

from end to end of the truss. The ties, also, were not disposed at the most economic angle; but with those exceptions, he had little doubt the Murphy-Whipple truss would, on investigation, prove to be one of good construction, and equal to such as were in ordinary use in England.

He regretted having to pronounce so unfavorable an opinion on these trusses; but he was glad to be enabled to do so, without the fear of his criticism being displeasing to the Author, who, it was understood, had merely submitted these particular trusses, as matters of interest in the history of railway works in America, without expressing approval of their construction, and for the very purpose of having their merits, or demerits, fully discussed.

Mr. PHIPPS said, the Paper was for the most part limited to several varieties of trussed girders. On these he would not at present offer any observations, but would confine his remarks to one or two iron arched constructions, also referred to in the Paper, as he had paid particular attention to the subject of cast-iron arches. It had been truly remarked, that whenever these arched constructions were loaded irregularly, it became difficult to calculate the strain to which the material then became subject. For instance, iron arches, particularly on railways, might be loaded upon one-half of the span only. In such a case the curve of equilibrium would often shift so much from the middle of the arched rib, as almost to touch the extrados and the intrados of the arch on opposite sides of the centre. Having obtained, however, the position of the curve of equilibrium, it then became a question, how to estimate the effect of the pressure in its detrimental action on the outer fibres of the rib. This was a point upon which, he agreed, that no practical, or reliable, information was to be obtained from books, and, in consequence, he had invented a method which he had found both simple and accurate in its application. To illustrate the degree to which the shifting of the line of pressure might affect the strain upon an iron arch, when placed under compression, he stated that in a prismatic bar of iron, in shape like a 3-inch plank, the pressure on the outer fibres on one side would be doubled, and on the other side be reduced to nothing, by the removal of the line of pressure only the one-sixth part of the whole width away from the centre of gravity. Now in this, as in every other case, whenever a piece of metal, or other elastic material, was compressed by a force on any other line than that of its centre of gravity, the action upon the outer fibres might be obtained, by conceiving the material, first of all to be compressed squarely throughout,