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Research Group

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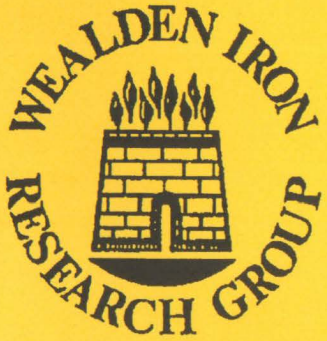

WEALDEN IRON RESEARCH GROUP
BULLETIN No. 17, SECOND SERIES
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FIELD NOTES compiled by J.S.HODGKINSON

A bloomery at Forest Row, Sussex

Construction of a pipeline has revealed a concentration of bloomery slag, burnt clay and charcoal impregnated soil, at a depth of 200 mm, east of a stream in Kidbrooke Wood, at TQ 4175 3370. Slag extends over an area of about $8m^2$. No datable material was found. Two dams lie across the stream, one close to the site and the other further downstream, but they appear to be related to the landscape gardens in the grounds of Kidbrooke Park (Michael Hall School) to the north.

We are grateful to Luke Barber, of South Eastern Archæological Services, for information about this site.

Bloomery slag at Peasmarsh, Sussex

Bloomery tap slag has been found scattered, in varying densities, over a field immediately north of Peasmarsh church. The greatest concentration is around TQ 8855 2202, although the absence of a greater density at that point, or of charcoal impregnated soil, suggests that the slag has been scattered by ploughing. Its source has not been located. The geology is predominantly Ashdown Sand, with caps of Wadhurst Clay on the tops of the hills, and adjacent to the field are two substantial opencast excavations reminiscent of the Roman ore extraction quarries seen near the Footlands site at Sedlescombe.[1]

We are grateful to Mr J. Painter for drawing attention to this site.

Two Romano-British bloomeries at Heathfield, Sussex

A bloomery has been discovered, by the Field Group, at the north end of Markly Wood, on the south-east bank of a stream, close to a footbridge (TQ 5802 2316). The site, which is characterised by a considerable amount of slag in the stream and up its bank, extends 8m north-east and 48m south-west of the footbridge. The bank of the stream is about 5m high on the south-east side but at stream level on the opposite side. Approximately 38m to the south-west of the bridge, burnt clay, suggesting furnace debris, has been excavated from a rabbit hole. Two trenches were dug into the slag heap and four body sherds of Roman pottery were recovered. One sherd was of grog-tempered East Sussex ware, two were fine wares (one, light self coloured, and the other a grey micaceous fabric with an oxidised orange outer surface), and the fourth a grey ware with angular black, ?iron rich inclusions and some grog.

The second bloomery lies on sloping ground in Crawlsdown Wood, centred on TQ 5735 2250. It covers an area estimated to be 100m by 100m (1 hectare), forming a number of banks of slag, some of which may have been removed. Three trenches were dug in the slag heap and two sherds of hand made, grog-tempered, East Sussex ware were recovered. Although this type of pottery spans the period c. 50BC - AD400+, these sherds are likely to date from the Roman period.

We are grateful to David Rudling for identifying the pottery from these sites.

A bloomery at Waldron, Sussex

A concentration of bloomery slag has been discovered on the north side of the stream in Longreach Shaw (TQ 5452 1774). The site covers an area of approximately 150m^2. The slag is of a distinctive

form, with the appearance of having dripped, in some instances against wooden laths. Similar slag was noted at the first century AD site at Smythford, Worth.[2] A sherd of pottery, identified by Margaret Tebbutt as probably East Sussex ware of the late Iron Age or early Romano-British period, has been found in the stream adjacent to the slag. Of a dark grey colour, the sherd was hand made, with a relatively small number of flint inclusions, and with crude surface decoration.

We are grateful to Mr Ashley Brown providing information about this site.

A bloomery at Hartfield, Sussex

A concentration of bloomery slag, along a low bank, and covering an approximate area of 55m^2, has been discovered during tree cutting on Kidd's Hill, Ashdown Forest (TQ 4590 3225). The site lies on the south side of a wide, marshy area near the source of the ghyll which flows down towards Newbridge. The slag, some pieces of which bear the impressions of wooden laths (see the bloomery at Waldron, above), has been found in a distinctive orange soil. Similar coloured soil has been noticed on the eastern part of the bay of Newbridge furnace.

We are grateful to Chris Sutton, a Forest Ranger, for notification of this site.

Wilderness Wood, Hadlow Down, Sussex

The two bloomery sites in Wilderness Wood have already been noted.[3] On a recent visit to the wood it was possible to locate the sites with greater accuracy. The grid reference of the first site is now corrected to TQ 5361 2366; slag covering an area of about 120m^2.

The position of the second site, which extends for 40m east-west, on either side of a track, and about 30m north-south (approximately 1200m^2), is now corrected to TQ 5373 2356. Mr and Mrs Yarrow, who own the sites, have found a sherd of pottery, identified by Dr Andrew Woodcock as East Sussex ware, from the late-Iron Age or Romano-British period, in a rabbit hole on the larger of the two sites.

Saxon iron working at Hassocks, Keymer, Sussex

Consolidation/forging slag, dated by context to the Middle Saxon period, has been found during excavations, by a team led by Chris Butler, of a small settlement near Friar's Oak (TQ 300 162). No evidence was found of working areas or of hearths, but a number of pieces of forge hearth bottoms were found. There was no evidence of smelting at Friar's Oak, but the transportation of raw, unconsolidated blooms seems a wasteful business. This would seem to suggest that raw blooms were either being smelted nearby, or that they were being brought from elsewhere; presumably the Weald. It is possible that smelting was undertaken in the Weald, during this and other periods, by the inhabitants of settlements in the more highly populated areas closer to the Downs; the smelters returning with the raw, unconsolidated blooms to work them up for their own use or for trade. This might account for the evidence of the forging of raw blooms at this and other settlement sites geologically remote from the main ore sources (see below at Burgess Hill). The only smelting site of the Saxon period so far identified has been that at Millbrook, Maresfield, also from the Middle Saxon period, although a Saxon smithing site, more comparable with the Friar's Oak site, was reported at Buriton, Hampshire.[4]

Mediæval iron working in Crawley, Sussex - further evidence

Following the excavation of an evaluation trench to the rear of 28 Ifield Road, Crawley, reported previously, a larger area behind 18-28 Ifield Road (TQ 2660 3657) was further examined, during a brief excavation, in 1996, by Thames Valley Archæological Services.[5] A variety of pits, gullies and post/stake holes contained quantities of iron slag, both tap slag and forging slag, as well as small amounts of furnace cinder, siderite iron ore and hammer scale. Among the pieces of forging slag were several fragments of plano-convex hearth bottoms. No actual hearths was found, although the quantity of material suggests that these must lie nearby. Associated pottery all appears to date from the 14th-15th century.

Burgh Wood Forge, Etchingham, Sussex

Construction of a water pipeline from Bewl Water to Darwell reservoirs has resulted in the sectioning of the hammer pond bay at Burgh Wood (TQ 7172 2759). A watching brief by Richard James, of South Eastern Archæological Services, has enabled a section to be recorded, and this can be added to the limited information available on the construction of Wealden pond bays.[6]

The bay is approximately 1.7m high on the downstream (southern) side, and is about 9m wide (*see* Fig.1). The bay was constructed of orange-yellow silty clay (3/5), similar to the underlying subsoil, and the more friable nature of the clay in the bay compared with the subsoil, suggested that the bay was constructed of redeposited natural material, possibly from the original excavation of the wheel-pits. There was no remanent turf line under the bay, suggesting topsoil stripping prior to construction. Slag had been deposited on the upstream side of the bay. Topsoil (1/2) had

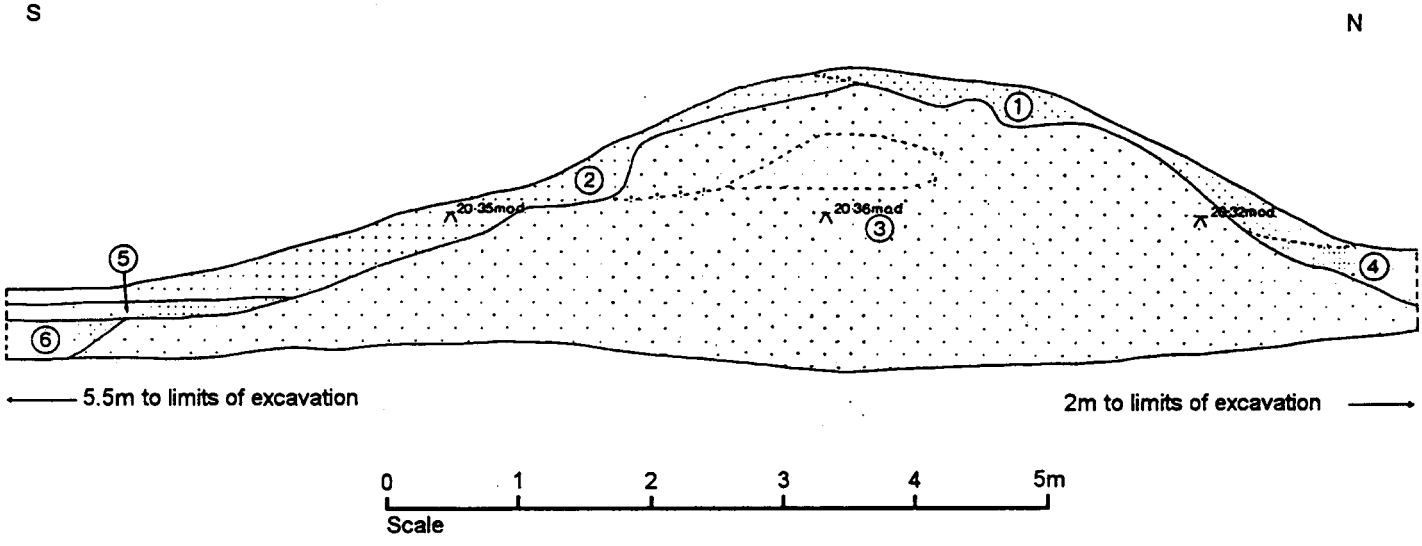


Fig. 1 Burgh Wood Forge: Section through Pond Bay

covered the bay and had been disturbed by cattle movement. On the lower part of the pond side of the bay was a clean, mid-brown silty clay, which was probably the result of pond silting (4). Some slag was evident (6).

We are grateful to South Eastern Archæological Services (now South-Eastern Archæology) for allowing us to reproduce the section of the bay.

Romano-British iron working at Burgess Hill, Sussex

A watching brief, followed by a brief excavation, by South Eastern Archæological Services, in July 1996, of a proposed factory site south west of Burgess Hill (TQ 296 188), has revealed evidence of iron forging. The interim report, by Jennifer Sawyer, notes the finding of a possible forge hearth bottom, a number of pieces of forging slag and a possible piece of furnace lining. There was no obvious evidence of tap slag. The slag was found in association with pottery from, possibly, late in the Romano-British period.

Further finds of bloomery slag at Outwood, Burstow, Surrey

A scatter of bloomery slag has been observed in a field at TQ 322 449. No concentrations have been located. A scatter of siderite clay ironstone has also been observed in the same field, and in an adjacent field at TQ 322 446. Our thanks to Robin Tanner for this information.

