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Biographies

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An unusual wrought iron artefact: the Pearsall Gate

Malcolm Tucker

During the Autumn 1987 HMS Council Meeting an application for a grant to help conserve an early 19th century wrought iron artefact was made on behalf of the Avon Wildlife Trust, a Bristol based organisation. This was favourably received and together with money from the ***Science Museum Fund for the Preservation of Technological Material,*** *made it possible to commission remedial work through the* ***Area Museums for the South West.*** *This has now been completed, the 'Pearsall gate' is displayed, suitably annotated at Willsbridge Mill and the person responsible for the discovery of this object, Malcolm Tucker, a chartered structural engineer with a particular interest in the history of such items has agreed to write a short resumé of its importance.*

Thomas Pearsall's Wrought Iron Construction

An unusual wrought-iron gate is to be put on permanent display at Willsbridge Mill, Bitton, near Bristol, at the local interpretation centre of the Avon Wildlife Trust. The gate is constructed in accordance with the 1811 Patent of Thomas Pearsall (1758-1825), for "A method of constructing ironwork for certain parts of buildings". Pearsall was the proprietor of rolling and slitting mills at the Willsbridge site, established by his grandfather John Pearsall around 1716.

Pearsall fixed thin, wrought iron plates, principally hoop iron, "in an edgewise position, cut or let into each other" so as to give mutual support and stiffness. In surviving examples, he did this mainly in the form of a lattice grid, with the pieces notched at the intersections and held by wedges and occasional metal loops. He also made compound members of cruciform or double cruciform section, held together with metal loops stitched through holes, although this method is not specifically described in the patent. Both methods of construction are used in the gate (Fig 1).

Pearsall's system was applied particularly to iron roofs, although floor joists, stair framing, ceilings, partitions, windows, doors and fences are mentioned in a handbill of 1812[2]. He was possibly the first in Great Britain to construct roofs wholly of wrought iron. Two of his roofs have survived near Calne in Wiltshire, where they were recorded as existing in 1812[2]. Of 17 feet (5.2 metres) span, these follow a simple king-rod pattern illustrated in his patent. Hoop-iron laths are notched into hoop-iron trussed rafters, which are only ⅛ *inch (3mm) thick and* 2⅞ inches (72mm) deep, at 10 inch

(254mm) centres . The double-cruciform method of fabrication was used for arch ribs and binding joists in the roof of the Theatre at Plymouth, 1811 to 14, by the architect John Foulston[3]. Spanning 58 feet (17.7 metres), the bow-string trusses were of another form illustrated in Pearsall's patent. This roof was described as "precarious" even before its destruction by fire in 1873.

Pearsall probably extrapolated from limited experiment and intuition, and his patent drawing showed an imperfect understanding of structural triangulation. With components so sensitive to buckling failure, this was fatal, and the collapse of a set of 35 foot (10.7 metre) roof spans under construction at the West India Docks, London, in 1813[4] led to his bankruptcy and the closure of the Willsbridge works. The development of more robust roofs of wrought iron was however continued by other Bristolians.

The Willsbridge gate is a rare survivor from the earliest period of wrought iron construction in Britain. It was found by the writer, lying in undergrowth near the Mill, and has been conserved by the workshops of Bristol

Industrial Museum, with grants from the Historical Metallurgy Society, and the Science Museum plus a private donation.

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M T Tucker

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