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# Wind and Water Mills

The Occasional Journal of the  
Midland Wind and Water Mills Group  
affiliated to the Society for the Protection of Ancient Buildings

Number 6  
Summer 1985

THE MIDLAND WIND AND WATER MILLS GROUP

(affiliated to the Society for the  
Protection of Ancient Buildings)

This Journal is published by the Midland Wind and Water Mills Group, which is concerned with the study of the history and technology of mills, and, in principle, with their preservation and restoration. Its area is the region loosely defined as the Midlands, especially the central counties of Staffordshire, Worcestershire and Warwickshire.

The Group, which functions as an autonomous society, holds monthly indoor meetings, with talks and discussions, during the winter, and arranges several tours to mills during the spring and summer. Members periodically receive a Newsletter and the Journal, and can purchase other publications at preferential prices.

For further particulars, please contact:  
Gordon Tucker, 26, Twatling Road, Barnt Green,  
Birmingham B45 8HT.



Wind and Water Mills, although the journal of the Midland Wind and Water Mills Group and therefore naturally concerned with the mills of the Midlands, is not intended to be narrowly parochial. Interesting and important articles relating to mill matters in other parts of Britain and the world will be included whenever available. In general, articles by members will have priority, but submissions by others will be willingly considered.

D.G.T.  
D.T.N.B.

#### CORRIGENDA

Rather a large number of errors was noticed in the text when it was literally on its way to be reproduced. It was too late to correct them properly, and those which were trivial have been ignored; other small ones have been corrected by hand. Some larger errors are noted below. The Editors offer their apologies for this lapse.

- p.14. No.27, Gig Mill. 4 lines from end: text should read-  
'... was this one further down the brook, and whether this lower works used water power from the brook, as well as steam power.'
- p.18. Stamber Mill. Line 8: after 'c.1880' insert-  
'but it appears to have gone by the time of the 2nd-edn. 25-inch O.S.map of c.1900.'
- p.29. Line 23 should be-  
'32ft of 2in lead piping, 10ft of 2in -do, 22ft of 2in -do, - to 3rd Vat'
- p.30. Line 20 should be-  
'Wrought iron tank 5ft 10in X 5ft 10in and 3ft 4in deep'

#### Cover illustration:

Grange Mill, Halesowen, c.1910, see p.41.

# Wind and Water Mills

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#### HON. EDITORS

D.G. Tucker	26, Twatling Road, Barnet Green, Birmingham B45 8HT.
D.T.N. Booth	18, Hawme Close, Halesowen, West Midlands B63 3QQ.
A. Cooke	28, Eastwood Road, Balsall Heath, Birmingham B12 9NB.

# THE WATER SUPPLY TO KEELE HALL, STAFFORDSHIRE

by BARRY JOB

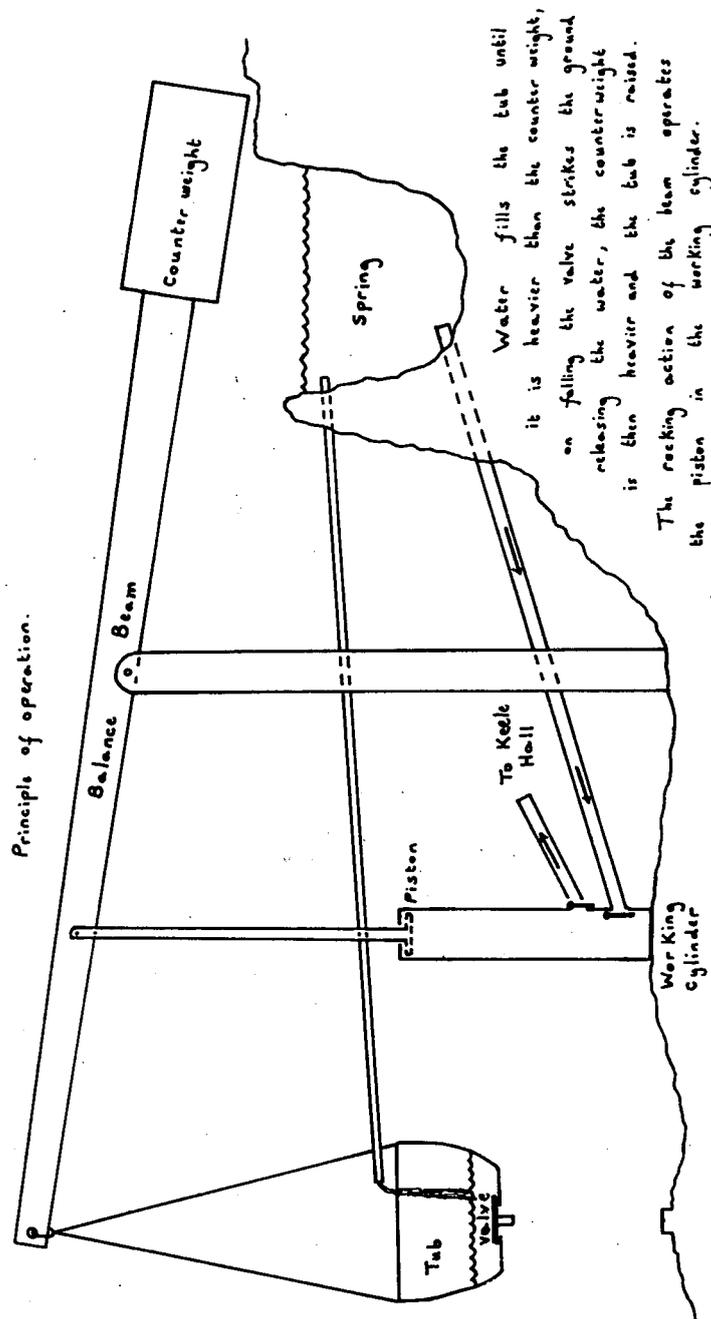
The present Keele Hall was completed in 1861 for the Sneyd family. It replaced a substantial building dating from 1580. The extensive Sneyd estate was sold in 1951 and the Hall now forms part of the University of Keele. The supply of water had been a reoccurring problem, a primitive 'water engine' of 1750 was replaced by three hydraulic rams and in 1876 these were supplemented by a water wheel driven ram pump in Springpool Wood.