Notes and References

1. J.S.Hodgkinson, 'Footlands ironworking site, Sedlescombe', *Wealden Iron*, 2nd ser., **7** (1987), 26-7.

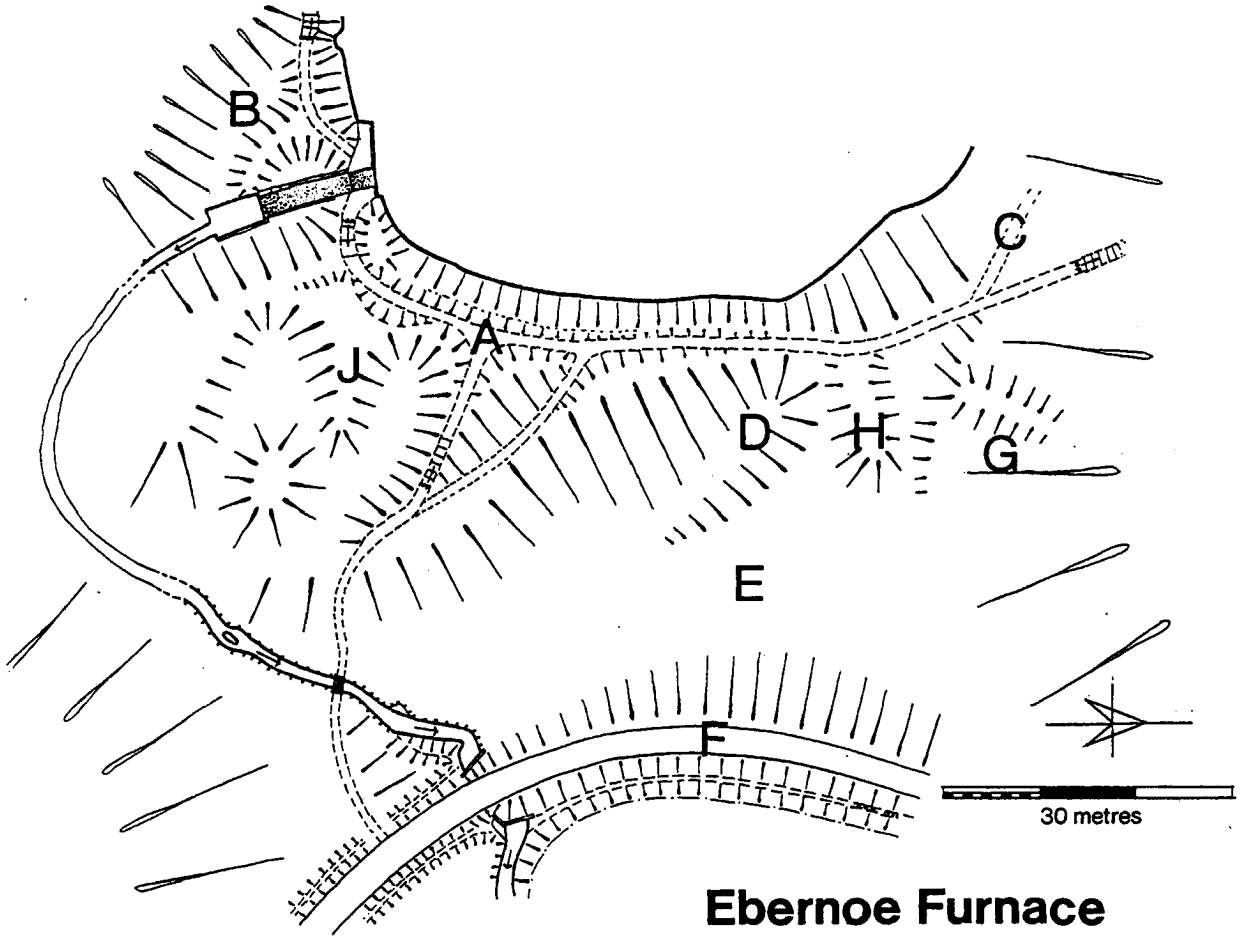
2. J.S.Hodgkinson, 'A Romano-British ironworking site at Crawley Down, Worth, Sussex', *Wealden Iron*, 2nd ser., **5** (1985), 16-17.
3. *Wealden Iron*, 2nd ser., **1** (1981), 22; 2nd ser., **2** (1982), 6.
4. C.F.Tebbutt, 'A Middle-Saxon iron smelting site at Millbrook, Ashdown Forest, Sussex', *Sussex Archæological Collections*, **120** (1982), 19-35; *Wealden Iron*, **17** (1980), 15-16.
5. *Wealden Iron*, 2nd ser., **16** (1996), 2-3.
6. H.Cleere and D.Crossley, *The iron industry of the Weald* (1985), 225-9.

EBERNOE FURNACE - SITE SURVEY 1996

J. S. HODGKINSON & R. G. HOUGHTON

The site of the iron works at Ebernoe (SU 977 278) was located, in common with many other such works, at the point where a valley narrowed, enabling the construction of a bay, or dam, **A**, by which a pond could be impounded. The original stream seems to have followed a course on the south side of the valley, where the remains of a natural ghyll can still be seen at **B**. The southern valley sides are steep in comparison with those on the north side, and it is for this reason that access to the site would have been more likely on the north side. A deeply worn track is still in evidence, commencing at **C**, and following a route, at a gradient manageable by wagons, up past the site of a former cottage. Known as Furnace Croft, the building, which is shown on a 1764 map of the Manor of Ebernoe, survived until the 1920s.[1]

The pond bay curves gently, and it is likely that an earlier overflow existed just west of the present concrete spillway, following the original stream course. The map of 1764 does not show this watercourse, but instead shows a stream issuing nearer the centre of the elongated depression, **D**. A sluice is shown at this



Ebernoe Furnace

position on the OS 25" map of 1912. It is not possible to be precise about the location of the furnace stack owing to the lack of surface evidence and the intractability of the undergrowth. However there exist a number of indications which suggest where it may have been positioned.

Firstly, the positions of the former outflows from the pond. The present and, it has been suggested, original route of the stream offers too constricted a space for a furnace, which, on the evidence of sites excavated in the Weald, would have been at least 5 metres square. Neither would there be space in that location for a working area where wagons could gain easy access for the removal of cast iron products. Nor would there be an easy route, for wagons, away from that location, up the south side of the valley. Access, as has been pointed out, is much easier to and from the north. Adjacent to the former watercourse, **D**, there is a wide working area on the east side of the pond bay, **E**, although its present swampy condition owes much to flooding caused by the inhibiting of the run-off of winter storm water by the embanking of the Cinderhill track, **F**, which was reinforced in the 1950s. Silting in this area has effectively concealed what evidence exists of its former use. In common with some other sites, the tail race from the wheel pit may have been culverted to maximise the working area around the furnace.

Secondly, the debris from iron working. Blast furnace slag has been found to the north and east of **G**, and large pieces have been reported in the stream close to the bridge where Cinderhill track crosses the stream. The greatest concentration lies along the stream, to the east of the Cinderhill track. Geophysical responses in the area of **G** have suggested both charcoal and roasted iron ore, and charcoal impregnated soil is noticeable on the mound, **H**. The position of this elongated mound adjacent to the former watercourse, **D**, suggests its former use as a charging bank, from which loads of ore and charcoal could be tipped into the throat of

the furnace, although the relative heights will have changed with the passage of time through the general degrading of surface features and the build-up of the surface through leaf fall. On the basis of the foregoing, it is suggested that the furnace lay close to, and slightly apart from, the end of the mound, **H**, and adjacent to the watercourse at **D**, which was possibly on the line of the former wheel pit..

In addition to the immediate accessibility of parts of the site, a general consideration of the destination of the products of the furnace weighs considerably in favour of the main route in and out of the site being to the north. With ownership, and almost certainly operation, of Ebernoe furnace being linked to that of Wassell forge, 700 metres ENE, access to the north would have been essential.

A previous interpretation of the site referred to two gullies, **J**, at the south-eastern end of the bay, suggesting that they may possibly have been former wheel pits.[2] In view of the evidence above, it is more likely that they represent the subsequent excavation of furnace debris for use on local trackways, such as the Cinderhill track.

Sources of ore for Ebernoe furnace, derived from the Weald Clay, lay mainly to the north-west, between Lurgashall and Northchapel. However, the nearest recorded source seems to be at Colhook Common, 1.5 km to the south-west, and minepits have also been recorded on Upperton Common, 4.5 km SSW.[3]

The Group wishes to record its thanks to the Sussex Wildlife Trusts, who own Ebernoe Common, and in particular to their Warden, Mr A. Simpson, and also to West Sussex County Council Planning Department Sites and Monuments Record, who have collaborated in the survey.

Notes and References

1. West Sussex Record Office, Petworth House Archives PHA 10,063.
2. H.F.Cleere and D.W.Crossley, *The iron industry of the Weald* (Leicester 1985), 329.

3. Cleere and Crossley, 18; *Wealden Iron*, 2nd ser., 5 (1985), 6.

FORGES IN THE LATE EIGHTEENTH CENTURY WEALD[1]

J. S. HODGKINSON

From the second half of the seventeenth century the output of the Wealden iron industry had changed from being concentrated on the production of bar iron, through the close integration of furnaces and forges, to a specialisation in the manufacture of castings and, in particular, ordnance.[2] This trend, which is reflected in the changing proportion of forges to furnaces, is demonstrated in the succession of lists which appeared during the hundred years from 1650. In them the reduction in output of the forges is very evident, and the petitions and pamphlets which often accompanied such lists point to the increasing dominance of Swedish iron in the eastern half of England, the market earlier served, in part, by the Wealden forges.[3] Not only was the iron, that was imported from the Baltic, of a higher grade than the Wealden product but, despite export and import taxes and a long sea journey, was cheaper as well. The Crowleys, themselves manufacturers of ordnance in the Weald, were the largest importers of Swedish iron, at their extensive works on Tyneside.[4] Thus the Wealden forges were deprived of a wider market by cheaper, imported iron, and reduced to working up the limited surplus iron from furnaces, the production of which was geared to casting guns.

Of the twelve forges which had survived in the Weald into the 1750s, most were associated with one or more furnaces, and worked up the iron that was surplus to the castings that were the mainstay of

their campaigns. Iron was surplus in several forms. Firstly there was pig iron, which was the output of the furnaces in the first weeks of a blast, before the iron flowed in sufficient quality for castings to be made. Secondly, there were the gunheads which were an essential part of each cast piece of ordnance, and which provided a volume of iron in the highest part of each casting, in which gas bubbles and slag could accumulate. The 'heads' were sawn off the guns before boring, and carried to the forge. Thirdly, there were failed castings. Although a founder would strive to minimise the occurrence of these, the accidental movement of the nowel bar during pouring, or a weakness in the mould causing a breakout, would necessitate the complete rejection of a casting. So long as a forge received most of its cast iron in the form of rejects, in one form or another, from the furnace, the quality of wrought iron produced would inevitably be poor. Furthermore, the time taken to convert poor quality cast iron into reasonably saleable bar would lower the output of the forge, so the average output of a Wealden forge at 40-60 tons a year, compared with 115 tons nationally, can be accounted for as much by the poor quality of the iron worked as by the small size of Wealden forges generally.[5] During periods when orders for castings were insufficient, ironmasters could increase production of pig iron, this time of probably better quality, for sale to forges.

From the distribution of forges and the pattern of their ownership, it appears to have been regarded as essential for gunfounders to have access to one or more forges for the profitable disposal of their surplus cast iron. The number of forges seems closely related to the number of furnaces, so Harrison & Co., who operated up to five furnaces, had four forges, while the Fullers had one of each. Only the Crowleys appear to have managed without a forge. They had an extensive ironmongery business elsewhere and any surplus cast iron could be used to supplement imported Swedish iron.

