

Issac Wilkinson at Backbarrow

by David Cranstone

Abstract

Isaac Wilkinson's career as 'potfounder' at Backbarrow, Cumbria, from 1735 to 1748 is re-examined from primary documentary evidence. Considerable evidence survives on his relationship to the Backbarrow Company and on his ironfounding activities; the latter includes the introduction of blowing cylinders into Backbarrow Forge over the period 1737-9.

Introduction

Isaac Wilkinson and his son John are among the best-known inventors and industrialists of the eighteenth-century iron industry. However, published descriptions of Isaac's life have continued to rely heavily on nineteenth-century sources, notably Stockdale 1872 (though Fell (1908) and Chaloner (1960) used what primary material was available to them). According to Stockdale (1872, p 209) Wilkinson set up a small independent foundry near Backbarrow Furnace, from which he purchased cast iron in small quantities. Stockdale was a relative of the Wilkinsons and has been assumed to speak from family knowledge; in fact some at least of his assertions derive from mid-nineteenth century hearsay (LRO DDHJ, Wilkinson correspondence, Roper to Stockdale 1861). This article is limited to Isaac Wilkinson's work at Backbarrow, Cumbria, (formerly Lancashire), and does not pretend to be definitive. It is based on research undertaken from primary sources in 1986, into various aspects of the Furness iron industry.

The Sources

The main source used is the Machell papers in Lancashire Record Office, Preston (LRO DDMc . . .); the Furness Collection in the Barrow-in-Furness branch of Cumbria Record Office (CRO Z. . .) has been briefly examined, and some use has been made of the Hart-Jackson (solicitors) papers, now divided between Preston (LRO DDHj . . .) and Barrow (CRO BD/HJ . . .). In character, the documents divide into:-

1). Backbarrow Company account books (in both Machell and Furness collections). The accounting system used was sophisticated, with several volumes in use at any one time. For the relevant period (1735-50) incomplete runs of Bar Iron accounts, Cast Iron Wares accounts, and Journals survive.

2). Legal and other business documents in the Machell papers (LRO DDMc 30/14-82).

3). Rawlinson correspondence in the Hart-Jackson papers. These collections are not fully catalogued, and were only briefly examined; little material relevant to Wilkinson was located.

No attempt has been made to locate or examine documentary material relating to the Wilkinsons in other Record Offices or libraries.

Wilkinson the 'Potfounder'

The Backbarrow Company had been set up in 1711, and had been in successful production for over 20 years before Isaac Wilkinson's involvement started. The Company had blast furnaces at Backbarrow and at Leighton (Lancashire), and for a while also at Invergarry in Scotland. Much of the output was sold as pig iron, the rest being worked up in the company's forge at Backbarrow (other forges were also held by the company, but were little used). Small amounts of cast wares were produced direct from the furnaces, but were not a major aspect of the company's trade. The company was dominated by the Machell/Maychell and Rawlinson families (shares were divided 50/50 between them during the period of Wilkinson's involvement), the Machells also being the landlords of the Backbarrow site. Both families were local landowners with a history of involvement in the iron industry; the Rawlinsons had close family and business links with the Goldney and Champion families of Bristol, and thus with the Darbys of Coalbrookdale. William Rawlinson Senior died in 1734, the Rawlinson shareholding coming into the hands of his son (also William); this change of generation may account for the innovations of the following year.