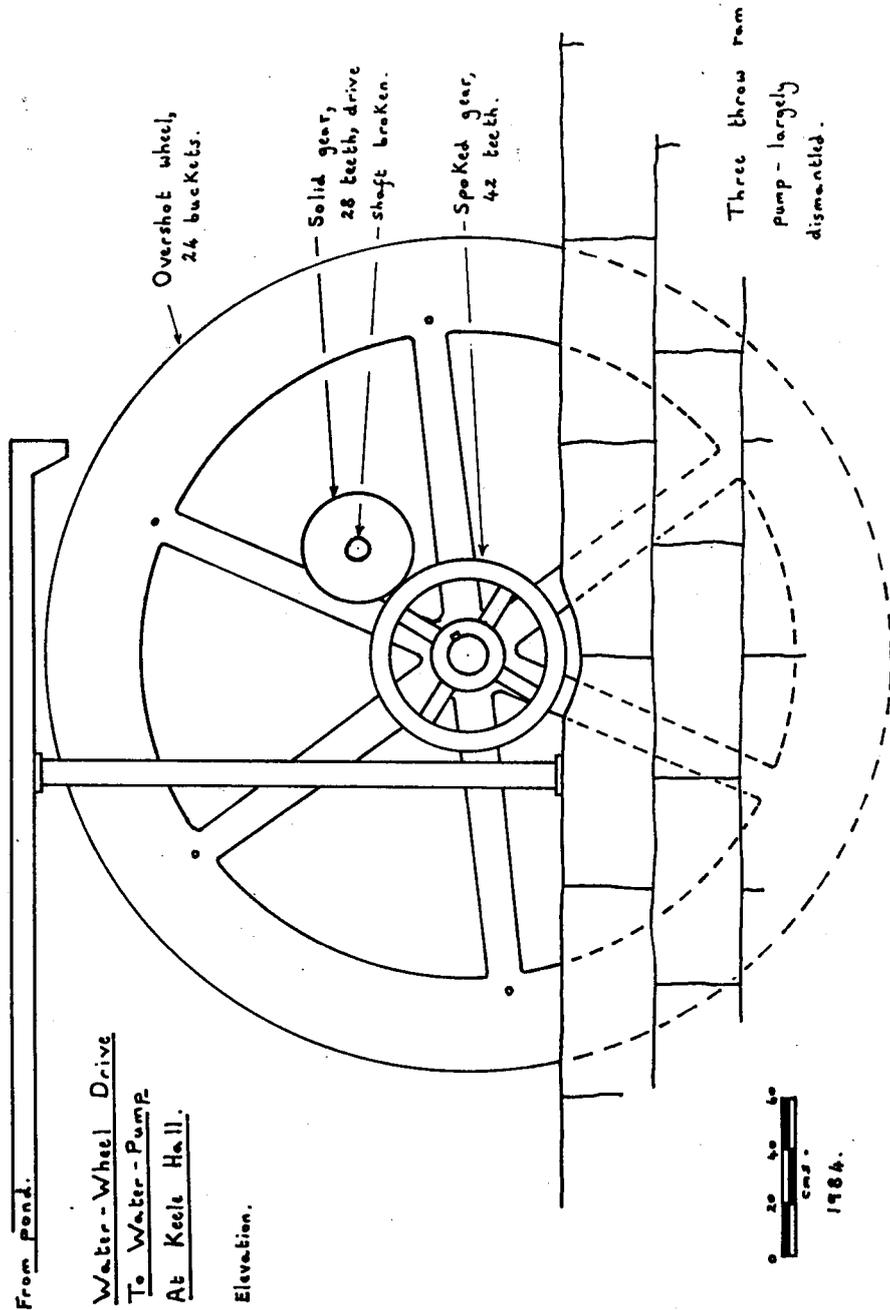
A series of pools lie below the Hall, a small stone and brick building stands below the outfall from the second pool. Inside is found an overshot waterwheel of ten feet in diameter and the remains of a threethrow ram pump. The wheel is of all iron construction and in very good condition. Rim gears drive the pump but only the base, cranks and air vessel remain.

The University archives preserve documents from the Sneyd Estate Office and investigations revealed much of the history of the Springpool Wood water supply. In September 1876 tenders were invited from London pump manufacturers but the contract was placed with the local Holborn Foundry and Engineering Works, Newcastle-under-Lyme. Work began the following year. In May Mr. W.G. Cowlshaw of the foundry, asked "How near to the pool can I get with a horse and cart? Delivery of the wheel will be an important item on the bill". He was suffering from labour problems and later he wrote "One side of the wheel will be cast Saturday next, but my smith has been away ill": To save delay a 5 inch square casting was supplied in place of the slightly smaller wrought iron axle originally specified. The pump house was built by direct labour supervised by Mr. W.A. Keates, of the Estate Offices, but problems were experienced here with running sand. In December Mr. Cowlshaw requested £50 on account "as the job has been a long time on hand, not through my negligence, and as far as I can see it will be some time before it is completed". The Estate promised the money but demanded that the wheel be altered which prompted Cowlshaw to reply "I must say in this you are very hard with me, it has not been proved that the wheel will not work and yet I must make extensive and expensive alterations at my own cost and in the end never know whether or not the wheel as first made was right". In May 1878 the pump was working and the balance of £76-9s-5d was paid. However, teething troubles were experienced and in October £12-6s-6d was necessary for repairs and again nine months later £11-18s-9d for repairs and additions. These proved to be satisfactory and no further work was necessary until July 1902 when Easton and Company, London, replaced the pump. They enquired "we notice from the papers that the Grand Duke has returned and we shall like to know whether the pump is alright?" But it wasn't 'alright' for long; in January 1903 the pump casing was burst by frost and the crank was broken. A protracted dispute began. The parts were sent to Eastons for examination. The Estate claimed that there was a flaw in the crank. Eastons replied "the crankshaft was strong enough not only for the work required of it but also to burst the pump box". But the Estate claimed that the crank broke before the pump became frozen. In May 1903 the director of Eastons travelled to Keele to discuss the matter and repairs were put in hand although the original dispute was unresolved. By August the work was completed and Eastons requested payment but the Estate refused until the work was inspected by their engineers. Three months later the Estate claimed that the work had not been inspected because of the bad weather. Eastons threatened to

Early Water Engine On The Keele Estate (circa 1750).

Principles of operation.





issue a writ and place the case before the Receiver. By May 1904 the matter was still not settled. Eastons said "we are quite prepared to make good our own defects but we really cannot undertake to make good the faults of others". They sent a questionnaire to the Estate:

1. Did the crank break before the pump?
2. Was the pump frozen before the pump started?
3. What were the degrees of frost when the crank broke?"

Not to be caught out the Estate replied:

1. Before
2. No.
3. No answer possible".

Finally in November the Estate gave way and paid the bill. The pump then worked satisfactorily for over two years when the pump valves needed repair. Eastons carried out the work and despatched new pump leathers but when they arrived they were found to be the wrong size. It then transpired that the Estate had not measured the pump correctly. The correct size were eventually received. In May 1910 a water sample was sent for analysis. The conclusion was that "the water is a thoroughly good one for drinking purposes". Labels were prepared bearing the Sneyd coat of arms. The water was to be bottled and sold. At about this time the waterwheel pump was delivering 4 gallons per minute for 24 hours giving 5,760 gallons per day. In 1912 it was supplemented by electric pumps at Silverdale which gave 20 gallons per minute for 8 hours supplying an additional 9,600 gallons per day. These two sources maintained the water supply until the Second World War when Mains Water arrived although it did still utilize the original reservoirs of 1857. In November 1951 the estate was auctioned but the Springpool Wood water supply was retained with the Hall with the intention of providing a reserve supply.