FORGE	OCCUPIER	DATES	FURNACE
Abinger	J. Goodyer	1751-80	?Warren/*North Park*
	J. Eade	1781-2	?
	A. Raby	1783-7	?
Ashburnham	Ashburnham Estate	1796-1828	*Ashburnham*
?Barden[6]	W. Bowen	<1729-71	*Barden/Cowden*
Bivelham	R. Tapsell (Harrison & Co.)	1751-65	*Lamberhurst/Hamsell*
	D. Collins	1766-92	Heathfield
Burwash	Fuller family	1700-1803	*Heathfield*
Glazier's	R. Tapsell (Harrison & Co.)	1757-65	*Waldron*
	T. Willis	1768-82	Heathfield
	J. Bourne	1783	Ashburnham[7]
Hawksden	R. Tapsell (Harrison & Co.)	1751-65	*Lamberhurst/Hamsell*
	S. Baker	1766-75	Heathfield
Howbourne	C. Cripps	1756-60	Heathfield
	W. Clutton	1761-3	*Gravetye*
	F. Bristow	1765-6	?Heathfield
	E. Raby	1767-8	*Gravetye*
	R. Saxby/Mr Pengree	1767-71	?Heathfield
Maresfield	R. Tidy	<1740-50	Heathfield
	D. Beard	1751-61	Heathfield
	W. Clutton	1762-3	*Gravetye*
	Mr White	1764-6	Heathfield
	B. Molyneux	1767-70	Heathfield
	E. Standen	1773-77	Heathfield
	R. Prickett	1778-9	Heathfield
	J. Willis	1783-1806	?Heathfield/ ?
Pophole	?J. Butler	?	*North Park*
	J. Wright & Co.	<1769-74	*North Park*
	J. Goodyer	1774-7	*North Park*
Robertsbridge	W. & G. Jukes	1737-54	*Robertsbridge*
	J. Churchill	1754-68	*Robertsbridge/Darwell*
	J. Bourne	1768-92	*Robertsbridge/?Darwell*
Thursley	O. Knight	1769	?North Park
Westfield	R. Tapsell (Harrison & Co.)	1757-65	*Beckley/Brede*
	J. Standen	?	*?Brede*
	H. Bourne	?	Robertsbridge
Woodcock	S. Baker	1743-4	?
	E. Raby	1759-71	*Warren/Gravetye*
	D. Fossick	1802-3	?

Fig. 1 Wealden forges and the furnaces that supplied them[8] (italics indicate forge and furnace in same occupancy)

Of the few forges that were not associated with particular furnaces by ownership or tenancy, and only Maresfield, Abinger and Thursley can be so described at the beginning of this period, little is known of the last two. Maresfield, however, purchased both pig iron and gunheads from Heathfield furnace so, from the point of view of the quality of the iron it converted, it cannot be said to have been any better off than those forges which were more closely linked to furnaces. In the case of Abinger and Thursley, it is not known from where they obtained their iron, but it is conceivable that Warren or Northpark were the source, as Thursley lies at too great a distance from any other furnace but Northpark, and Abinger was to be associated with both furnaces in later periods.

Of all the Wealden forges, Maresfield seems to have been operated on commercial lines to a greater extent than any other. It was directly associated with a retail outlet in Lewes. The tenants, from Richard Tidy through to Benjamin Molineux, supplied a shop, in Lewes High Street, with bar iron and edged tools. John Whitfield and Fawkenor Bristow, owner and sometime tenant, respectively, of Howbourne forge, were also Lewes merchants.[9] Abinger could also have been commercially orientated from 1751 when James Goodyer may have begun to occupy the works.[10] His family had an ironmongery business in Guildford which he presumably supplied from the forge. Apart from Maresfield and Abinger, the only forges for which there is evidence of retail outlets for their products, the market for Wealden bar iron lay mainly in the country smiths, as it had done since the decline in the London market at the end of the seventeenth century; bar iron, and other ironwork such as share moulds, being advertised for sale, to smiths, at some forges.[11] The Fullers operated a wholesale outlet to forgemasters and blacksmiths from their Iron House at Brightling, which seems to have been a clearing house for the products of Heathfield furnace, and 'The Ironhouse' at Robertsbridge is mentioned in a lease of 1737.[12] The

purchase of the lease of the forge and furnace at Robertsbridge in 1768, by James Bourne, William Polhill and David Guy, the last two being ironmongers, suggests that an attempt was being made to focus production at the works on a wholesale outlet, perhaps in Rye.[13]

Tomlinson has suggested that the concentration on gunfounding was at the expense of the home market, with local, domestic purchasers of bar iron neglected in favour of lucrative government contracts.[14] However, it could equally be argued that the growth in gunfounding in the Weald was a response to the declining market for bar iron because of foreign imports. Paradoxically the increase in the production of ordnance generated by the demands of the Seven Years' War stimulated the work of the Wealden forges, and it seems that the market for Wealden bar iron expanded in this period, despite the fact that Swedish iron imports were well established and American bar iron had been allowed into England since 1750. What may be regarded as a speculative venture, to take advantage of the increased output during the war, was the revival, in about 1756, of Howbourne Forge, Buxted, which had been idle since the mid-seventeenth century.[15] Although initially not associated with any particular furnace, it worked up iron purchased from Heathfield furnace, and was occupied later by William Clutton and subsequently by Edward Raby, both of whom occupied Gravetye furnace. Its apparent continuance after the demand for ordnance had subsided highlights a continuing local demand for bar iron, perhaps stimulated by increased mechanisation of agricultural methods in the Weald in the second half of the eighteenth century. This continuing demand is also illustrated by the fate of the forges occupied by Harrison and Co. The bankruptcy of Richard Tapsell in 1765 liberated the tenancy of four forges (Bivelham, Hawksden, Westfield and Glazier's). The correspondence which survives from the attempts of the Glynde estate to relet Hawksden forge offers

indicators of the problems facing the landlords of the others.[16] The prospective tenant, Samuel Baker, showed considerable concern for the viability of the forge both from the point of view of the markets for the iron, in view of growing American competition, and of the cost of wood. Apart from inquiring at Ashburnham furnace about supplies of pig iron, he had also written to an American ironmaster about the same. Of the three other forges, only with Westfield is it less clear how it was kept in work; the others being sustained with raw iron during the post-war years by Heathfield furnace, which also supplied them with hammers, anvils and other items of tackle.[17]

Details of production at Wealden forges in this period are very scarce. In correspondence prior to the leasing of Robertsbridge forge in 1754, its output was said to be about seventeen hundredweight of bar iron a week, although no hint is given of the market for it.[18] The only accounts available are those for Burwash forge which show an average annual profit over the twelve year period, 1757-69, of £122, although the average becomes a deficit of £12 if the aberrant periods of 1763-6 and 1764-? are omitted.[19] No output figures are available for the same period. What does seem evident is that the Fullers, who owned Burwash, did not expect to do any more than cover their costs and were regularly prepared to subsidise the running of the forge from the rest of their estate because of the benefit that the estate and its tenants would derive from it. So Burwash forge cannot be regarded as commercial in the sense that Maresfield can.

Gunfounding had brought considerable income to the Fullers, and by the end of the Seven Years' War, when contracts were no longer available, their Jamaica estates had recovered from the management problems they suffered in the 1720s and 30s. Thus, money from sugar was able to make a greater contribution to the family's income just at the time when iron was ceasing to do so. The Fullers, however, remained hopeful that government contracts would come

	Income	Expenditure	Surplus/*Deficit*
Nov 57 - Dec 59	1491 08 00	1719 15 00	*228 07 00*
May 59 - May 60	582 16 00	591 03 00	*8 07 00*
May 60 - Sep 62	731 18 00	753 12 00	*21 14 00*
Jun 61 - Dec 62	711 06 00	700 03 00	*11 03 00*
Jun 62 - Sep 64	600 07 00	613 07 00	*13 00 00*
May 63 - Aug 66	1089 09 00	92 16 00	996 13 00
Jun 64 - ?	542 12 00	08 00	542 04 00
Jun 65 - Feb 69	551 00 00	634 08 00	*83 08 00*
Jun 66 - May 69	990 02 00	1021 01 00	*30 19 00*
Jun 67 - May 69	613 11 00	673 15 00	*60 04 00*
Jun 68 - Aug 69	242 11 00	05 00	242 06 00
TOTAL	8147 00 00	6800 13 00	1346 07 00

Fig. 2 Burwash Forge: Income and Expenditure (£. s. d.) 1757-69

their way again, so Heathfield furnace was kept working intermittently, and Burwash forge was therefore kept in work.

The supply of charcoal was every bit as vital to a forge as it was to a furnace. Contrary to the view of Ashton, the records of Wealden ironworks which survived into the mid-eighteenth century show that sources of wood for charcoal remained within a convenient radius of the works, and there is no evidence to support his assertion that the Weald's specialisation in castings was mainly caused by a shortage of charcoal, thus inhibiting the operation of forges.[20] Most Wealden ironworks were leased by the owners of substantial estates. Thus it was in the interests of landowners, seeking a market for their timber and underwood, to ensure that the ironworks they leased were an integral, viable part of that marketing process. Many of those estates had been founded, in part at least, on the profits of ironworking in earlier centuries, so the estate infrastructure had been geared to servicing the needs of the iron industry. The

continuous operation, over more than a century, of many of the forges and furnaces which survived into the 1750s attests to the effectiveness of woodland management on the estates which supplied them. Sir Whistler Webster's steward referred to some 3,000 acres of the Battle Abbey estate woods which had always been used for charcoal for the two Robertsbridge works, implying that they could continue to be so used.[21] This figure falls somewhat short of Cleere and Crossley's estimate of 4,000 acres for a furnace and forge.[22] However, other woods were available to the occupiers, as in March 1763 when James Bourne, on behalf of John Churchill, paid Thomas Hussey for 195 cords of coppice wood.[23]. Nor were Harrison and Co. apparently experiencing any difficulty in obtaining raw materials. Cattell has shown that Hawksden forge was supplied by the regular rotation of nearby woods, and the lists of locations supplying Gloucester furnace with both wood and ore in the late 1740s reveal a similar hinterland.[24]

Correspondence relating to the attempts to find a lessee for Hawksden forge, following Tapsell's bankruptcy in 1765, concentrates on the problems faced by estates in finding markets for wood when ironworks closed.[25] Roger Challice, the incumbent at Mayfield, reported to the Bishop of Durham's steward that, without a tenant at the forge, he saw no better way of disposing of woodland, that was overdue for felling, than to sell to the other tenants of the manor, suggesting that, far from there being competition for the woods, landowners who wanted an income from their property depended on the demand the iron industry created. This state of affairs corresponds well with the experience of the ironworks in the East Midlands during the same period, and lends support to Hammersley's view that the price of wood was largely artificial and local in nature.[26]

The relative unimportance of forges, together with their, possibly, intermittent use, may have led to their neglect. In the 1765 correspondence about Hawksden forge, the state of the works, the structure, machinery and waterways, was described as in need of repair, some urgently. It may be that the neglect was, in part, due to the difficulties which had beset Richard Tapsell, the former tenant, prior to his bankruptcy. It also seems likely that tenants of forges had to take pains to ensure that, when they entered into a lease, a full set of tackle was included. Churchill made it clear that he expected Robertsbridge forge to be in a good state of repair when he took it over.[27]

Although several forges continued to be operated into the 1780s, their role became increasingly anachronistic. There is no evidence in the Weald of any of the developments which affected forges elsewhere in England, and especially in the West Midlands. Although a wire mill was established at Woodcock Hammer by 1787, the use of rolling or slitting mills is not recorded in the Weald during the second half of the eighteenth century. The Jukes brothers' conversion of the second finery at Robertsbridge forge into a reverberatory furnace can be related more to the casting of shot, but it is of some interest that John Churchill wished the second finery to be reinstated. In one instance at least, an ironfounder did without a forge altogether. Crowley and Co. employed their forge site at Ashburnham as a boring mill; ample boring capacity being a necessity at the larger furnaces. Only at the very end of the century was the forge there revived, surviving for a further thirty years, the last fifteen after the furnace had gone out of use.

