twelve years, fell suddenly; the construction of a new bridge thus became necessary and it is now in progress under the direction of Messrs. Walker and Burges. The worm is described as entering the wood through a hole not larger than a pin and perforating the timber in all directions, but chiefly in the direction of the fibre, at the same time increasing the size of the holes even sometimes to an inch diameter; a few of the worms had been found of the extraordinary length of 3 feet. They confine their operations between low-water mark and the bottom of the river, showing that they cannot exist out of water.

A specimen of part of a log picked up off Jersey was as much perforated, but in a different manner, the worms having penetrated the wood indiscriminately all over the surface; in some cases leaving in the holes a coat resembling the tail of a lobster about 3 inches in length, which showed that the ravages had been committed by the "*Lymnoria Terebrans*."

The paper was also accompanied by a specimen of wood sheathing charged with nails from the bottom of a vessel believed to be about 100 years old, together with some of the worms ("*Teredo Navalis*") for the purpose of showing the peculiar shape of the head—resembling a pair of forceps, with which they cut away the wood.

"Description of the Roof of Messrs. Simpson and Co.'s Factory."

By John Boustead, Grad. Inst. C.E.

The truss of this roof is double, consisting of two frames of Memel ^{Factory} timber. The principals are fitted into cast-iron shoes, resting on the ^{Roof.} walls, with projections let into the wall-plates; they taper towards the ridge, and there abut against a cast-iron ring-piece, through which a wrought-iron bolt, $1\frac{1}{2}$ inch diameter, passes, and answers the purpose of a king-post in supporting the collar-beam. To the under side of this beam is attached a heel and eye-plate, to either end of which are linked bolts passing between the principals, and secured by nuts at the backs of the shoes, thus forming efficient ties to resist the thrust of the principal rafters.

The slate-boards are supported by five purlins 4 feet apart, and abut against a ridge-piece resting on the kings.

The span of the roof is 34 feet 3 inches. The pitch is about 3 to 1, and the principals are placed 9 feet apart.

The scantlings of the principal timbers are:—Principals $9\frac{1}{2}$ by $2\frac{1}{2}$ inches tapering to $6\frac{1}{2}$ by $2\frac{1}{2}$ inches; collar-beam 7 by $3\frac{1}{2}$ inches; purlins 6 by 4 inches; wall-plates 6 by 4 inches; slate-boards 1 inch thick; ridge-piece 10 by 2 inches.

The principals were sawn out by a template so as to insure the given taper and the accuracy of the angles of the ends: they were then laid in a horizontal position placed at the required angle and the collar-beam inserted $\frac{1}{2}$ inch deep into each principal and secured by bolts $\frac{3}{8}$ inch diameter; the mode of raising the roof is then described.

Some of the advantages of roofs of this construction are stated to be, economy in materials and workmanship, with lightness and simplicity, and that all sagging of the timbers may be rectified by screwing up the nuts of the kings and shoes.

The truss is recommended for buildings where lofty apartments or coved ceilings are required, and also for its presenting so few points for the suspension of heavy weights that may subject the timbers to strains for which no provision has been made.

From the examinations that have been made, this roof seems to answer satisfactorily: it has been erected three years and a half and has sustained heavy falls of snow, but the ridge and rafters have preserved their lines perfectly, and the walls show no signs of having been subjected to undue pressure. The design of the roof is simple, its appearance light, and it may be considered an interesting specimen of the art of simple carpentry assisted by iron-work.

A drawing of the truss accompanied the paper.

March 22, 1842.

JOSHUA FIELD, V. P., in the Chair.

“Remarks on Machines recipient of Water Power; more particularly the Turbine of Fourneyron.” By Professor Gordon (Glasgow).

Turbine of
Fourneyron

Notwithstanding the diminished importance of water power since the almost universal application of the steam-engine, some situations may still be found, in the mining districts of Cornwall, of Derbyshire, and of Cumberland, the Highlands of Scotland, and generally in the districts comparatively destitute of cheap fuel, where it is desirable to render falls of water available.

The theory of water power as it now stands may be announced in general terms thus: “The mechanical effect obtained is equal to that of the moving power employed, minus the half of the *vis viva* which the water loses on entering the machine, and minus the half of the *vis viva* which the water possesses when it quits the machine.”

Bernoulli recognized the second cause and soon after, Euler, the first. Borda in his “*Mémoire sur les Roues Hydrauliques*” in 1767, gave the proposition in precise and general terms: whence he con-