In conclusion the waterwheel powered pump worked for over 60 years and in reserve for a further period and indeed could be made operational again if necessary. Its fully documented history reveals times of problems with the pumps but generally a very satisfactory working life reflecting on the quality of the original installation.

Thanks must go to the staff of the University of Keele Library Archives and to Mr. N. Walley for their generous assistance in completing this article.

# THE 'MOULIN DE BILLION', MORBIHAN, BRITTANY

by N.M. CLARKE

In August 1983, whilst on holiday in Brittany, I was fortunate to visit a number of windmills in the coastal area of Morbihan. Among the most interesting of these mills was the 'Moulin de Billion' which commands a fine view on a hill just outside the town of Ambon, in the village of Billion. The mill had recently been purchased by M. Delpy, and was being converted into a holiday home by the addition of a ground floor living room, after lying idle for many years. My two brief visits were timely, since much of the old and damaged minor machinery of the mill had been removed and was piled in the garden. I saw the remains of a flour dresser. Even between my two visits, some pulleys were removed to ease the congestion during the conversion work. However, it was explained to me that the local planning requirements demand that the main features and machinery of the mill are retained. Inevitably, many items of interest are lost or altered during conversion, so I tried to measure and sketch as much of the details of the workings of the mill as was possible, and also took photographs. The scale drawings were constructed from a rough copy I made of the conversion plans made available to me by M. Delpy, and from the photographs that I took. Inevitably, my brief visits mean that some details and measurements are unknown.

The Billion mill is a cylindrical stone tower with no batter, about 5.5m (18ft.) diameter, constructed of local granite, like most mills in Morbihan. It is 10.5m (35ft.) high with the conical cap adding a further 4m (13ft.). The walls are very thick, over 0.8m (2ft. 8in.) and have been rendered externally for the conversion. The mill is believed to have been built around 1746, for this date is carved in the timbers in the cap, but most of the machinery was renewed about 1904-1906, and the fine iron-work described here must date from that period.

The cap is constructed along typical Breton lines, with massive 30cm (1ft.) square beams carrying a 'wigwam' construction for the roof timbers. This is then close boarded, the boards running diagonally, and the slates are nailed (wire hooked in modern work) directly to the boards. There is a projecting dormer with a storm hatch giving access to the windshaft. Around the top of the curb runs a circular timber to which is bolted the circular iron rack of 2.5cm (1in.) pitch. A 15T iron nut engages the rack and is driven by a long shaft from a set of iron windlass gears with a driving pulley (for a chain or rope?) close behind the brake wheel.

All the mills I saw in Morbihan had the main sweep timbers directly morticed into the end of the windshaft, and clearly carried common sails. The main sweep timbers at Billion are 6m (20ft.) long, and unusually, must have supported some form of patent or automatic sails, for the iron fixings are still visible in places. I also saw a pile of these fixings lying near the electricity pole in the garden! On the end of the windshaft can also be seen a rotating ring gear and a four-arm spider mechanism to control the patent sails. The timbers are fitted directly into the wooden end of the windshaft, formed from one solid timber 0.5m (1ft. 8in.) square, and 5.5m (18ft.) long. Close behind the rear pair of sweeps, a large timber breast beam supports the neck bearing (now partially collapsed) which was made of granite. The windshaft is roughly octagonal over most of its length, except where the brake wheel is fitted, where it is square. The tail of the windshaft is bound with iron and carried in a wooden bearing made from heavy timbers and reinforced with iron straps to the cap frame.

The brake wheel is formed from two cast iron halves, bolted together, and is about 1.5m (5ft.) diameter, carrying an iron brake band and 78 wooden teeth. Each half is formed from a half-box section in the centre with three cast iron spokes. The central box is fitted to the square windshaft by heavy wedges. An iron brake band runs over the top of the brake wheel and is operated by a brake arm which can be screwed down using a hand crank. Close to the tail bearing is the interesting gear mechanism which drives the patent sail mechanism via two long iron rods, set into the sides of the windshaft. This gear looks like the differential gear in a car back axle. Two large ring gears are mounted around the windshaft, and can turn relative to one another, driving a small pinion set between them, which communicates a rotary motion to the iron rods which lead to the ring gear and spider mechanism on the end of the windshaft.

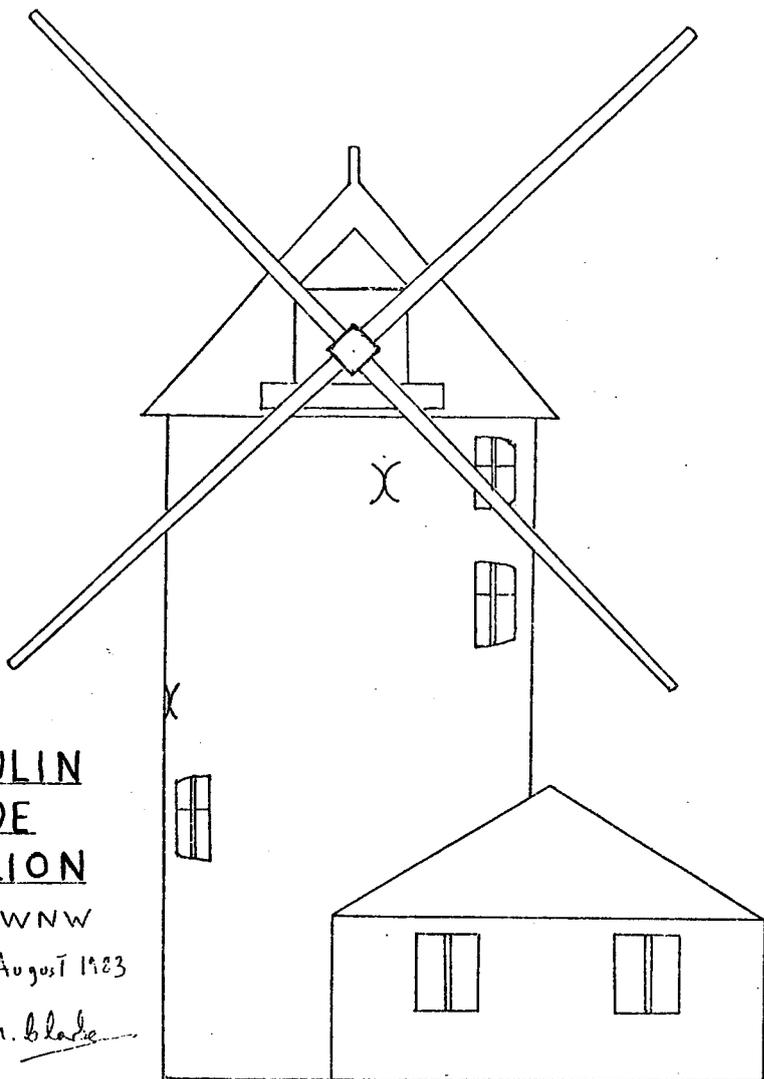
The brake wheel drives a 0.5m (1ft. 8in.) diameter spoked cast iron wallower with 26T which is fitted to a 10cm (4in.) diameter iron upright shaft which runs down to the first floor. Where it passes through the floor, there is a greased wooden bearing. On the stone floor (below) the upright shaft carries a 0.5m (1ft. 8in.) diameter iron bevel gear carrying 40 wooden teeth which engage a 20T drive to a pulley, a long shaft and a further large pulley near the wall, where there are holes passing up through the ceiling to the brake-wheel floor. The pulley immediately near the 20T pinion clearly drove a belt to a layshaft with pulleys at either end, situated immediately above one of the grain hoppers. The remnants of a spiral from a flour dressing machine could be seen in one hopper during my visit, together with much other domestic bric-a-brac covering the octagonal tuns. These tuns fill the space between walls and upright shaft, and through the cracked boarding, the stones could be glimpsed. These were about 1.3m (4ft.) diameter, bound with iron and backed with plaster. On the top of each tun, a wooden horse supports the hopper and the shoe which fed grain to the eye of the upper (runner) stone. A wooden ratchet on the top of the tun provides adjustment for the damsel string. The damsel shafts are about 65cm (2ft. 2in.) long with 3 flutes 10cm (4in.) long and a 2cm (3/4in.) square driving socket at the other end.