Notes and References

1. Research for this article was undertaken with the assistance of a grant from the Tebbutt Research Fund.

2. H.Cleere and D.Crossley, *The iron industry of the Weald* (1985), 187.

3. *See* E.W.Hulme, 'Statistical history of the iron trade of England and Wales, 1717-1750', *Transactions of the Newcomen Society*, **9** (1928-9), 12-35; J.L.Parsons, 'The Sussex Ironworks', *Sussex Archæological Collections*, **32**

(1882), 19-32; P.Riden, 'The output of the British iron industry before 1870', *Economic History Review* (hereafter *EcHR*), 2nd ser., **30** (1977), 442-459; Cleere & Crossley, 187-91.
4. M.W.Flinn, *Men of Iron* (Edinburgh 1962), 107.
5. C.K.Hyde, *Technological change and the British iron industry, 1700-1870* (Princeton 1977), 10.
6. It is not clear whether Barden forge, which occupied the same site as the furnace, was operating in this period.
7. ESRO, ASH A192; although the lease was signed, it is unlikely that the forge was worked at this date.
8. *See* J.S.Hodgkinson, The iron industry in the Weald in the period of the Seven Years' War 1750-1770 (unpublished MA dissertation, CNAA/University of Brighton 1994), Appendix 1, for details of individual occupiers.
9. *Wealden Iron*, 2nd ser., **1** (1981), 15-6; **2** (1982), 32; C.Brent, *Georgian Lewes* (Lewes 1993), 41.
10. Surrey Record Office, PI/6/1-.
11. Cleere and Crossley, 192-3. For examples *see Wealden Iron*, 2nd ser., **1** (1981), 15.
12. *See* ESRO, RAF/F uncatalogued ledgers 1758-60 (the Fifth Ledger) and 1765-71 (the Sixth Ledger); C.Whittick, 'Wealden iron in California,' *Wealden Iron*, 2nd ser., **12** (1992), 52
13. Whittick, 48-9.
14. H.C.Tomlinson, 'Wealden gunfounding: an analysis of its demise in the eighteenth century,' *EcHR*, 2nd ser., **29** (1976), 393.
15. P.Combes, 'The eighteenth century revival of Howbourne Forge, Buxted,' *Wealden Iron*, 2nd ser., **7** (1987), 16-19.
16. ESRO, GLY 2770-1.
17. *See* Centre for Kentish Studies (hereafter CKS), U274 T54; Westfield was later in the occupation of John Standen, then of Henry Bourne, both probably scions of ironworking families, and suggesting a later association with Robertsbridge furnace.
18. Whittick, 58-9.
19. ESRO, RAF uncatalogued ledgers 1758-60 & 1765-71 (the Fifth & Sixth Ledgers; *see* R.V.Saville, 'Income and production at Heathfield Ironworks 1693-1788,' *Wealden Iron*, 2nd ser., **2** (1982), 53-4).
20. T.S.Ashton, *Iron & steel in the Industrial Revolution* (3rd ed. Manchester 1963), 15.

21. Whittick, 57.
22. Cleere and Crossley, 135.
23. CKS, U1776.E19A.
24. C.S.Cattell, The historical geography of the Wealden iron industry (unpublished M.A. diss. University of London 1973), 143-5; Guildhall Library, Ms.3736/4.
25. ESRO, GLY 2770.
26. P.Riden, 'The Charcoal Iron Industry in the East Midlands, 1580-1780,' *Derbyshire Archaeological Journal*, **111** (1991), 64-84; G.Hammersley, 'The charcoal iron industry and its fuel, 1540-1750', *EcHR*, 2nd ser., **24** (1973), 608-10.
27. Whittick, 60.

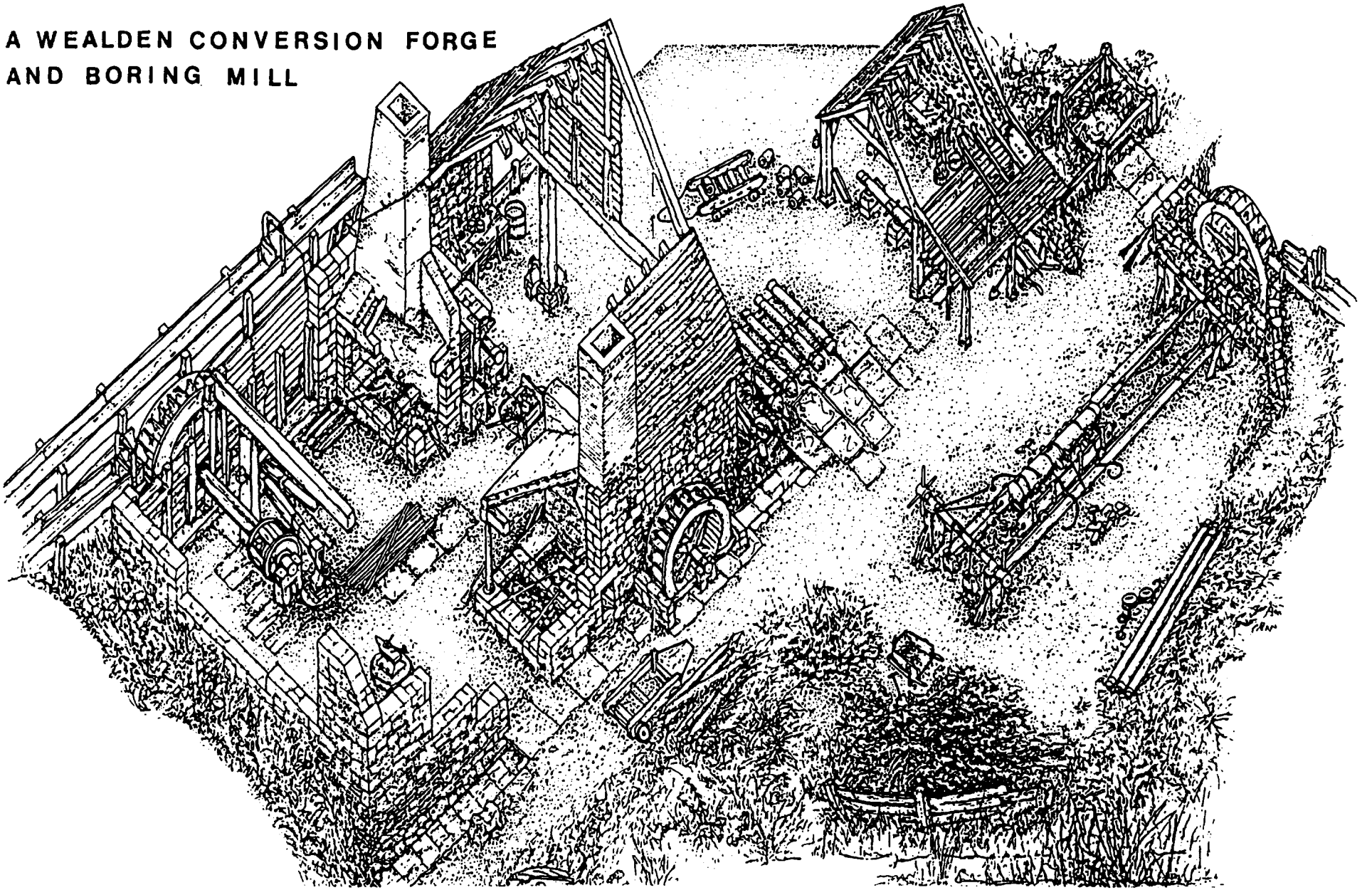
A RECONSTRUCTION OF A WEALDEN CONVERSION FORGE AND BORING MILL

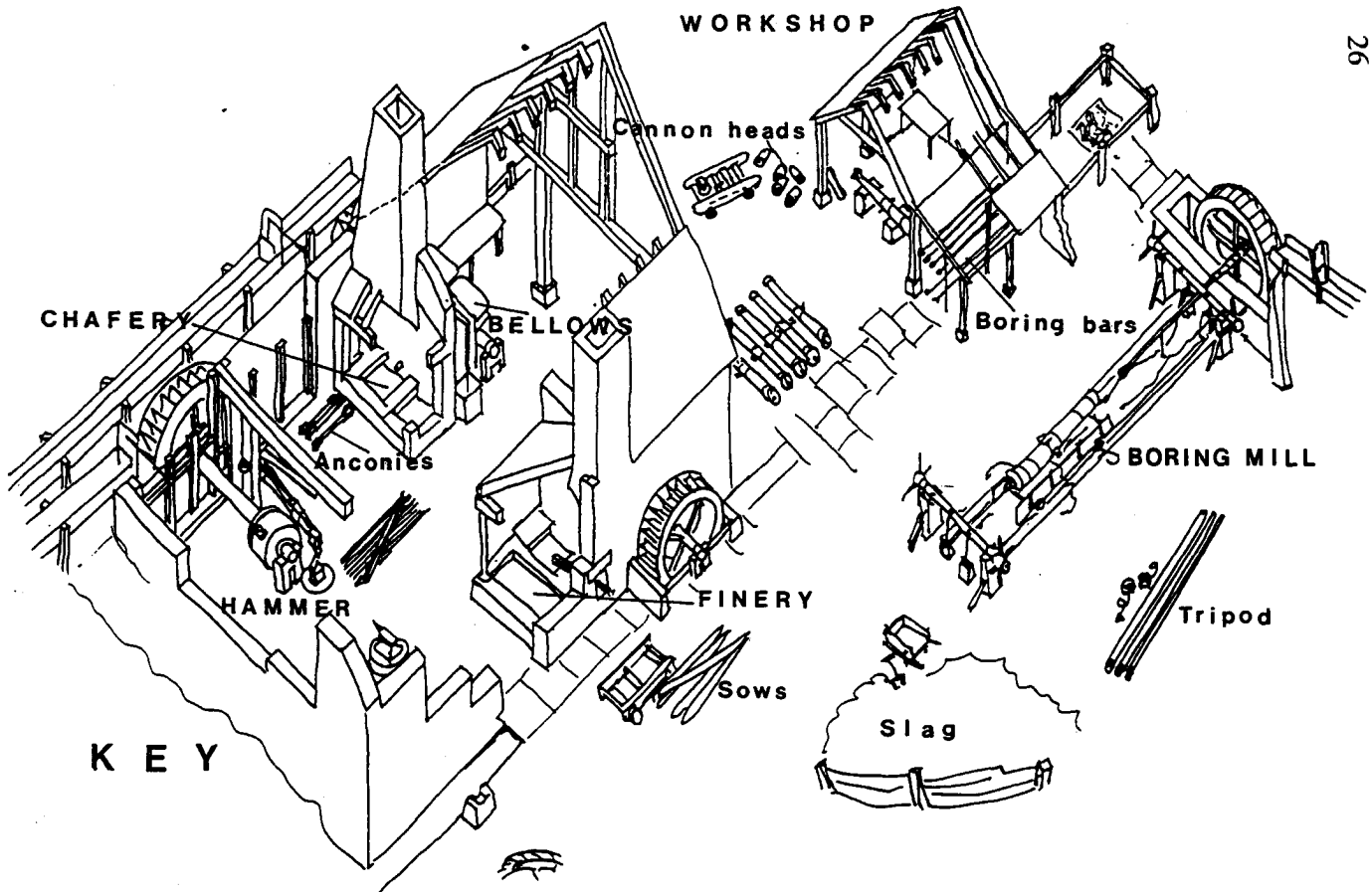
R. G. HOUGHTON

To many people, mention of the Wealden iron industry conjures up a picture of a blast furnace by its pond, busily casting the cannon which, according to Kipling, 'smote King Philip's fleet'. However, there were two stages in the production of iron. The first, at the furnace, was production of pig iron and castings such as cannon and firebacks. The second was less well publicised but was no less important. At the conversion forge, sows or pigs of cast iron were decarburized and hammered, to produce malleable wrought iron for the blacksmith. Some time ago, I produced a cut-away drawing of a furnace.[1] Since then it has several times been suggested that a companion drawing of the forge would complete the picture. In many ways it has proved more difficult than the first.

