which he explains his position as follows:

"I have been officially engaged for over twenty-three years, whether as a State or government officer, in original work having for its main object the control of