Below the stone floor, on the 1st (meal) floor, a massive oak beam carries the bearing for the lower end of the upright shaft, together with the bearings and centering mechanism for the stone nuts. Just above the bottom bearing of the upright shaft, a 3-piece cast iron gear fitted with wooden teeth, carries 2 shallow bevel gears 30cm (1ft.) and 80cm (2ft. 8in.) in diameter above which is bolted the 1.3m (4ft. 3in.) diameter spur gear with 118T, and a pulley to drive the fly-ball governor. No pinions or shafts could be seen associated with the two bevels, although usually such gears are installed to enable an auxiliary drive to the stones. The stone nuts are spoked cast iron with 56T, the stone spindles passing up through the underside of the bed stones, clearly visible in the ceiling. The stone spindles are carried at their lower ends by bearings which are acted upon by shafts passing through the supporting timber. These shafts are carried on a steelyard 15cm (6in.) from their pivots fixed to the underside of the beam. The far end of the steelyards, 90cm (3ft.) long rest upon centering wheels 22cm (9in.) diameter, which may be screwed up or down the threaded ends of 2cm diameter rods which pass upwards through the support beam. These rods connect to an 'A' frame steelyard, pivoted upon the support beam, which extends almost to the wall, where the point of the 'A' is carried upon the collar at the lower end of a fly-ball or centrifugal governor. This is mounted close to the wall, and the masonry is scooped out to clear the balls. As the balls increase in speed, (driven by the pulley above the spur gear), they rise, lifting the point of the 'A' frame and depressing the rods connected to the feet of the 'A'. This depresses the ends of the steelyards under the beam and lowers the bearing of the stone spindle by 1/6 (15cm:90cm) the movement at the end of the steelyard. The runner stone therefore descends into closer contact with the bed stone. The fly ball governor carries two iron balls about 20cm (8in.) diameter.

In the floor of the 1st floor there is a flour chute, perhaps indicating that the flour was dressed on this floor and then passed to the ground floor for bagging. The overall condition of the Billion windmill is very fine. All the stone work and timbers appear sound; all the cast iron work is intact and unbroken, with

only a few odd wooden teeth missing here and there. It is a great pity that no remains of the sails or patent mechanism survive, since such features appear to be a rarity in that part of the world.

I would like to thank M. Delpy and his family for their kindness and hospitality during my two brief visits.