The drawing is set out in axonometric projection with sides at 45° to the horizontal and the original was drawn to a scale of ¼" :

A WEALDEN CONVERSION FORGE AND BORING MILL




WORKSHOP
Cannon heads
CHAFERY
BELLOWS
Boring bars
Anconies
BORING MILL
HAMMER
FINERY
Tripod
Sows
Slag
K E Y

1 ft. (approx. 1:50). It is envisaged that the forge is being used in conjunction with an adjacent cannon-casting furnace from which sows are obtained for conversion, while waste iron heads sawn from the cannon are put through the same process. The cannon are then finished in the adjacent boring mill.

Each unit is generally based on original evidence from excavation, illustration or documents, but is not meant to represent any specific site.

THE FORGE

A basic conversion forge layout consists of water powered finery and chafery hearths and a hammer set on a stout timber foundation. To date, only three forges have been excavated in the Weald, out of a total of 92 known sites.

1. Ardingly (Fig. 1)

The excavation in 1975 revealed that very little of the forge survived beneath the later fulling mill.[2] It was first recorded in 1571, is included in the list of 1664 but not that in 1717.

Both north and south water channels were found, together with the remains of the anvil foundation. This consisted of a hollow iron cylinder set on top of a tree trunk buried in the ground and held in position by a triangle of timber beams.

The site is now beneath Ardingly Reservoir.

2. Blackwater Green (Fig. 2)

On excavation in 1988, few structured features were found.[3] It appears that everything, including buildings, was removed when operations ceased. Much damage was caused when the stream

diverted across the site and the area was used as a ford. The site is mentioned in the 1574 list, but there is little documentary evidence, and it may have been very sort lived.

Timber water channels were found, although the hammer wheelpit appears to have eroded away. The anvil base remained, and consisted of ~~two~~ two large timbers set flat in the ground in the form of a cross.

The site is now covered by a large housing estate.

3. Chingley (Fig. 3)

The furnace and forge at Chingley in the Bewl Valley were excavated in 1969-72, and from this and documentary evidence, three periods of operation were defined at the forge site: c.1300-1350, c.1580-1640, c.1670-1720.[4]

The excavation plans show all the major components of the conversion forge, together with wall foundations and evidence for a pitched roof. In this case the last anvil foundation was formed by a 7 ft. (2.13m) -long oak trunk set deep in the ground and strutted and wedged to the pit sides. The hammer was driven by a breast shot wheel, whose curved wheel-pit base survived.

The forge and furnace sites now lie beneath the Bewl Reservoir.

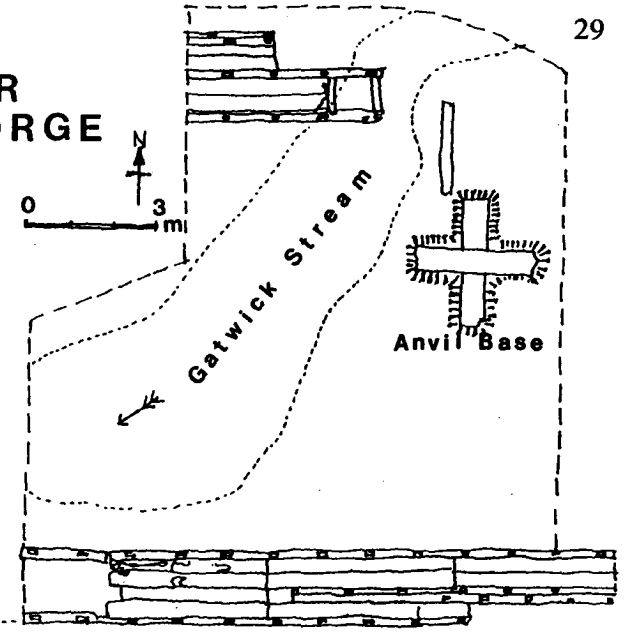
The excavation plan of the last period at the forge was taken as the basis for its possible appearance around 1700. In Fig. 3 the reconstruction is shown dotted and superimposed over the excavation plan.

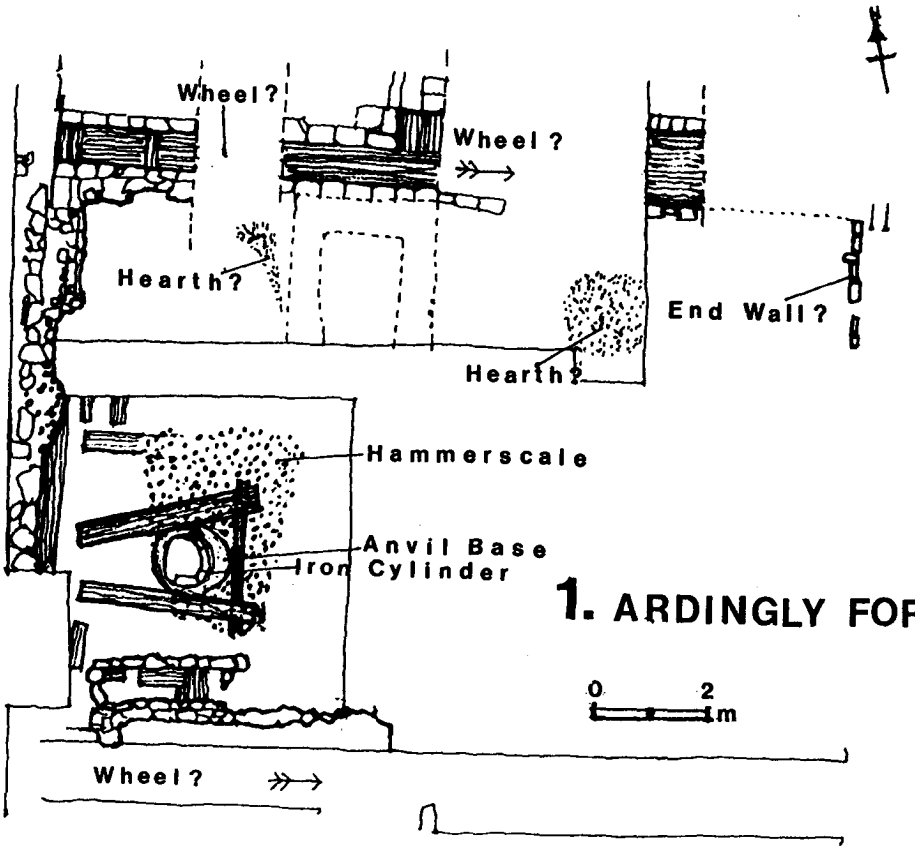
(a) The Building

It is assumed that the roof covered the area between the water channels, and from the bay in the south to an open end represented by post holes in the north. This gives and overall size of 30 by 38 ft.

BLACKWATER GREEN FORGE

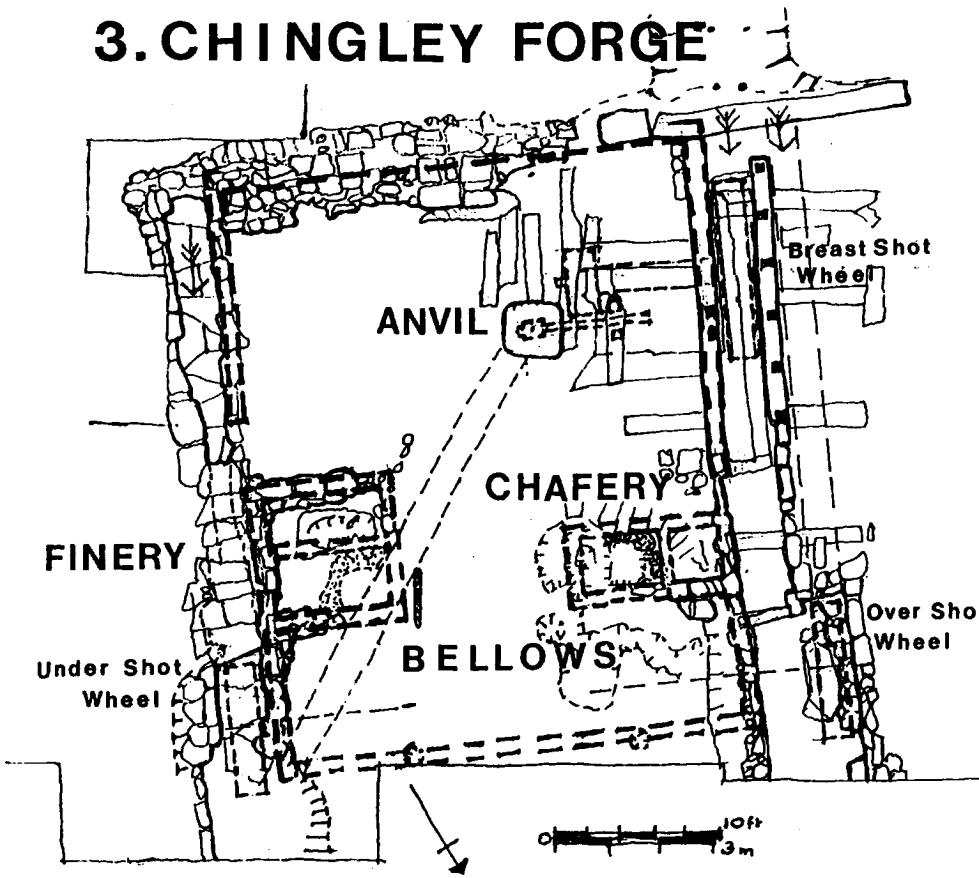
2.

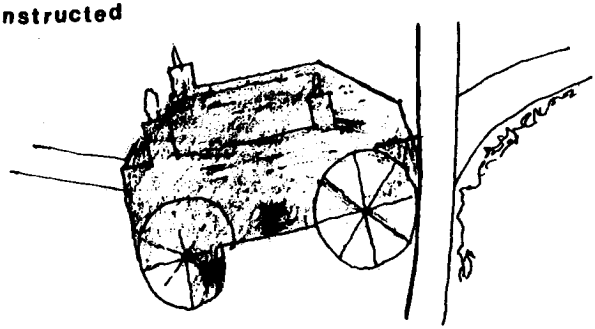




1. ARDINGLY FORGE

3. CHINGLEY FORGE





4. LANGLES FORGE

(9 by 11.58m).[5] A little artistic licence has been taken in extending the building slightly in order to mask the ends of the finery and chafery wheels which, when fitted into their respective pits were found to project beyond the end wall.