On 25th July 1735, the company signed an agreement (LRO DDMc 30/28) with 'Isaac Wilkinson of Clifton in the County of Cumberland, Founder'. Wilkinson was to cast all kinds of cast iron wares, at Backbarrow and Leighton Furnaces; rates were quoted for 'Potts and Panns of all sizes', 'Girdles and Boshes', 'Backs Grates and Heaters', weights, and wagon wheels. The Company was to provide a casting-house 20 yards long by 10 yards wide, but Wilkinson had to provide his own tools. There was provision for an air furnace to be constructed if the company wished, for foundry work when the blast furnaces were blown out; this would be built at Wilkinson's expense, but fuelled by the

Company. Wilkinson was bound to the Company by the agreement for twenty-one years; the Company could terminate the agreement within this period (paying Wilkinson £50 for the cost of his tools), so long as they did not replace him with any other ironfounder. Construction of the 'new Pothouse' (foundry) started in December 1735 (DDMc 30/3), and Wilkinson started casting on 6th July 1736. A new account titled 'Isaac Wilkinson Potfounder' was opened in the company's books (DDMc 30/4, f 448); Isaac's wages for the first quarter amounted to £43 19s 5d, and by February 1736/7 he had produced some 60 tons of pots, pans, backs, girdles, plates and wheels.

The year 1737 was marked by two important innovations at Backbarrow; the casting of box irons and of blowing cylinders. The financial arrangements for the former were unusual, and were proposed by Wilkinson in a document (DDMc 30/33) in his own eccentric spelling and grammar. He proposed to buy all his production of smoothing irons from the Company to sell on his own account, the Company giving him a monopoly of production; he was to receive the same wage rate as for pots and pans (£2 7s 6d per ton), but to pay the company £12 per ton for the irons. He argued that this would give the Company ready money for an assured and increased sale, the retail price being low enough to fend off non-local competition, and that by making three standard sizes all the irons could take a single standard heater also made by the Company. This proposition was accepted on 18th October, with the amendments that the wholesale price of the irons was set at £14 per ton, and that the Company would replace irons that failed in grinding.

This unusual arrangement (which applied only to box iron production) presumably reflects the use of Wilkinson's innovation in moulding technique, which he patented in the following year (1738, No. 565):

'My said cast metallick boxes, both bottom, top, sides, and the barrs within them, consist of one entire piece of any cast metall, either iron, brass, copper, bell metall, or any mixt metall, and are made and performed from a melted fluid of any of the said metalls cast into a mould invented for that purpose, and then ground and finished in the same manner as other box irons now in use are'.

This agreement is presumably the source of the confusion in Stockdale and derived sources over Wilkinson's relationship with the Backbarrow Company.

The evidence for the introduction of blowing cylinders is more piecemeal, since it derives from the accounts; in view of the importance of this innovation it is worth quoting in some detail. The first references to bellows in the Journal for 1736/7-1737/8 (DDMc 30/5), in which the Forge was debited for 'tanned Hides for Bellows' in December 1736 and April 1737, reflect repairs to the traditional leather concertina bellows.

However later in the year the Backbarrow Forge account was debited to the Cast Iron Wares account for 'a pair of Cylindrical Cast Iron Bellows, put up in Septem[be]r 1737 being computed at 1/2 a tun and valued at £12 p tun £6---' (p 467). A labourer was paid for fourteen days work 'about Iron Bellows &c' (p 463) (two further payments 'at Bellows' may or may not relate to the new iron ones), and the Masters paid 3s for ale 'on occasion of the Iron Bellows' (p 462). The Bar Iron Accounts (DDMc 30/12, f 867) debited the Forge for 'iron used about Geering the new Iron Bellows 1cwt 7st 12lb £1-11--9'. No Cast Iron Wares accounts survive for the year. The accounts do not specify which of the three hearths in the forge (which had two fineries and a chafery) was blown by the new bellows.

Information for 1738 can be found in the Bar Iron and the Cast Wares accounts, no Journal surviving. The Bar Iron accounts (DDMc 30/12) record the supply of 2st 11lb of iron 'for Iron Bellows' in September, and of 1cwt 4st 7lb for 'Geering a new the lower Finery Iron Bellows' in October (ff 882, 954). Presumably these were repairs to the 1737 bellows. In December, however, a new set of bellows was constructed; the Cast Iron Wares account (DDMc 30/10, f 51) supplied 'a p[ai]r of cylindrical Bellows, & Appurtenances', weighing 18 cwt, and the Bar Iron account supplied the Forge with three separate items or batches, weighing respectively 7st 8lb, 4st 10lb, and 6st 11lb, for 'new Iron Bellows' (DDMc 30/12 ff 884, 885, 954).