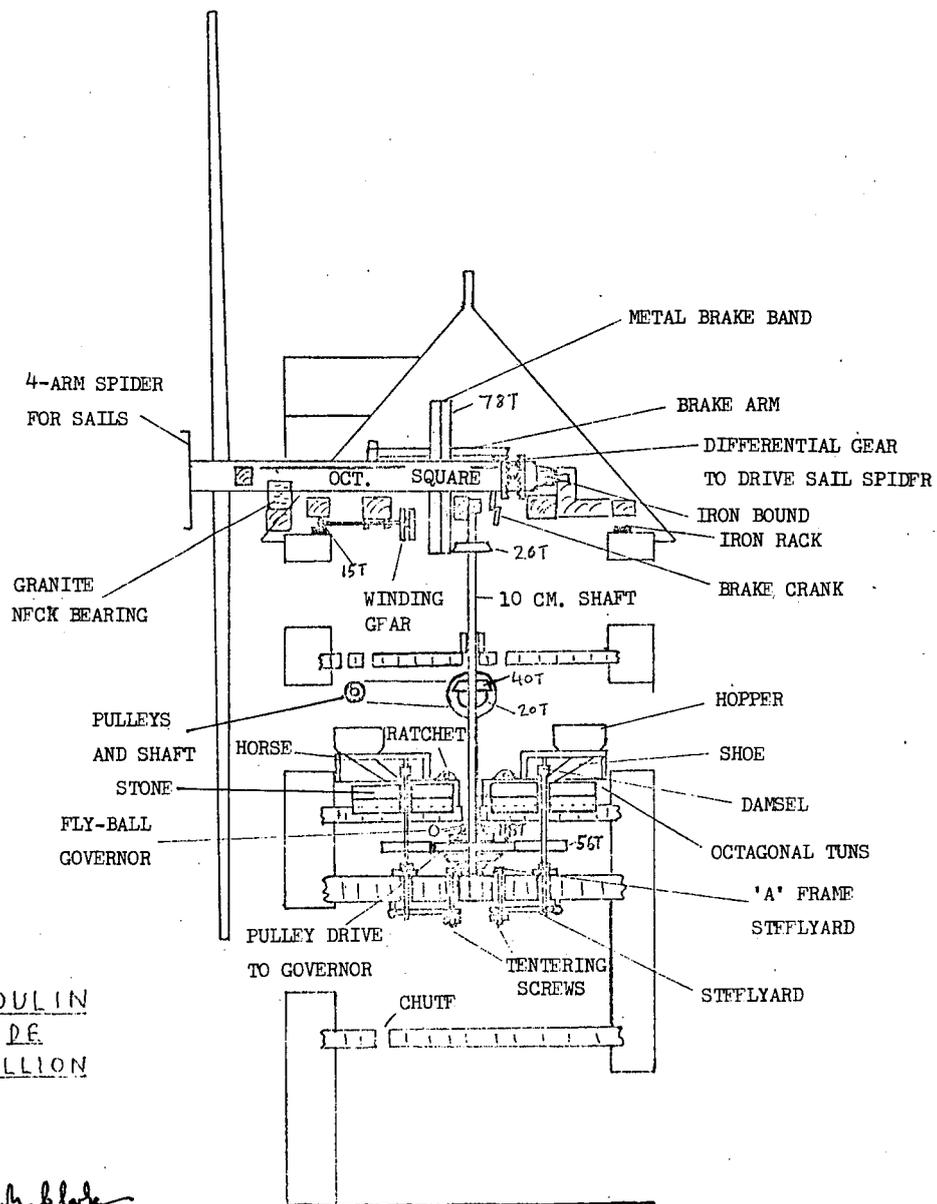


**MOULIN  
DE  
BILLION**

View WNW  
4th August 1923

*N.M. blade*

Scale 1:50



**MOULIN  
DE  
BILLION**

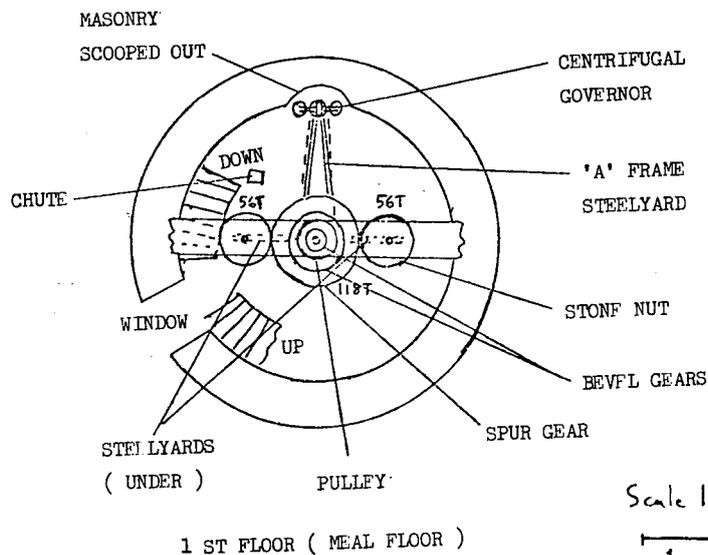
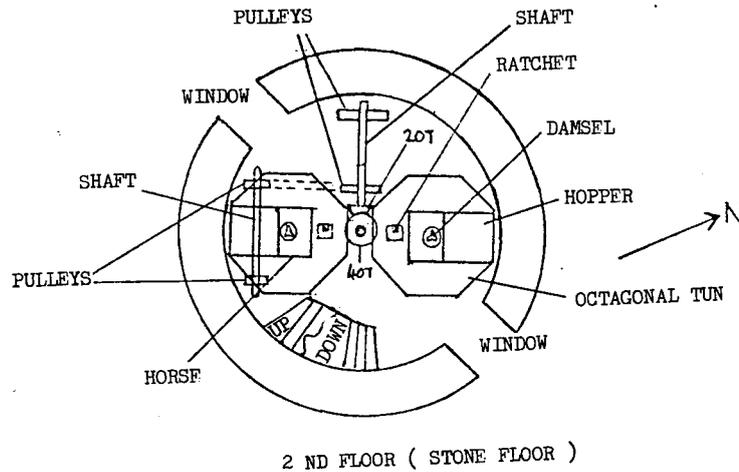
*N.M. blade*  
Scale 1:50



# WATERMILLS AND WATER-POWERED WORKS ON THE RIVER STOUR, WORCESTERSHIRE AND STAFFORDSHIRE

## PART 3. STOURBRIDGE, LYE AND CRADLEY

by GORDON TUCKER



MOULIN DE BILLION

Scale 1:50



*R. M. Blake*

This part of the series of articles continues the study of water-powered sites on the River Stour and its minor tributaries through the urban areas known as Stourbridge, Lye and Cradley, a distance of about five miles. The two previous parts studied the river from its confluence with the R. Severn at Stourport up to the boundary of the parish of Kinver with that of the modern area of Stourbridge, and in that length identified 25 water-powered sites. In the present short section of the river, which, being now above the confluence of the large and powerful Smestow Brook, is really quite a small stream, and joined by only very tiny brooks, no fewer than 15 water-powered sites have been identified with reasonable confidence and four others which have had to be considered doubtful. The fall of the river over this section is about 100ft (30m), so that the density of waterwheels was remarkable by any standard.

The southern bank of the river, in this section, lay in Worcestershire, and the northern bank in Staffordshire. Up to late in the nineteenth century, the whole of the area covered by Stourbridge and Lye (and also Amblecote which was in Staffordshire) lay in the parish of Old Swinford; Cradley had its own parish. It is unfortunate that, as far as can be ascertained from the Worcestershire Record Office, no Tithes Map exists for Old Swinford; if there had been one, it might have enabled some of our doubtful cases to be resolved. It is also understood that there is no Enclosure Map either. Other early maps which have been used are Taylor's of 1772 covering the county of Worcestershire on a scale of one inch to a mile; one of 1775 in the British Museum (now British Library) Map Room, ref. PS/5772.5100(23); and one by James Sherriff of 1812 being a 'Plan of the Mines of Lord Dudley and others etc.etc.' of which there is a photocopy in the Brierley Hill Library. (I am much indebted to Mr. H.W.Gwilliam for copies of the last two maps.)

As emphasised in previous parts, this series of articles is concerned with identifying and locating the various sites where water power has been used, ascertaining the purpose for which they have been used, and reporting the present condition of, and physical remains on each site. It is not part of the purpose to give a general account of the development of industry in the area. Much has been published on this general aspect in the area covered in this part, but what has been lacking is any attempt to locate the sites where the industrial developments took place. Some of these more general accounts are listed below:

William Scott, 'Stourbridge and its Vicinity', Stourbridge, 1832.  
H.E.Palfrey, 'Early Stourbridge industries', Trans. Newcomen Soc., 8, 1927-8, pp. 99-106.  
Rhys Jenkins, 'Stourbridge and Dudley', *ibid*, pp.113-116.  
E.W.Hulme, 'Statistical history of the iron trade of England and Wales, 1717-1750', Trans. Newcomen Soc., 2, 1928, pp.12-35.  
R.L.Downes, 'The Stour partnership, 1726-36', Econ.Hist.Rev., 2nd. series, 3, 1950, pp.90-96.  
M.W.Flinn, 'Men of Iron: The Crowleys in the early iron industry', Edinburgh, 1962.  
B.L.C.Johnson, 'The Foley Partnerships...', Econ.Hist.Rev., 2nd. series, 4, 1951-2, pp.322-40.  
R.G.Schafer, 'Records of Philip Foley's Stour Valley Iron Works 1668-74', Worcs.

