

From these experiments on the amount of extension and compression of cast iron, measured at the under and upper surfaces of rectangular beams, subjected to transverse strain, the author assumes, that within limits which considerably exceed those of elasticity, and equal to at least two-thirds of the breaking weight, there is no sensible difference between the amounts of compression and extension, and that as the breaking point is approached, extension yields in a higher ratio than compression, and gives way first. Results.
Cast iron.

It would appear certain that up to the point when the elasticity of wrought iron is completely destroyed, and the beam is bent, the amounts of compression and extension continue exactly equal, and it is therefore probable that this equality would continue to the last. Wrought
iron.

It is clear that the amounts of extension and compression up to three-fourths of the breaking weight do not sensibly differ in fir batten, but that as the ultimate strength of the beam is approached, compression yields in a much higher ratio than extension, and may be actually seen to give way first. Fir
battens.

He states also, that the amounts of extension and compression are in direct proportion to the strain, within the limits of elasticity, and that even after those limits are greatly exceeded, and up to three-fourths of the strength of a beam, they do not sensibly differ.

The apparatus with which these experiments were made was exhibited, and presented by the author to the Institution.

Mr. Donkin eulogised the novel and ingenious manner in which Mr. Colthurst had conducted the experiments, which he considered to be highly satisfactory. They not only determined the position of the neutral axis of the beams experimented upon, but showed also the relative amounts of compression and extension, so as to demonstrate that the elasticity of a body was the same in compression as in extension. These experiments also confirmed the correctness of Tredgold's opinion as to the pernicious effects of attempting to produce peculiar forms in beams by cambering and inserting wedges into their upper sides. Mr.
Donkin.

Cambered
beams.

Mr. Vignoles reminded the meeting of the discussions which had taken place relative to the position of the neutral axis in the Railway Bars, which had the upper and under tables similar; it was contended that the neutral axis was situated close beneath the upper lip, or table of the rail, whereas, if Mr. Colthurst's mode of experimenting had been adopted, a different and more correct result would have been arrived at. Mr.
Vignoles.
Railway
bars.

Mr. Cubitt. Mr. Cubitt accorded great merit to Mr. Colthurst for the experiments, which had determined the question as regarded rectangular beams. It appeared that no attempt had been made to use the same mode of proceeding with beams of irregular figures; in them, therefore, it might be concluded, that the neutral axis would be found in the centre of gravity of the section of the beam.

Mr. J. Horne. Mr. J. Horne remarked, that these experiments perfectly accorded with those which he laid before the Institution in 1837. His object had been to show that the neutral axis was always in the centre of gravity of the section, as well as to determine the figure which should resist the greatest amount of pressure with a given quantity of materials: the strongest form was shown to be a prism, placed with the base upwards, and the same figure reversed was the weakest; the strength of the former figure exceeded that of the latter by at least one-third.

April 27, 1841.

The PRESIDENT in the Chair.

“Memoir of the Montrose Suspension Bridge.” By J. M. Rendel, M. Inst. C. E.

Montrose Suspension Bridge. Old wood bridge. Previous to the year 1792, the passage of the River Esk at Montrose was effected by common ferry boats; at that period an act of parliament was obtained for the construction of a wooden bridge, with numerous arches, or rather openings formed by beams, supported upon piles, with stone abutments at either end: the action of the tide undermining the piles, and the usual progress of decay causing great expense for repairs, it was decided in the year 1825, to erect a Suspension Bridge, the iron-work of which was contracted for by Captain Samuel Brown, R.N., for the sum of £9430., and the masonry of the towers for £9080. The total cost being £18510., exclusive of the land arches and approaches; those of the old bridge being preserved for the new one.

Dimensions. The dimensions of the new bridge were—

	Feet
Distance from centre to centre of the towers	432
Deflection of the chain or versed sine of the catenary	42
Length of the suspended roadway	412
Width of ditto	26
Height of ditto above low water	21
Ditto of the towers above ditto	68
Base of the towers at the level of the roadway 40 ft. by 20	
Archways through the towers, 16 ft. wide and 21 ft. high.	