A third set of bellows was set up in 1739 (for which year Cast Iron and Journal accounts survive, but no Bar Iron); the Forge paid the Cast Iron account for 'a pair of Cylindrical Iron Bellows for the Chaffery, set up in May 1739, computed with the Rings on the Beams & all appurtenances at 1t[on] 1cwt 1q 24lb at £10' (DDMc 30/6 p 720). John Myers Senior was paid 5s 6d for Puteing up Iron Bellows 5½ days', and Isaac Wilkinson 12s 6d for his men rubbing 3 p[ai]r of Iron Bellows smooth on the inside' (p 689; my underlining). Other costs included 'Expenses May 4th when the Chaffery Iron Bellows first blew 1s, Swines Grease for them 6d' (p 690). The production of a single pair of cylindrical bellows is confirmed in the Cast Iron Wares accounts (DDMc 30/10, f 148). The reference to rubbing *three* pairs of bellows is mysterious; perhaps the earlier pairs were dismantled and the bore improved.

Returning to the foundry production in general, the Cast Iron Wares accounts for 1737/8-1739/40 (DDMc 30/10) give considerable details of sales during the period. Smoothing irons, sad irons, and heaters were sold to Isaac Wilkinson, as had been agreed. Other sales included 'underground wheels' to Sir James Lowther of Whitehaven. The main sales area encompassed the modern Cumbria, Lancashire, western Yorkshire, and south west County Durham, with occasional shipments to London. In contrast, the Bar Iron accounts (DDMc 30/12, /13) for his period

show a more local pattern of trade, largely confined to Lancashire, Furness, south Westmorland, and west Cumberland. In 1739, a second 'pothouse' was built at Backbarrow; 217 tons of pig iron was used for castings, Isaac Wilkinson was paid a total of £398, and the company made a profit of £500 from cast wares (DDMc 30/6). A new development was the purchase of 75 lb of gunpowder 'for trying of Cast Guns' (p 681).

By 1740, the pace of innovation seems to have slackened (DDMc 30/7, /11). A pothouse was built at Leighton, but it may be noted that, when the furnace bellows were replaced, old-style leather bellows were used, not cylinder bellows. Isaac also prepared to lease the corn mill at the east end of Backbarrow Bridge, with liberty to alter it, and a dwelling house and outhouse with orchard and garden at the west end of the bridge; the lease (DDMc 30/36) was dated 2nd February 1739/40, but was to run from 1st May 1741 for 21 years. It was endorsed with an inventory, showing the property to be a run-down corn mill. However a second endorsement, of 1753, illuminates Wilkinson's purpose; by this Machell agreed to terminate the lease and take back the mill as altered 'with all the grindstones Tackle and other Furniture'. Presumably therefore Wilkinson had converted the mill into a grinding mill for his smoothing irons.

In 1741 Isaac spent much of his time at Leighton, Backbarrow being out of blast from January to October. Occasional guns were cast, some of which burst on proof (DDMc 30/11), and large shipments of cast wares were sent to London. Small amounts of cast iron were sold to a John Wilkinson, who may have been Isaac's son, or a local smith of the same name.

The main innovation in 1742 was the construction of an air (reverberatory) furnace. Three 'pieces' were cast for this in November (DDMc 30/11, f 321), and in January 1742/3 Wilkinson started casting from the air furnace as well as the blast furnace (f 218). During the financial year the foundry used 275 tons of pig iron and made a profit of £610, Wilkinson being paid £485 (DDMc 30/8). The Forge made a 'Bellow pipe and collar' weighing 2st 10lb for its own use (DDMc 330/13, f 190), and in December the foundry supplied a cylinder weighing 3cwt 8lb (DDMc 30/11 f 217), perhaps a replacement for one of the existing blowing cylinders.