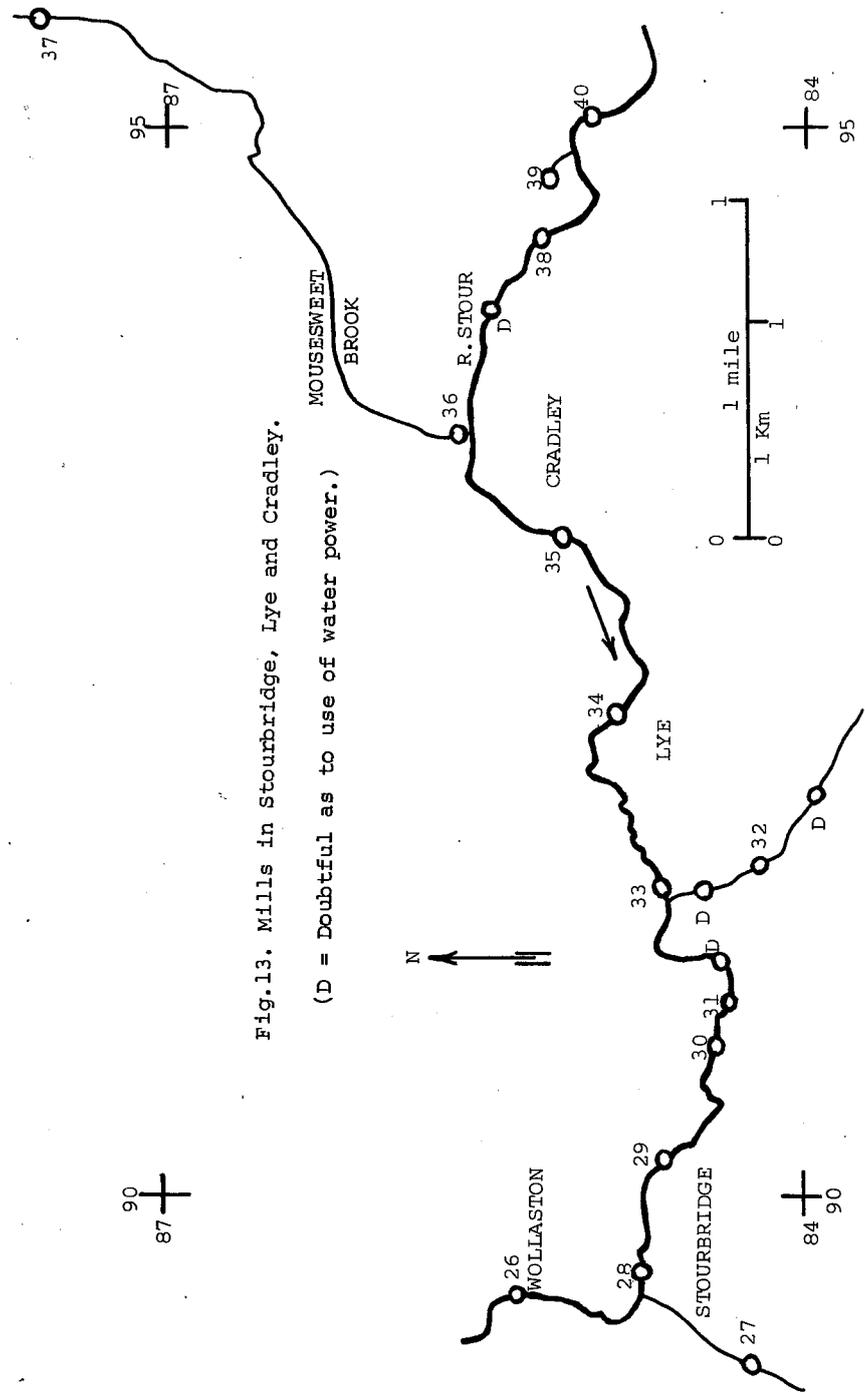


Fig.13. Mills in Stourbridge, Lye and Cradley.

(D = Doubtful as to use of water power.)

Historical Soc., 1978.

R.Page, 'Richard and Edward Knight:ironmasters....', Trans.Woolhope Club, 43, Part 1, 1979, pp.7-17.

An interesting account of a different nature is given in:

'History, Topography and Directory of Worcestershire', published by Edward Cassey & Co., printed by W.Bailey, Preston, 1860.

A good short account of the industries of the area in the 1940s is given by: L.T.C.Rolt, 'Worcestershire', Robert Hale, London, 1949, Chapter 14.

Finally, a most useful account of the industries and entrepreneurs of this upper section of the Stour Valley, related as far as possible to specific works, is given in a typescript by Mr.H.W.Gwilliam which has now been deposited in the Worcester Record Office, but which Mr. Gwilliam very generously made available to me while this article was in preparation.

The Victoria County History of Worcestershire and the V.C.H. of Staffordshire have been used for information on medieval mill matters. It seems that there were not very many mills in this area in medieval times:-

1086 (Domesday Survey): a mill in Old Swinford.

1193 (and again in 1535 and 1599): a mill in Cradley.

1317 (and again in 1338): a mill at Bedcote.

1518: a mill in Amblecote.

1592 (and again in 1628): a mill in Wollaston.

Later references to early mills are included in the main gazetteer.

The principal industries of the area in the 17th to 19th centuries were iron-making, iron-refining, iron-tool making, wire-drawing, chain-making, nail-making, coal-mining, fireclay mining, and glass-making. The first four required water power in the days before steam power; the others did not. However, it is not quite clear why the grinding of clay in mills did not apparently use water power.

Of course, the people had to be fed, and there were several corn-mills.

The mill-sites which are discussed in the gazetteer are shown in Fig.13 and are listed here, together with a note of the parishes to which I believe them to have belonged (a) in earlier centuries up to at least the mid-19th century, (b) during most of the 20th century up to 1974; the latter are the civil parishes or urban districts, and not necessarily the same as the ecclesiastical parishes. D indicates a site where the use of water power is doubtful. The order continues the system used in earlier parts, namely, numbering up the main stream, digressing up each tributary before continuing up the main stream.

26. Wollaston Mill; (a) Old Swinford, (b) Wollaston (Worcs.)

27. Gig Mill; (a) Old Swinford, (b) Stourbridge (Worcs.)

28. Bradley's Iron Works; (a) Old Swinford (township of Amblecote), (b) Amblecote (Staffs.)

29. Cloth/Leather Mill; (a) Old Swinford, (b) Stourbridge (Worcs.)

30. Bedcote Lower Mill; (a) Old Swinford, (b) Stourbridge (Worcs.)

31. Bedcote Mill; (a) Old Swinford, (b) Stourbridge (Worcs.)

D Clatterbatch Forge; (a) Old Swinford, (b) Stourbridge (Worcs.)

D Stamber Mill; (a) Old Swinford, (b) Lye (Worcs.)

D Shepherd's Brook Iron Works; (a) Old Swinford, (b) Lye or Wollescote (Worcs.)

32. Shepherd's Brook Corn Mill; (a) Old Swinford, (b) Lye (Worcs.)

33. Bagley's Mill; (a) Old Swinford (township of Amblecote), (b) Amblecote, (Staffs.)

34. Lye Forge; (a) Old Swinford, (b) Lye (Worcs.)

35. Cradley Mill; (a) Kingswinford, (b) Quarry Bank (Staffs.)

36. Cradley Furnace/Forge; (a) probably Cradley, (b) do.(Worcs.)

37. Withymere Mill; (a) probably Dudley, (b)do. (Worcs.)

D Forge/mill; (a) Cradley, (b) do. (Worcs.)