The stone walls have been shown as 15" (400mm) in thickness, that at the south end acting as a retaining wall to the base of the bay. There is evidence of considerable repair and rebuilding to the wall of the finery and also to the S.E. corner where an earlier wheel had been removed. The old axle bearing to this is shown *in situ* with part of a wheel which was found on site lying close by. The length of timber framed wall on the west side is probably the remains of an earlier structure. On the opposite side, the wall between the finery and the bay has been reconstructed in stone, although it could possibly, originally have been of timber. An opening has been shown close to the finery. It seems probable that, with iron being fed into the hearth from outside via a small opening, rapid communication between both sides would have been desirable.

Apart from one timber brace there is no evidence for the type of roof structure and it is presumed to have been constructed in the typical style of trusses, purlins and rafters finished with tiles. One contemporary illustration of a forge is a very simple line drawing of an elevation (Fig. 4) on a map dated 1653 showing Langles Forge.[6] It is very small but appears to show a hipped roofed building with three chimneys. From this it would appear that its equipment consisted of a hammer, two fineries and one chafery, with two more water wheels on the far side of the building.

(b) The Hearths

The finery and chafery hearths are based on the reconstructions by H. R. Schubert, adapted to suit the excavation plan.[7] On the site there appears to be a cinder pit immediately adjacent to each hearth.

At the finery this pit certainly lies within the surrounding wall and in this reconstruction it has been shown as an integral part of the structure of both hearths.

Their appearance is in general agreement with those shown in a painting of a Swedish forge which gives a good overall picture of these features, as do the illustrations in an early French encyclopædia, which has several drawings showing the conversion process.[8] This last forge is rather sophisticated and on a very grand scale. It probably shows 'state of the art' rather than one particular site. Unfortunately both these examples are from the 18th century, but the basic design was undoubtedly used earlier.

In the drawing, the canopies over the hearths are formed of timber finished with clay or plaster on laths, with the chimneys in stonework supported and cantilevered from the lower walls.

The chafery wheel, part of which was found on excavation, was overshot and mounted in a pit offset from the hammer wheel tailrace. It was 8 ft. (2.5m) in diameter, about 2 ft. (600mm) wide and was fed at a high level from a timber trough. No remains were found of the undershot finery wheel and this was taken to be similar to that of the chafery.

Local controls of water supply to both the hammer and chafery wheels are illustrated in the form of chain operated slats raised and lowered into the timber chutes. It is assumed that these would be used in conjunction with the sluice gates in the bay to avoid overflows. There is no sign of any local control to the undershot finery wheel nor any 'by-pass' channel. Either orders were shouted up to the bay sluice, or possibly some method existed of disengaging the bellows from the cam shaft.

On being removed from the finery the bloom was consolidated by being beaten on the iron plates set in the floor between the hearths. This process was known as 'shingling the loop'. The bloom was then reheated in the finery and passed to the hammer where the bloom was alternately hammered and reheated to drive out the slag,

working from the middle outwards to form the dumb-bell shaped 'anconies' shown next to the chafery hearth. Finally, using the chafery hearth for reheating, the anconies were hammered out into the wrought iron bars shown by the anvil.

(c) The Hammer/Anvil

The basic features can be seen in the painting and encyclopædia illustrations referred to earlier, but the best known English depiction is probably the painting by Joseph Wright, ARA, of 'An Iron Forge 1772'. The illustration shown (Fig. 5) was based on a combination of this picture and a written description dated 1831 of a similar forge, and has been used as the basis of other drawings since.[9] Details for this reconstruction were taken from the following sources:

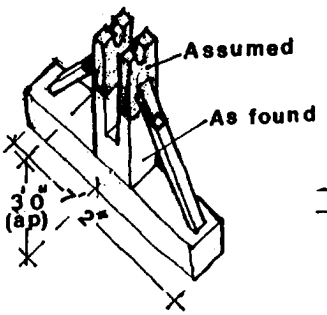
From the excavation report and drawings,

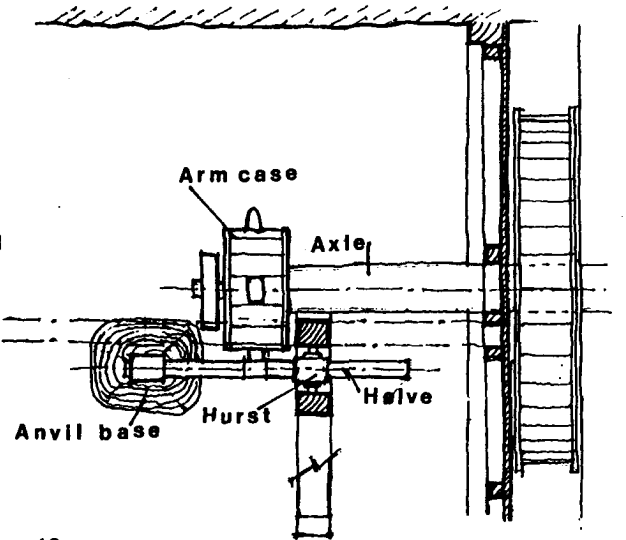
1. Position of anvil base.
2. Approx. position of the breast-shot wheel and its deduced diameter of 11' 4" (3.45m).
3. The level of the Period III floor taken as the top of the anvil base from Section A-B.
4. Possible timber base plate for A frame fulcrum on Section A-B about 3' west of anvil base.
5. The hammer shaft or helve about 9' (2.743m) long with circumference of 30"-40" (762mm - 1.1m).
6. The cam shaft or arm case about 4' (1.2m) diam. For the purposes of this drawing the diameter of the axle is taken a 1' 6" (457mm).

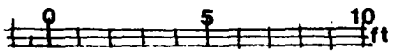
From the Anne of Cleves Museum, Lewes,

7. The size of the hammer and anvil (Fig. 6). From the size of the hammer slot the helve would be 6" wide by 1' 2" deep (150mm x 356mm), giving a circumference of 40" (1.1m).

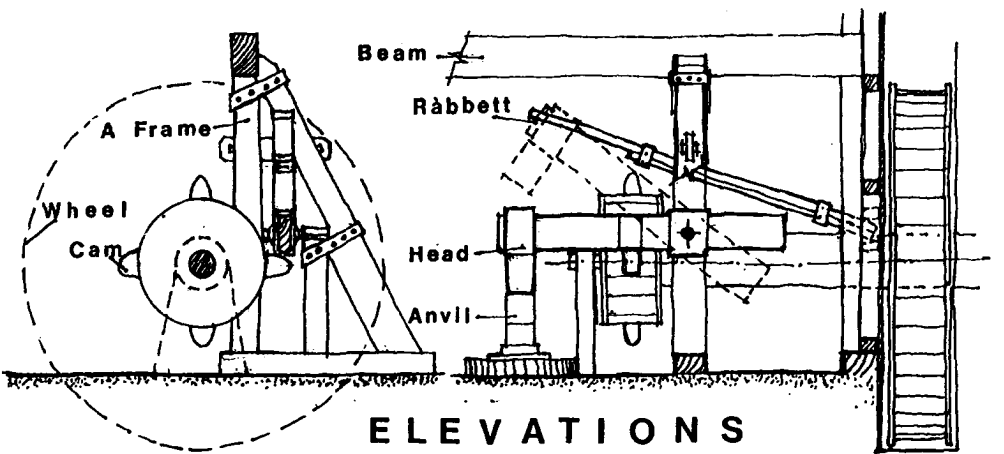
8. FULCRUM





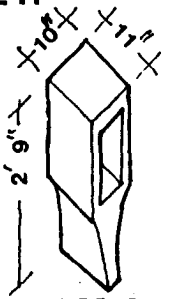


PLAN



ELEVATIONS

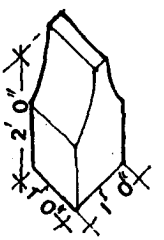
7. HAMMER

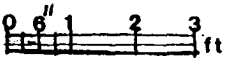


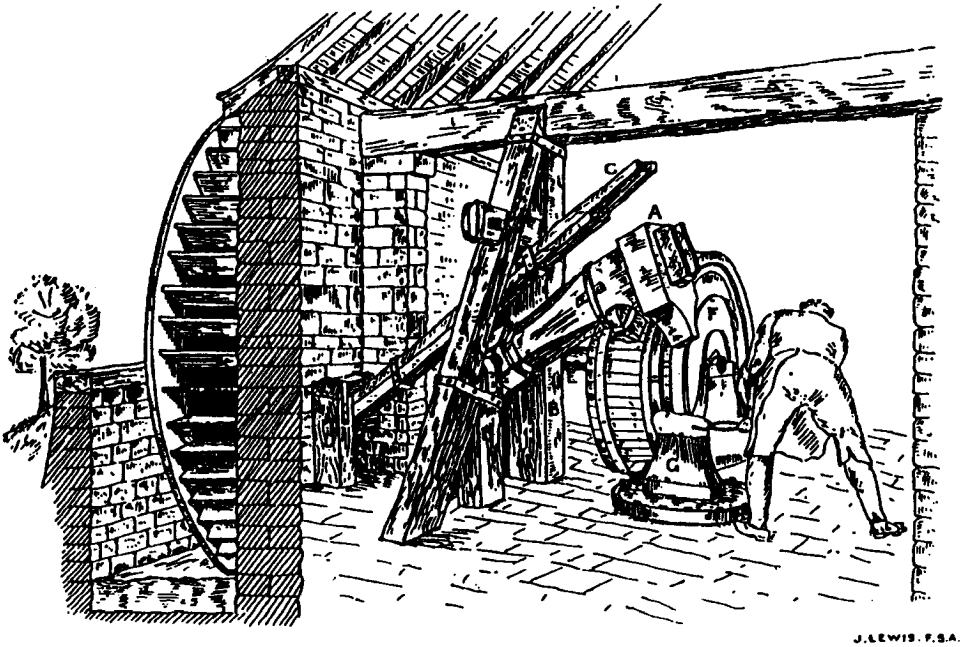
6.

HAMMERHEAD

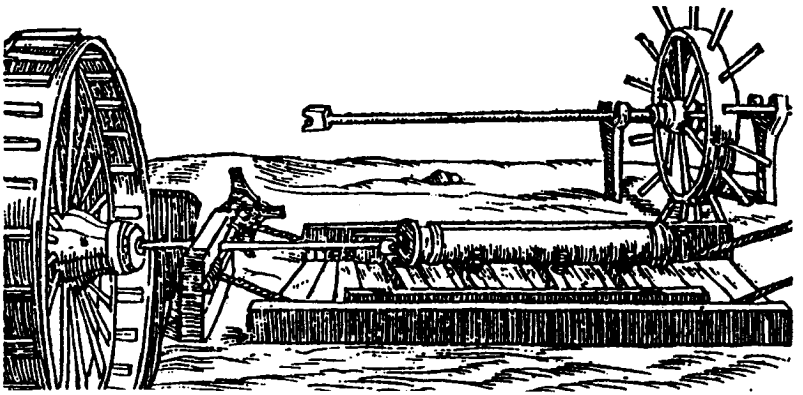
ANVIL







5. AN IRON FORGE; 1773



9. A BORING MILL; 1540

The illustration (Fig. 7) is an attempt to assemble all these items, so as to represent a working hammer within the parameters of the excavation. It forms the basis of the axonometric drawing.