In the following year a new agreement (DDMc 30/42, dated 14th March 1742[3]) was made between Wilkinson and the Company, the wording giving the impression that a dispute was being settled. It was agreed that 'the Damage which the Company have suffered by Casting of Guns, shall be ballanced by the workmanship of Casting Hammers and Anvills at Leighton last blast', both sides dropping their demands. Wilkinson was to 'sink a deep Sand Bed in the Casting House at backbarrow . . . and fit it with a large Tub or Wooden Vessel', for a fee of £10 if successfully completed. The rates for some types of castings were also amended. The Journal (DDMc 30/9)

confirms that the casting pit was sunk; the air furnace remained in use, and the pothouse was enlarged, 4500 slates being boated up from Kirby Pool for the purpose (p 288). A batch of broken cast iron patterns was wrought up in the Forge (p 268), most of these being John Wilkinson's; this does seem likely to refer to Isaac's son, of later fame.

From the end of the financial year 1743, the surviving records become increasingly patchy, most of the relevant information coming from legal documents rather than accounts. There is evidence of increasing friction between Rawlinson and the remainder of the Company; for example in February 1746/7 Benjamin Ayrey (the manager) prepared a list of Rawlinson's (alleged) debts to the Company, amounting to £3369. One item on this account was a shipment of cast iron water pipes to London in August 1746; Rawlinson was normally responsible for the shipment of Wilkinson's products to London.

By the autumn of 1747, Wilkinson was in major dispute with the Company, to the extent that they obtained a lawyer's opinion (DDMc 30/56). This stated that Wilkinson was still fully employed by the Company, but had contracted for several shares 'in a new Workes which is setting up in Opposition to Backbarrow furnace and it is presumed he intends to make the same Kinds of Wares there and to serve the Backbarrow Company also'. The Company were advised that they could not prevent this under the terms of the 1735 contract. The background to this move is given by Fell (1908, pp 219–20, 266), quoting from original documents not known to survive today. He states that in 1747 Wilkinson, Job Rawlinson (William's brother), William Crossfield, and George Drinkall formed the Lowwood Company and built Lowwood Furnace (a mile downstream from Backbarrow), and that the operations carried out there initially included 'the grinding and polishing of iron', which however was abandoned and replaced by a forge.

Wilkinson's potfounding activities at Backbarrow came to an end in March 1748 (CRO Z 192, quoted by Chaloner 1969, p 29); surprisingly, there are no legal papers relating to his departure, and the terms are therefore unknown. However an extremely stormy background is indicated by an exchange of letters in June 1748 (DDMc 30/58). John Sunderland, writing to Machell as William Rawlinson's attorney (he was also a relative) demanded the production of accounts, the dismissal of the stocktaker for fraud, and the sale of the stock to meet the Company's (alleged) debts to Rawlinson. A reply from Maychell was fairly conciliatory, while reluctant to break up the Company. The dispute was resolved in April 1749, when Machell and Maychell bought out Rawlinson's moiety of the Company (DDMc 30/60).

Wilkinson's partnership in the Lowwood Company does not appear to have lasted long; according to Fell

(1908, p 266) Wilkinson, Rawlinson, and Drinkall disposed of their interest in 1749, to John and Thomas Sunderland. This is partially confirmed from surviving primary evidence by a lawyer's opinion (DDMc 30/76) on a dispute of 1754 between the Lowwood Company and the woodowners (by now partners in the Backbarrow Company); this states that the partnership that had signed the charcoal articles had been dissolved, a second partnership had also been dissolved, and none of the original partners remained. Wilkinson's final known dealing with Backbarrow came in 1753, when the lease of Backbarrow Mill was terminated by agreement. It should be noted that later documents (DDMc 32/4, /11) describe the house at the west end of the bridge (which had been included in the mill lease) as 'Wilkinson's house'; this casts doubt on the identification (by Stockdale) of Bare Syke (500m further to the southwest) as Wilkinson's residence.