38. Lodge Forge; (a) Cradley, (b) do. (Worcs.)

39. Corngreaves Iron Works; (a) Rowley Regis, (b)do. (Staffs.)

40. Hedges Mill; (a) Cradley, (b) do. (Worcs.)

## 26. Wollaston Slitting Mill SO 895854

Taylor showed a mill symbol here on his map of 1772, and it might just possibly have been a slitting mill then. It also appeared on maps of 1775 and 1812 without any particular description. However, it was advertised for sale in *Berrow's Worcester Journal* on 12 June 1809 as Wollaston Slitting Mill; Mr. Hill was in possession and there were three tenements for workmen. It was still a slitting mill in William Scott's list of 1832. It had become a spade and shovel works under Samuel Hodgson by 1842 (1) and under Alexander Norris in 1872. (2) On the 1st-edition 25-inch O.S. map of c.1880, it was 'Wollaston Mill (Spade and Shovel)'. Part of this map, with relevant features emphasised and with annotations, is reproduced in Fig.14. The river Stour evidently fed the works directly; the overflow channels are clearly shown, but the tail race has to be inferred. By the time of the 1920 edition of the 25-inch O.S. map, the works had become 'Wollaston Mills (Edge tools &c)' -- note the plural -- and had steam power indicated; the water channels still remained but it seems unlikely that water power was still used.

Today there is no sign at all of the former existence of the mill. The site is completely obliterated by the factory of Messrs. BSR and even the river itself has disappeared into a long culvert under the works.

## 27. Gig Mill SO 891838

The location of this mill is suggested by the fact that the small area of Stourbridge around this grid reference is known at the present day as Gigmill and there is a public house of this name there. Gigmill House was named at this point on the 2nd-edition 25-inch O.S. map of c.1900, but no mill has been marked there for at least 100 years. The best positive evidence for the existence of a mill here is the 1st-edition one-inch O.S. map of c.1830, which marks 'Gig Mill', together with a large pond extending some 400 yards below the Heath Pool (of about three acres, centred on SO 897834) which appears on later maps, and with what seems to be a leat from the pond to 'Gig Mill'.

The mill must have relied very greatly on the large pond, for the brook, tributary to the R. Stour, is very small indeed. However, there is no doubt that it was water-powered. It was marked on Taylor's map of 1772 as 'Mill'. It was advertised for sale in 1782 as 'a well-established water-driven plating forge for the manufacture of Spades, Shovels and Hoes'. (3) In 1823, Joseph and Thomas Parks were Spade, Shovel and Edge-tool Makers at 'Gig-mill-forge'. (4)

What appears to be the same mill was again for sale in 1835, but it now had a steam engine. But the 1st-edition 6-inch O.S. map of c.1880 shows no mill at the point discussed above, although it shows a 'Spade & Shovel Works' a quarter of a mile further down the brook, at SO 892843. The questions which arise, which cannot at present be answered, are whether the mill of 1835, with its steam engine, was this one further down the brook, as well as steam power. By the time of the 25-inch O.S. map of 1919 there were several spade and shovel works in this lower area, and there is no indication on that map that any of them could have been water-powered.

## 28. Bradley's Iron Works SO 896848

Fig. 15 shows an evidently water-powered works here as indicated on the 1st-edition 25-inch O.S. map of c.1880; it lies about 400 yards below the High Street Bridge on the Amblecote side of the river. By this date this water-powered works was surrounded by the much larger steam-powered works of the Bradley and Foster organisation, and it is hard to determine whether it was still in use. Certainly by the time of the 25-inch O.S. map of 1920, although the weir was still shown, the leat and tail-race (i.e. the watercourses on the north side) had disappeared. Today it is hard to detect any sign of the former use of water power here.

The earlier history of this site is not readily separated from that of the next site upstream. The combined history from 1518 is given in some detail in V.C.H. Staffs., Vol. XX, pp.55 and 60, but is there entirely attributed to the

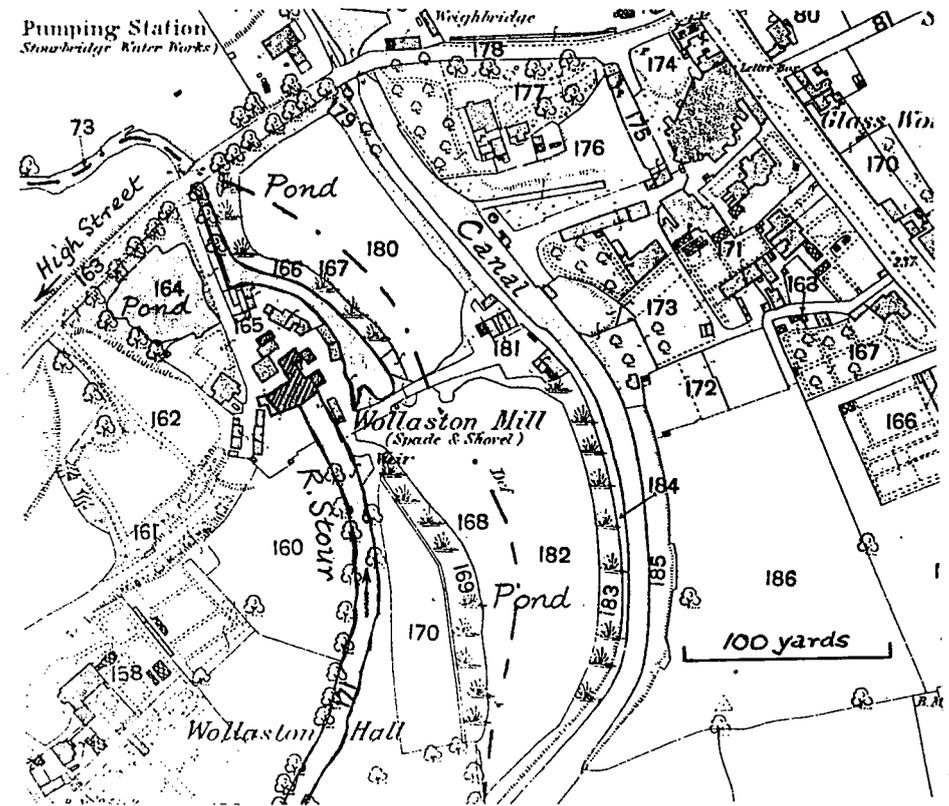


Fig.14. Wollaston Mill, as shown on 1st-edition 25-inch O.S. map of c.1880.