The anvil is positioned centrally on its foundation with the hammer set immediately above it and the helve set at right angles to the sluice. Allowing for the base to finish 6" (150mm) above the floor, the height of the helve will be 3' 10½" (1.19m). With the helve resting immediately on a 9" (225mm) deep cam, the centre line of the wheel axle will be 3' 6"" (1.06m) above the floor. From this, allowing 2" (50mm) clearance below the wheel, the depth of the channel below floor level is 2' 4" (711mm), which is in reasonable agreement with the 2' 6" (762mm) measured on Section A-B.

On plan, the minimum distance between helve and axle is 1' 3" (381mm), that is with the arm case set directly against the helve. This seems rather too narrow to accommodate the A-frame post and the iron collar or hurst to the helve pivot. In order to improve the clearance it is necessary to move the arm case away from the helve. Ideally this distance should be kept to a minimum since, as it increases, so does the loading on the cam. A distance of 3" (75mm) would probably be sufficient, given a clearance of 1' 6" (450mm). This gives a distance of 8' 6" (2.6m) from centre of helve to edge of wheel, which comes very close to the wheel breast on the excavation plan.

The A-frame fulcrum probably developed from a simpler earlier type similar to that shown in Fig. 8, the base of which was found in an earlier level at Chingley. To resist the greater shock action induced by larger hammers, larger timbers were taken up and braced against an overhead beam which, running at right angles to the frame, ensured the stability of the head. Some illustrations show this member passing right across the building, while others show it supported by a central post or even as part of a free standing unit with posts at each end. In our case, there is no sign of any

intermediate support. The timber slotted horizontally through the frame members appears to act as a tie, which in the event of the timbers working loose under vibration, could be tightened by hammering home the securing wedges at each end.[10]

The power of the falling hammer is reinforced by the reaction of the timber spring of rabbet set above the helve, which is forced upwards by the rising hammer, and springs downwards when released. It is secured to the rear wall and also where it passes through the frame.

The construction of the arm case is not clear, either from illustrations or from a description which says that it is 'a ponderous cast iron circular frame with holes cast for the insertion of wooden blocks shod in cast iron'.[11] Diameter is given but no width. In our case it has been fitted in between frame and anvil, allowing for the axle to avoid the anvil base, which gives a width of about 2' (600mm). In the Wright painting it would appear that if the arm case continued to revolve the arm would jam in the angle between helve and hammer. In the Ashburnham accounts reference is made to the casting of mill cases.[12] These were probably the containers which held the grindstones in a corn mill and may have been similar in form to arm cases.

It seems possible that hammer blows could have a 'rebound' effect on an unrestrained anvil, slowly moving it from position especially if, as in this case, the striking surfaces are narrow. To prevent this, a cast iron frame has been fitted round the foot of the anvil and fixed down to the base. The hollow iron cylinder found on the anvil base at Ardingly could perhaps have been for this purpose.

The Boring Mill

The boring mill was used to drill out the bore of a cannon cast solid and ream out that of one cast hollow. It consisted of a carriage or trolley to which the cannon was securely fixed with chains or ropes,

and which was pulled up a track on to a revolving bar fitted into a water wheel.

The track as reconstructed is based on that found at Pippingford East furnace.[13] It consisted of slots about 8" (200mm) deep and 3' (914mm) apart, containing the rotted remains of oak timbers. On the track were three cast iron wheels 9" (225mm) in diameter. There were no flanges to the wheels so it was assumed that a simple rebate along the track was a sufficient guide. If the wheels retained their original positions the distance between the axles of 7' 6" (2.286m) would suggest a trolley of about 10' 6" (3.2m) long by 3' (914mm) wide. For obvious reasons the length of the track would be at least twice the length of the longest cannon involved.

Fig. 9, from Biringuccio, shows a general layout.[14] The trolley is set low for ease of loading, and the windlass is raised to about waist height to facilitate handling. As shown, with the pull ropes taken direct from the trolley up to the windlass, with the increasing angle as the distance shortens it should become increasingly hard to pull. There would be a tendency for the front of the trolley to lift, which could affect the accuracy of the bore.[15] To overcome this possibility, pulleys have been fixed below the windlass to ensure that the forces acting on the trolley are horizontal, along the full length of the track.

On later consideration, a simpler method would be to lower the windlass to the level of the trolley and to operate it by means of long removable bars, worked lever fashion from above. In either case pawls and ratchets would need to be fitted to stop slipping, and to maintain a steady pressure on the boring bar.

The boring bar is based on the example found at Stream furnace site, and now in the Anne of Cleves Museum.[16] It measures 11' (3.53m) long and, when fitted to the wheel, would cantilever for at least 9' (2.75m). The free end would certainly drop, leading to difficulties in alignment. Possibly temporary props or steadies were

used, set in the ground and moved as the cannon was drawn forward.

A building such as that shown at the top of the drawing would probably have been found at most working sites, in use as a workshop, store or general purpose shed. Here it serves as a shelter for the lengthy job of sawing the heads from cannon. Boring bars were required in different lengths and diameters. In this case, to avoid damage, they are stored in racks beneath the lean-to.

It was not unusual for the various races to be culverted beneath a working site, and the remains of possible access manholes have been found.[17] In this an access has been shown at the junction of the finery and boring mill races, an old defective fireback being used as a cover.

Notes and References

1. *WIRG Bulletin*, 2nd ser., **11** (1991), 18.
2. Owen Bedwin, 'The Excavation of Ardingly Mill and Forge 1975-76', *Post Med. Arch.*, **10** (1976), 34-64.
3. Christopher Place and Owen Bedwin, 'The 16th century Forge at Blackwater Green, Worth, West Sussex', *Sussex Arch. Collections*, **130** (1992), 10-11.
4. David Crossley, *The Bewl Valley Ironworks* (Royal Archæological Institute 1975).
5. The width between water channels at Ardingly and Blackwater is 9m and 10m respectively. The length of the Ardingly building would be about 13m if the few stones at its N.E. end represent a return wall. At Blackwater no evidence remains on which to assess the length.
6. East Sussex Record Office (hereafter ESRO), SAS/AB17A. The original is extremely small and the illustration was sketched from the projection of a slide kindly loaned by Jeremy Hodgkinson.
7. H. R. Schubert, *History of the British Iron and Steel Industry* (1957), Appendix XV, 421-2.
8. *Ibid.* Plate XXIV, 270: Interior of the Walloon Forge at Forsmark, Sweden, in 1793. Diderot et D'Alembert, *L'Encyclopédie, Forges ou L'Art du Fer*, 1763 (repub. 1988), 4th sect., plates IV, V, VI and VII.
9. C. Dawson, 'Sussex Ironwork and Pottery', *Sussex Arch. Collections*, **46** (1903), 1-32. The forge painting is also illustrated in E. Straker, *Wealden Iron*

(1931), 84. The drawing is by John Lewis, CE, FSA, while the description is from Dr Lardner's *Cabinet Cyclopedia*: *Manufactures in Metal* (1831).
10. The tusk tenon joints used at the timber frame junctions of the blast furnace tower are very similar and used for similar purposes.
11. This quotation is taken from Dr Lardner's *Cabinet Cyclopedia*; see note 10 above.
12. ESRO, ASH/1815.
13. D. W. Crossley, 'Cannon Manufacture at Pippingford, Sussex. The Excavation of Two Iron Furnaces c.1717', *Post Med. Arch.*, **9** (1975), 1-37.
14. V. Biringuccio, *The Pirotechnia* (repub. 1966), Ch. 8, 309-310.
15. From the Parallelogram of Forces, the force in the rope consists of two components, the vertical and the horizontal. As the angle of the rope increases, the upward forces increases while the horizontal force decreases.
16. D. S. Butler and C. F. Tebbutt, 'A Wealden Cannon-Boring Bar', *Post Med. Arch.*, **9** (1975), 38-41.
17. J. S. Hodgkinson and R. G. Houghton, 'Warren Furnace, Worth, Sussex', *Wealden Iron*, 2nd ser., **12** (1992), 19.

BURGH WOOD FORGE, ETCHINGHAM

ANNE DALTON

R. F. Hunnisett, in his introduction to *Sussex Coroners' Inquests 1485-1558*, refers to the fact that there were several inquests involving aliens, French, Brabantines and Flemings, who were often found to have killed their fellow countrymen.[1] One such case, in 1521,[2] concerned John Ongerfeld of Etchingham, 'hammersmyth', who has been mentioned already by Awty,[3] and Cleere and Crossley,[4] as indicating an early start to iron forges in the Etchingham area. For those who do not know Hunnisett's book, here is the inquest:

52 13 Jan. 1521. Ticehurst. Nicholas Tufton, Hastings rape coroner. Jurors: William Jurden, Thomas Stephyn, John Hunte, Simon Yong, Thomas Randolff, William Morebrede, James Fowle, Henry Page, Thomas Graylyng, Thomas Stonden, John Gaston [*or* Gascon], John Gylbert. About 3 p.m. on 13 Jan., when John Ongerfeld of Etchingham, 'hamersmyth', was at Ticehurst, Peter Ferrour, 'Frensshеman', of Etchingham, 'laborer', came and assaulted him in the house of Thomas Lambard, 'taylour', with 'a dager', wishing to beat and wound him. Ongerfeld fled from Lambard's house to that of John Fowell in Ticehurst, with Ferrour pursuing and assaulting him. Ongerfeld fled from him to a wall in Fowell's house, beyond which he could not escape. Ferrour furiously pursued him to the wall and Ongerfeld, seeing that he could not otherwise escape with his life, struck him in the chest with a knife worth 2d. which he held in his right hand, from which blow Ferrour immediately died. Thus Ongerfeld murdered him in self defence and not maliciously. He then possessed a coat, a small coat, a shirt, a cap and a pair of hose worth 6s. which came to the hands of Thomas Randolff, 5s. in coin and 'a dublett' worth 12d. which came to the hands of John Fowle, and 'brasse', 'pewter' and a utensil worth 6s. 8d. which came to the hands of Thomas Brecher, by what right or warrant the jurors do not know. KB9/486, m.60.
[Delivered to Lewes gaol delivery on 18 July and on to King's Bench in Michaelmas 1521. Ongerfeld was outlawed at Lewes on 3 Sept. 1523. Randolff, Fowle and Brecher were summoned to King's Bench to answer for the 18s. 8d.; they later fined for that sum which was paid to the coroner of King's Bench. Lord Hastings was summoned to King's Bench to show by what warrant he had a coroner in the rape; for further developments see **56** KB29/153, m.16].

I was struck by the fact that a member of the jury, Thomas Randolff, was unable to explain at the inquest, presumably held on the night of 13 January, why he had some of Ongerfeld's clothes and how he, Fowle and Brecher had acquired the possessions and the money. Were Ongerfeld's possessions already in Fowle's house? Was any of these three men Ongerfeld' employer in a forge at Etchingham, where Ferrour also worked? Perhaps research into wills and Inquisitions Post Mortem might throw some light on ironworks in Etchingham in the early sixteenth century.

Research in the East Sussex Record Office produced the Will of 'John Fowle of Kechyngham in the parish of Echyngham', made on 3 April 1542, in which he gave his third daughter, Mildred, his iron mill as well as half his farm land of Kechyngham [the modern name is Kitchingham (TQ 707 279)].[5] Kechyngham belonged to Bayham Abbey and, following its dissolution by Cardinal Wolsey, was given by him to what was to become Christ Church, Oxford. The bailiffs' accounts for 1526-27 state 'John Fowle farmer -£5 6. 8. Rents resolute of 2s. to Manor of Etchingham, 1 lb. cummin to Shoyswell, 21d. to prior of Combwell and 18d. to him for castle ward'.[6] There is no mention of an iron mill nor is there in the documents in which his name appears in 1522, 1531 and 1534, all of which deal with land belonging to members of his family near his farm.[7] Those named in the documents include William Wybarne, the tenant of Bayham Abbey forge, Thomas Randolf and his son, John, Thomas Brechar, step-son of John Fowle's brother, Thomas, and William Morbrede of the jury of 1521. At some point after 1727 the land became Crown property.