Discussion

The scope of this article has been limited strictly to Isaac Wilkinson's activities at Backbarrow; no attempt has been made to investigate earlier or later aspects of his career.

The primary evidence indicates clearly that Isaac was recruited in 1735 from Little Clifton furnace (near Workington in Cumbria), where he was already a founder. This furnace had been built by the Cooksons in 1723, and was an early coke-fuelled venture. His arrival, and the construction of a pothouse at Backbarrow, marked a move by the Backbarrow Company into the specialised foundry business. It is tempting to relate this to the dominance of William Rawlinson Junior, with his family connections with the Darbys of Coalbrookdale, who had always concentrated on foundry production (Raistrick 1989); Chaloner (1960, p 24) suggests that Wilkinson may himself have been of Shropshire origin. Isaac's appointment was as a 'potfounder' to the Company, and he was paid according to his output; this was the normal way of engaging a skilled craftsman. In addition, from 1737 onwards he acted as wholesaler of the box-irons produced by his own process, though these were still produced in the Company's pothouses, as part of his employment. The Company's foundry trade appears to have been highly successful, though it is impossible to say how far this was due to Wilkinson's technical innovations. Isaac's place in the development of the (under-studied) eighteenth-century foundry trade would repay a full assessment, not attempted here. By 1742, the use of an air furnace was not unusual; Coalbrookdale had two by 1718 (Raistrick 1989, p 45). However his smoothing iron patent of 1738 was apparently based on an improvement in moulding technique, as were his patents of 1753 (No 675) and 1758 (No 723) (Chaloner 1960, pp 29–30, 40–41). The production of iron wagon wheels appears to be a very early example, slightly pre-dating their use at Coalbrookdale (Raistrick 1989, p 174).

The introduction of blowing cylinders at Backbarrow is of great interest, coming twenty years before Wilkinson's patent (1757, No 713); this patent is frequently taken to mark their invention (eg Chaloner 1960, p 39–40; Ince 1989, p 108). The evidence establishes beyond doubt that a first pair of blowing cylinders was erected in September 1737; probably these served the lower finery, in which case their 'geering' needed replacing after only a year. It appears that a second hearth (the upper finery?) was fitted with iron bellows in December 1738, and the chafery cylinders were installed in May 1739. The effect of these bellows on the productivity and costs of the forge has not been investigated (though the evidence to do so does exist).

The bellows consisted of cast iron cylinders, with cast iron rings on their beams, and wrought-iron 'geering' (probably 'fittings' rather than 'gears'). It is likely that the bellows were simple piston-operated blowing cylinders such as those (probably of late-eighteenth-century date) known from Duddon Furnace (Fell 1908, p 228; Mart 1937–8, pp 93–100), though they could have been more complex (Wilkinson's 1757 patent is extremely vaguely worded, as if intended to cover a multitude of devices). The progressive installation of iron bellows at all three forge hearths at Backbarrow indicates that they were at least moderately successful. However they were not installed during this period at Backbarrow or Leighton blast furnaces, nor at Duddon Furnace (equipped by the Backbarrow and Cunsey Companies in 1738). This may indicate difficulties in producing castings or fittings of adequate size, or that blowing cylinders were not yet considered sufficiently reliable for blast-furnace use (where a breakdown of any duration would result in the blowing-out of the furnace with a full charge).

It should be noted that the evidence does not prove that Wilkinson invented the blowing cylinder at Backbarrow in 1737, merely that this is, on present evidence, the first recorded use. Very little is known of Isaac Wilkinson's activities at Little Clifton furnace, and it is quite possible that he may have experimented with blowing cylinders at this stage of his career (whether by his own inventiveness, by adopting someone else's innovation, or, conceivably, by indirect knowledge of Chinese methods).

