Hot blast iron smelting in the early 19th century: a re-appraisal

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ABSTRACT: The introduction of hot blast was the most important development in early 19th century iron smelting. The conventional story of James Beaumont Nielson’s 1828 patent has been widely accepted since the 1840s. This paper re-appraises the development of hot blast in the light of an earlier patent of Thomas Botfield, and suggests that many elements of Botfield’s development anticipated those of Nielson. The role of Gilbert Gilpin, and through him connections with John Wilkinson and the iron industry in South Wales, are also discussed. It is argued that the early development of hot blast iron smelting in fact remains poorly understood, and some suggestions are made for improving understanding.

Introduction

The development of hot blast has been described as ‘the most important single innovation … in the age of iron’ (Birch 1967, 181). Certainly it ranks alongside the development of the blast furnace, and the introduction of mineral fuel, in enabling a significant step-change in the production of cast iron. The invention of hot blast is conventionally associated with James Beaumont Nielson, who took out his first patent in October 1828. Nielson’s story is one of an outsider to the industry developing a new technology – initially in the face of opposition from a suspicious and conservative establishment, but subsequently universally accepted. This trajectory is familiar in narratives of 18th and 19th century technological development: it is evident for example in the stories of Abraham Darby and Henry Bessemer, and, to some extent, John Wilkinson. All four entrepreneurs feature in the influential Industrial Biography, produced in 1863 by an author of improving self-help books – Samuel Smiles – who was an enthusiast of heroic individualism; his perceptions have coloured subsequent interpretations.

More recent studies have perhaps inevitably shown that such developments were more complex, and, critically, were often arrived at by more than one person at around the same time. This has been shown in the case of iron smelting with mineral fuel (King 2002) and iron puddling (Hayman 2004; Hayman 2008). Similarly, Nielson was unlikely to have been alone in attempting to develop hot blast. This is evident from the zealous way in which he protected his patent through extensive litigation, seeking to establish that any earlier attempt by others did not anticipate his own invention. One of these was a patent taken out in January 1828 by Thomas Botfield, a Shropshire ironmaster. Although dismissed during Nielson’s legal arguments, the wording of Botfield’s patent in fact suggests that several of Nielson’s principles (if not his details) were indeed anticipated. Although it is not clear that Botfield’s patent was ever successful, it is argued that Nielson’s version of events – which has been generally uncritically accepted since the 1840s – obscures a more complex picture, and that in fact the early development of hot blast iron smelting remains poorly understood.

The invention of hot blast

James Beaumont Nielson was born at Shettlestone, near Glasgow, in 1792; his father was an enginewright at Govan colliery. James was apprenticed to his brother at Oakbank foundry, and in 1814 was employed as an enginewright at William Taylor’s collieries in Irvine (Smiles 1863, 150-1). Largely self-taught, he became the foreman at Glasgow gas works in 1817, and sub-