As noted above, John Fowle made his Will on 3 April 1542. He had five daughters: Alice, aged 26 and married, was to receive £20, 2 oxen and 2 steers; Marion, aged 22 and married to Goddard Bachelar, Fowle's executor, was to receive his house and barn and all the land lying to the east of the 'laneway' leading from Kitchingham to and over the bridge over the River Limden except

for 'one medowe, the whiche lieth frome the aforenamed brege and lane waye downe by the ryver syde, the whiche medowe I wyll and gyve to my doughter Myldred with a mylhouse'; Mildred, aged 17, was also to have all the land to the west of the 'laneway', while the two youngest girls, aged 13 and 8, were to have named properties in Ticehurst and Hawkhurst. Should Mildred die without lawful issue her share was to be divided between the two youngest girls and, should Goddard Bachelar buy the land, the money raised was to go to them.

The Tithe award map of Kitchingham Farm of 1839 shows a bay (TQ 717 276) in the field called 'Forge Brook' on the right bank of the Limden.[8] A field called 'Forge Field' is on the opposite, left, bank where the river changes from running west to east to run south to join the Rother. Straker connected these fields, where the streams from Pashley join the Limden, with a forge connected with Pashley furnace.[9] The bay was identified as that of a forge by C. F. Tebbutt in 1978 and was called Burgh Wood Forge.[10]

According to the Inquisition Post Mortem held at Battle on 8 November 1543, Fowle died on 12 February 1542/3, holding Kechyngham of the King in socage, the value of his land and half an iron mill above the reprises being £6 8. 4.[11] It would seem that Fowle acquired a partner for the management of the forge before he died. One possibility is that this was Robert Tyrwhitt who, according to the I.P.M., was the owner of the 'acre of meadow', called 'Borghamdowne mead', on which stood the forge and for which field Fowle paid a rent of 6d. Tyrwhitt had become Lord of the Manor, through his wife, Elizabeth, who inherited the manor in 1540, when she was eleven years old, from her father, Thomas Oxenbridge.[12] Another possibility is that Fowle's partner was Thomas May of Pashley, his immediate neighbour to the west of Kitchingham, who acquired Pashley furnace with the manor of Pashley in 1543.[13] In the absence of the Subsidy Roll for Shoyswell, and before the name of Fowle turned up as a possible employer of

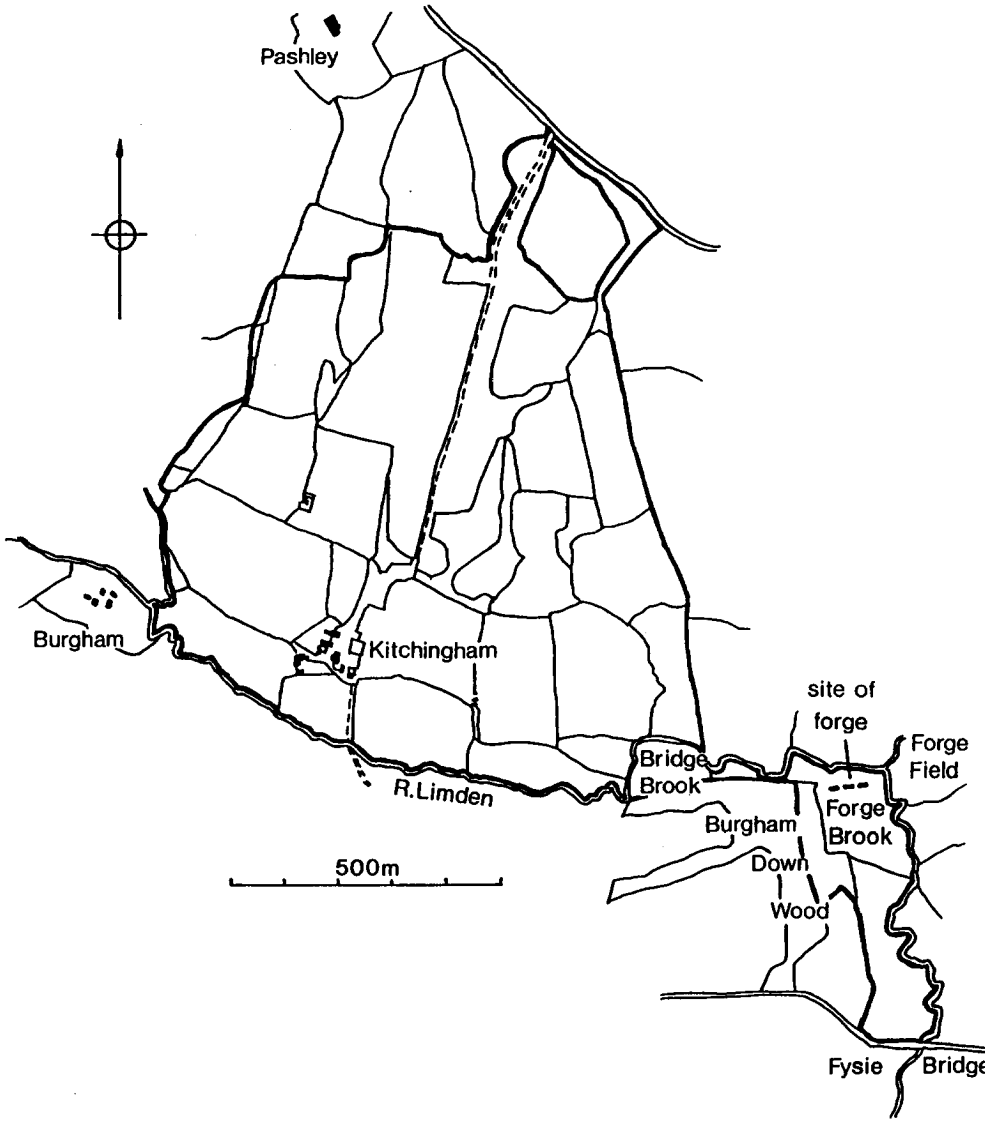


Fig. 1 Kitchingham Farm and Burgh Wood Forge
(based on 1839 Tithe and 1870 OS 6" maps)

aliens in the area, Brian Awty had connected Burgh Wood forge with May and Pashley furnace.[14] The studies by Sylvanus Vivian of the 1597 survey of the Manor of Etchingham cum Salehurst show that in 1597 Thomas May of Pashley and William Hicks (through his wife, John Fowle's grand-daughter), held Kitchingham and Burghamdown mead, which, in a survey held in the first year of Edward VI's reign, had been held by Goddard Bachelar, Fowle's son-in-law.[15] Vivian's article shows how both parts of John Fowle's estate ended up in the possession of the May family.

There is no evidence that John Fowle had a forge in 1521 but there is firm evidence, in 1542, for what is now called Burgh Wood forge. Fowle was probably not Ongerfeld's employer, but knew him well enough for Ongerfeld to try to take shelter in his house and for Fowle to be prepared to be involved in the division of Ongerfeld's property. Fowle's partner could have been either Thomas May or Robert Tyrwhitt. The latter, by a Chancery Decree of c.1545, had been awarded Etchingham forge and Darvel furnace, formerly rented from Thomas Oxenbridge by Thomas and Joan Welshe.[16] Oxenbridge had died in March 1540 and Welshe a month earlier. Joan was to receive from Tyrwhitt an annuity of £24 for thirteen years.

I am most grateful to Christopher Whittick, Jane Cox and Duncan Harrington for their help during my research on John Fowle, and to Jeremy Hodgkinson for his advice on previous drafts of this article and for the map.

Notes and References

1. R. F. Hunnisett, *Sussex Coroners' Inquests 1485-1558*, Sussex Record Society, **74** (1984/5), xxxviii.
2. Ibid, 13. I am grateful for his permission to quote the inquest in full.
3. B. G. Awty, 'Aliens in the ironworking areas of the Weald: the Subsidy Rolls, 1524-1603', *Wealden Iron*, 2nd ser., 4 (1984), 23.
4. H. Cleere and D. Crossley, *The iron industry of the Weald* (2nd ed. 1995), 330.
5. East Sussex Record Office (hereafter ESRO), A1 p.197.

6. ESRO, AMS 5864 (copy of Christ Church, Oxford, archives D.44 f. 216).
7. ESRO, DUN 20/14, 20/15, 20/16.
8. ESRO, TD/E 127.
9. E. Straker, *Wealden Iron* (1931), 299.
10. C. F. Tebbutt, 'Etchingham: Burgh Wood Forge', *Wealden Iron*, **14** (1978), 5.
11. Public Record Office (hereafter PRO), E150/1090/44.
12. ESRO, AMS 6437.
13. Cleere and Crossley, 122.
14. Awty, 24.
15. Sylvanus Vivian (ed.), *The manor of Etchingham cum Salehurst*, Sussex Record Society **53** (1953), 193-7.
16. PRO, C78/1 no. 57.

THE SUPPLY OF RAW MATERIALS TO THE HEATHFIELD IRONWORKS

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The editors of the Fuller correspondence expressed surprise at letters which seemed to suggest that charcoal was carried to the family's furnace at Heathfield from Newick, a distance of approximately ten miles.[1]

It can however be demonstrated that the Newick to which the letters refer is not the parish north of Lewes but Newick Farm in Heathfield, a little over two miles north of the furnace.

The Fullers bought both wood and mine from Elizabeth Savage and her son, Richard, between at least 1723 and 1748. In 1729 the tenant of Mrs Savage's farm was named Beard. The editors correctly identified Elizabeth as the wife of John Savage of Boughton Monchelsea in Kent, and her son as Richard Savage who

married Margaret, daughter of Francis Gouldstone of Widdiale Hall in Hertfordshire. The wood was said either to be *at Newick* or *at Newick Wood*. Such is the evidence of the letters.[2]

Newick Farm in Heathfield was bought by Francis Newberry, the owner of the Heathfield Park estate, in 1803 and an abstract of its title is among the archive of the Lewes solicitors who acted for him. Newick was bequeathed in 1686 by John Alchorne of Boughton Monchelsea to his only daughter Ann, who was already the wife of John Savage. Their elder son John Savage married Elizabeth Finch and died in 1726. In 1743 Newick was settled on the marriage of Elizabeth's son Richard Savage with Margaret Gouldstone; the farm then had 113 acres of wood in hand. It lay in five separate woods, including Furnace Wood and Minepit Wood. The settlement specifically includes iron mine, which remained in the standard description of the farm until 1803 at least.[3]

It is clear from the land tax returns for Heathfield that in 1729 the tenant of Newick Farm was John Beard; he had been rated for the property from at least 1707, and left in either 1734 or 1735.[4]

This evidence resolves conclusively the problem identified by the editors of the Fuller letters of the improbability of charcoal having been transported over long distances.

Notes and References

1. D. Crossley and R. Saville (eds.), *The Fuller Letters 1728-1755*, Sussex Record Society (hereafter SRS), **76** (1991), xvii, citing letters 625, 637 and 680.
2. SRS **76**, letters 4, 319, 330, 351, 388, 418, 602, 625, 637, 679 and 680.
3. East Sussex Record Office (hereafter ESRO), ADA box 962.
4. ESRO, ELT Heathfield; the return for 1735 does not survive.