The evidence for Wilkinson's departure from Backbarrow, and the contemporaneous ructions, is tantalisingly incomplete. The documents give the impression that the running of the Company was increasingly in the hands of the Machells, whereas Wilkinson's links appear to have been with Rawlinson. It was probably not coincidence that Wilkinson's involvement in the Lowwood company (with Rawlinson's brother) occurred at the same time as Rawlinson's breach with his Machell partners, especially as John Sunderland appears as Rawlinson's attorney in this dispute, and as a partner in Lowwood soon after. Indeed it appears that Sunderland rapidly

eased both Wilkinson and Rawlinson out of the Lowwood Company.

It is normally stated, following Stockdale (1872, pp 210–12), that around 1748 Isaac Wilkinson set up an ironworks at Wilson House near Lindale-in-Cartmel (Cumbria, formerly Lancashire), which he operated until moving to Bersham (Clwyd) in 1753. However the present research has not revealed any primary evidence for an ironworks at Wilson House. From a brief examination of secondary sources (including material quoted by Stockdale) it appears that there is evidence for Isaac Wilkinson having lived at Wilson House in the 1750s, and for John Wilkinson having operated an ironworks of some form there later in the century. The latter is to some extent confirmed by the presence on site of cast iron pipes bearing the legend "Wilkinson 1784". It is therefore very doubtful whether Isaac Wilkinson had more than a residence at Wilson House; the question of an ironworks at this site (in Isaac and/or John's time) requires investigation from contemporary sources and site evidence.

Acknowledgements

I am grateful to the Lake District Special Planning Board for financial assistance during my research, to Andrew Lowe of LDSPB for advice and

encouragement, to the staff of Lancashire and Cumbria (Barrow-in-Furness) Record Offices for their help, and to the depositors of the documents used for making this work possible. I am also grateful to Charles Blick, Dr Colin Phillips, and Dr Stafford Linsley for commenting on a draft of this report and for help with secondary references.

Bibliography

Chaloner W H, 1960 'Isaac Wilkinson, Potfounder', in Presnell L S (ed), *Studies in the Industrial Revolution*.

Fell A, 1908 (1968). *The Early Iron Industry of Furness*. (Hume Kitchen, Ulverston, reprinted Cass).

Ince L, 1989. 'Water power and cylinder blowing in early South Wales coke ironworks', *Historical Metallurgy*, Vol 23, No 2, 108–112.

Mart, J N, 1937–8. 'The Iron Bellows of Duddon Furnace, Cumberland', in *Trans. Newcomen Society*, XVIII, 93–100.

Raistrick A, 1989. *Dynasty of Iron Founders*. 2nd Edition, Sessions Book Trust/Ironbridge Gorge Museum Trust, York/Ironbridge.

Stockdale J, 1872. *Annales Caermoelesenses*, Ulverston.

The Historical Metallurgy Society, what it is and how to join

Origins

The Historical Metallurgy Society was established in 1962, and now covers all aspects of metallurgical history and has an international membership of over 500. Currently 42% of the membership is outside Great Britain and ferrous and non-ferrous interests are equally represented.

Publications

The Society publishes the results of its research at regular intervals. A Journal, is produced annually normally in two parts, and a news sheet is issued three times a year, with conference details, and excavations.

An index of publications is available and back copies of Journals and special publications are usually obtainable.

Conferences

The Society holds an Annual Weekend Conference each September, and a day of lectures and visits at the AGM in the Spring. These meetings are held in

different parts of the country. At each Conference there are lectures by metallurgical historians, and experts with local knowledge of the area. One day is spent in the field with coaches taking members to sites of interest.

The conference weekend also provides the opportunity for members to give short talks on their own particular interests.

Joining

The annual subscription, is £15.00 sterling anywhere in the world for an ordinary member. There are alternatives for those who are already members of the Institute of Materials or who are full time students.

Payments of the subscription entitles you to receive the Journal each year. Newsletters, and details of the various activities of the Society.

If you are interested in joining please write to:

Diana Court
Rock House, Bowen's Hill, Coleford,
Gloucestershire GL16 8DH, Great Britain