‘Westphalian’ fining: a tool mis-identified

Martha Goodway

ABSTRACT: At present there is no known example of the iron staff used as a tool in a unique process for the fining of iron intended for drawing into wire, although a staff used in a different process (puddling) was published as such a tool. It is suggested that this absence of examples results from the lack of recognizable features and the recycling of wrought iron by forging.

Introduction

Schubert (1957, 297–302) describes a special method of fining iron that was intended for drawing into wire, based mainly on Eversmann (1802, 218–21) and Rinman (1782, 98), to which he gave the name ‘Westphalian’ from its apparent source; further details of the process are provided by Paar and Tucker (1975 and 1977). This special fining solved the problem of the iron breaking during reduction from rod to coarse wire when this operation was converted from man-power to water-power, an operation referred to as ‘ripping’, perhaps because of the sound it produced.

By the 16th century the mass-production of iron wire had developed into a sequence of three operations. In the first, iron bar was ‘strained’, *ie* forged, into rod of ‘about the bigness of one’s little finger or less’ (Ray 1675). Then, using water power, the rod was ripped to coarse wire of about the size of a ‘great pack thread’. The iron was given a final anneal to soften it before the third operation, the ‘drawing’ of the coarse wire by hand into fine wire.

Because ripping by man-power had been the rate-limiting step in this sequence, a water mill in Nürnberg had already been adapted before the 16th century to supply increased power (von Stromer 1977). Dürer painted a watercolor of this mill (*Drahtziehmühle*, now in the Kupferstichkabinett, Berlin) no later than 1494. The first technical description of wire drawing was given in 1540 by Biringuccio (Smith and Gnudi 1959, 377–81) and included a woodcut illustrating the ripping of rod by water power (Fig 1).

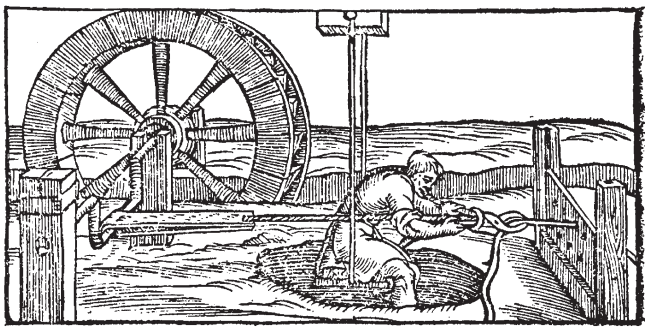

Figure 1: Woodcut from Biringuccio’s Pirotechnia *(1540) illustrating the ‘ripping’ of rod to coarse wire by water power. The worker did not draw the wire but only operated the tongs that gripped it. While the crank was moving towards the drawplate he disengaged the tongs and swung forward so as to close them again before the crank began rotating away from the drawplate.*

The first water-powered wire mill in the British Isles was erected at Tintern Abbey in 1566, although the operations there were not described until over a century later by John Ray (1675). The assay master of the Royal Mint, William Humfrey, obtained the capital and required privileges. The new mill was part of an effort to make Britain less dependent on imports, among them the substantial quantities of wire required for the manufacture of wool cards, essential to the wool industry.

Initial efforts at Tintern to manufacture iron wire in the amounts needed met with difficulties with the machinery and in the quality of the bar iron locally obtainable. Though this was called 'Osmond' iron, it was not the closely controlled product of Sweden of the same name, which commanded a premium price for its ductility (Heckscher 1954, 42–3; Tholander 1975). Eventually both problems were solved by the importation of skilled workmen from Germany (Schubert 1957, 294 and 298).

Iron intended for drawing was not the usual wrought iron bar supplied to blacksmiths, which customarily

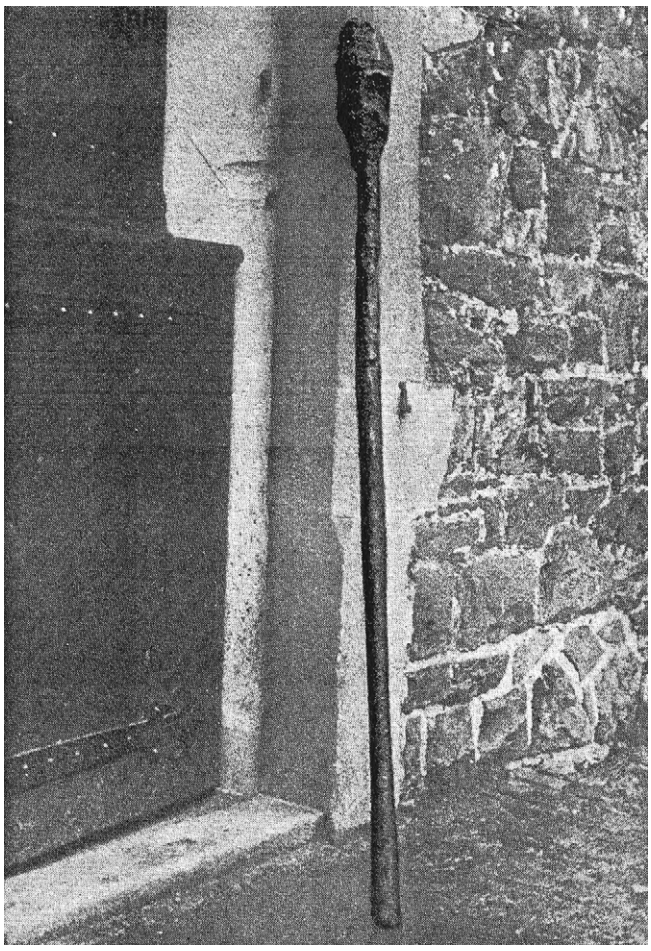

Figure 2: The iron staff in the Berg Altena Museum previously published as the essential tool in Westphalian fining.

Figure 3: Exhibit of puddling tools in the Berg Altena Museum; the arrow indicates the misidentified staff.

contained considerable amounts of slag. In order to be ductile, wire iron had to be 'clean', as free as possible of slag and other brittle inclusions. The smiths imported from Westphalia used a special fining procedure that removed carbon from pig iron without introducing slag. The critical difference from the usual fining to wrought iron bar was the drop-by-drop collection of the iron melting off the end of the pig on the end of a staff, rather like a gather of glass. It was then held in the oxidizing zone of the fire until nearly complete decarburization of the iron resulted (Goodway and Odell 1987, table 4). Figure 2 is the photograph of what Schubert believed to be such a staff in the Castle of Altena that was reproduced in Goodway and Odell's book on the metallurgy of music wire (*ibid*, fig 5).

On a recent trip to Westphalia, I visited the Museum Berg Altena and was astonished to discover that the illustrated staff was in an exhibit of iron puddling tools (Fig 3). Evidently by 1998, when all the objects that pertained to wire and wire drawing were moved halfway down the mountain to the newly-opened Deutsches Drahtmuseum, the staff had been assigned to the craft of puddling iron. No staff known to have been used in the fining of wire iron is on exhibit at the Drahtmuseum, nor anywhere else so far as I know. Given the ease with which wrought iron can be recycled by forging, this may simply be another example of a not very distinctive tool type now lost to us.

Acknowledgment

The interest and assistance of Dr Max Bannert, director of the Deutsches Drahtmuseum, Fritz-Thomée-Strasse 12, 58762 Altena, Germany, is gratefully acknowledged.

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The author

Martha Goodway, FASM, is the metallurgist for the Smithsonian Institution.

Address: Smithsonian Center for Materials Research and Education, 4210 Silver Hill Road, Suitland MD 20746 USA.

e-mail: goodwaym@scmre.si.edu