

“On Mr. Hodgkinson’s experiments on Cast Iron Girders.” By Thomas Webster, M.A.; Sec. Inst. C.E.

Iron
Girders.

The object of this paper was, to detail the result of an examination of the above experiments, undertaken with the view of ascertaining whether those forms of beams recommended by Mr. Hodgkinson, as requiring greater breaking weight, had also a greater elastic weight than the more ordinary forms, with equal flanches at the top and bottom. The principle assumed by Tredgold (which also was the principle assumed by Dr. Young,) was, that within the elastic limit the forces of extension and compression were equal; whereas Mr. Hodgkinson started with the inquiry as to the law which connected the forces of extension and compression.

Mr. Hodgkinson’s experiments must be viewed, as directed entirely to determining the breaking weights, and the earlier weights were not set down in many of the experiments. The weights and deflections first recorded, were in many cases, very near the elastic weight and the point of permanent set, so that there was great difficulty in applying the principle already laid down,* for determining the elastic weight. But in some of the experiments which had a long series of early weights, it would be seen, on comparing the increase of deflection, with the increase of weight, that this ratio changed from one of equality, sooner in these forms, than in those with equal flanches at the top and bottom. If then, the beams with large bottom flanches did possess practical advantages, it might be, from their allowing a violation of the elastic limit, with comparative safety; this was however, a state of things which ought never to be contemplated.

April 4, 1837.

BRYAN DONKIN, V.P., in the Chair.

“Results of experiments, made with a view to determine the best figure and position for Wooden Bearers, so as to combine lightness and strength.” By James Horne, F.R.S.; Assoc. Inst. C.E.

Wooden
Bearers.

The results of several experiments on wooden bearers of different sections were tabulated in this paper; together with the dimensions and weights of the pieces, and the nature of the fracture. The conclusion at which Mr. Horne arrived was, that a triangular prism, placed with its

* Vide ante, page 27.

base upwards, was the strongest figure and position ; and that with an edge uppermost was the weakest, for a given quantity of material.

The subject of the vibrations, produced in the soil by the passage of Locomotives and Coaches was discussed, and several instances were mentioned, in which the vibration of the soil was sensible, at the distance of a mile and a half, during an observation by reflexion. It was stated, that the experiments recently made, for determining the effect which the passage of the locomotives at a small distance, might have on the observations at the Royal Observatory, had not been conclusive ; but that as no sensible effect could be produced on any observations, but those by reflection, no apprehension of inconvenience might be entertained.

Vibrations
of the Soil.

It was also stated, that a number of persons running down the hill in Greenwich park, produced a slight tremor, which was quite sensible during an observation by reflection, and that the shutting of the outer gate of the Observatory threw an object completely out of the field of the telescope.

The comparative merits of the Single-acting Engine and of the Crank Engine, for the purposes of raising water, were discussed.

Raising
Water.

Mr. Simpson stated, it was a generally received opinion, that a single-acting engine would do one-third more duty than, a crank engine : but that recently he had a crank engine altered by Messrs. Maudslays and Field, and being fitted with expansion valves, it did more duty than the single-acting engine. The two engines were worked from the same boiler. The duty of the crank engine was about thirty-two millions ; it worked to a fixed lift, which was in some respects advantageous. The duty of the Cornish engines was reported as ninety-five millions, and an engine near London in which the Cornish valves and system of clothing had been adopted, was doing a duty exceeding fifty millions.

With respect to the Cornish engines, it was stated that their superior duty was due to the system of clothing ; that although many persons had examined their duty, the calculations appeared to be made from the contents of the working barrel ; that the Cornish bushel was 90 lbs. or 94 lbs. of a very superior coal ; the London bushel being only 80 lbs. or 84 lbs. ; that notwithstanding the great duty done by the pumping engines, the crank engines in Cornwall were doing less duty, than the crank engines in London.