booms themselves doing part of this bridging across if suitably designed; on the contrary, it is rather economical.

In Scotch law there is a remarkable middle sentence between conviction and acquittal. For myself, I am quite proud to be classed with Dr. Levy and fall with him and Rankine, Stoney, and many German names, but conclude that Mr. Waddell's attacks and vituperations amount to a "Not proven."

I quite agree with Mr. Waddell that neither mathematics nor book-work of any kind are conclusive in Engineering, but I include his book as no more practical nor experimental except by his own assertion, and much less general and more crude in its mathematics and incomplete in its treatment than many others. In fact in my former short letter I said so. It is the case, however, that students of engineering must be tanght on "sound" bases and the general principles, and not supplied with a sort of quack doctor's cure for all diseases guaranteed by the vendor. They must also be tanght mathematics, even although a little of that article is emphatically a dangerous thing. Bazalgette, in his presidential speech at the meeting of the Engineering Section of the British Association for the advancement of science, although himself the most practical and experienced of engineers, said the training of an engineer was first mathematical, second mathematics, third mathematics.

I hope this letter will conclude the correspondence, as Mr. Waddell long ago said he was tired of it, as I am sure the public are also, and as in the second of his last two consecutive letters he says he has cleared up the last remaining point.

I am, &c.,

THOMAS ALEXANDER.

February 20th, 1886.

## (February 27th, 1886.)

Sir,-There are a few points in Professor Alexander's last letter that require comment.

First, the designs to which he refers were not made according to my own hypotheses, but in accordance with the best American practice In the Memoir it is plainly stated that my system is essentially American; moreover it has been so accepted both directly and indirectly by the leading technical periodicals of the United States in their reviews. In proof of this let me quote the following from *The American Engineer* of January 21st;—

"This work ought to prove valuable to Japanese engineers, illustrating, as it does, the American system of bridging so much in detail that any engineer with the slightest knowledge of iron work, should be able with its aid to meet ordinary cases at once.

"There is probably nothing published in this country covering the same ground in such a practical manner.

"The progressive spirit so manifest in Japan of recent years, with such aids at hand, can scarcely fail to adopt the American system for the railway bridges of that country."