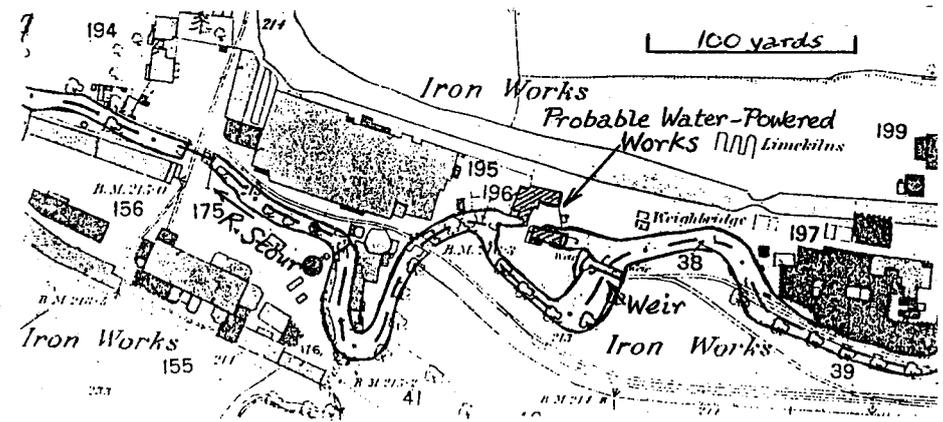


Fig.15. Mill No.28. The river channels here suggest a water-powered works, probably the original iron works, later embedded in the large complex of the Bradley Iron Works at Stourbridge. From the 1st-edition 25-inch O.S. map of c.1880.

upper site, which is stated to be in Amblecote although actually it was on the south side of the river and not in Amblecote. The present site, which was (and is) in Amblecote, is completely ignored. The earliest map evidence, which is not very clear, is dated 1688. (5) It is likely that most of the early history is really attributable to the present site, and encompasses a manorial mill (i.e. a corn mill), a 'forge, battering mill or slitting mill' known as the Town Mills, and a fulling mill, not necessarily in succession to one another, for corn grinding apparently continued until 1793. Iron working may have been almost continuous, and the Royal Forge, mentioned in 1784, may have been here. It was certainly considered to have been here by Scott in 1832. (6)

29. Cloth/Leather Mill SO 902847

A map of Stourbridge of 1781 (7) marks Mill Lane very distinctly, and indicates unambiguously a 'Cloth Mill' at the end of it. There would probably have been a cloth mill here for a long time before 1781; a map of c.1750 (8) shows a leat and weir very clearly, and, indeed, an announcement in the London Gazette for 9-12 September 1710 probably refers to it. In this there were to be let a large Dye House and Workhouses by the river side in Stourbridge, to be leased a Fulling Mill, and to be sold the appropriate equipment.

By 1832, according to Scott, (9) there was the 'Stourbridge Leather Fulling Mill' here, so evidently the works had gone over to leather. On the 1st-edition large-scale O.S. maps of c.1880 it was 'Leather & Parchment Works' here, and so it remained on the 2nd-edition 25-inch O.S. map of c.1900, the relevant part of which, with a few annotations by the author, is reproduced in Fig.16. The continued existence of the mill race suggests that water was taken from the river for the processes of the works, even if water power might not have been still utilised. Part of the old watercourses remain at the present day, although the area has been completely redeveloped, and otherwise only the name Mill Street gives any sign of the former use of the site.

30. Bedcote Lower Mill SO 907844

As this mill stood beside the R.Stour, between the river and the main road, it is supposed that in earlier times it was water-powered. However, the first positive reference found is 'Bedcote Mill' on the 1st-edition 6-inch O.S. map of c.1880, followed by 'Bedcote Mill (Skin Rug)' on the 2nd-edition 25-inch O.S. map of c.1900; neither of these maps gives any positive evidence of the use of water power. Simmons reported that the site was covered by a boiler-makers' works when he visited it in 1945.

31. Bedcote Mill SO 909844

This was marked as 'Corn Mill' on the 1st-edition 6-inch O.S. map of c.1880. It is known from directories (via the Simmons Papers) that James Aldred was using this for corn milling from 1828 to at least 1842; that Edwin Blundell was there in 1851, and J.Webb in the late 1860's. There is no positive evidence that it was a water-powered mill, but it seems highly likely both from the dates and from the position beside the R.Stour.

This mill was not shown on the 2nd-edition 25-inch O.S. map of c.1900. Today there is no sign of it.

Clatterbatch Forge SO 911844

There are references to Clatterbach (it is variously spelt '-bach', '-batch', '-back') as an iron forge as early as 1673, (10) when it was held by John Finch, and 1687, (11) when it was bought by a partnership of Ambrose Crowley, John Wheeler and William Winchurst. At that date it could only have been powered by water, but its exact location is not known. There was still a Clatterbatch Forge in 1835, for the London Gazette of 30 January of that year lists a fiat in bankruptcy against George Foster of Clatterbatch Forge, Spade, Shovel and Edge Tool Manufacturer. A Spade & Shovel Works is shown at the location indicated by the grid reference above, on the 1st-edition 6-inch O.S. map of c.1880, but without any indication of water power; the works is not shown on the 2nd-edition 25-inch O.S. map of c.1900.

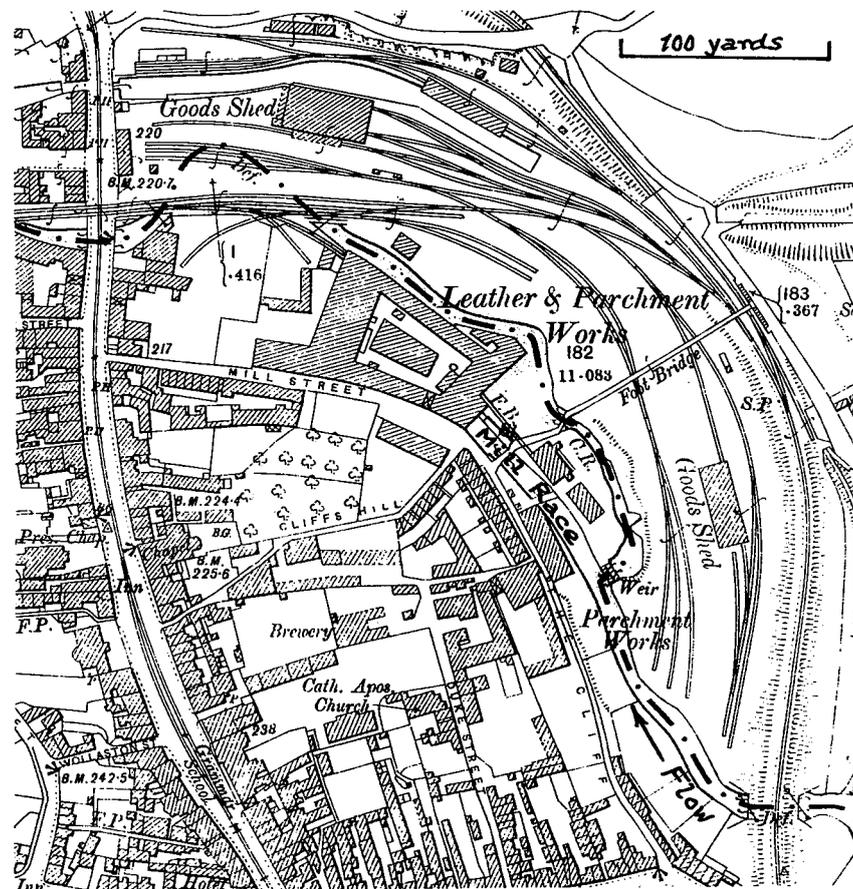


Fig.16. Mill No.29. The Leather & Parchment Works at Stourbridge, formerly a Cloth Mill, as shown on the 2nd-edition 25-inch O.S.map of c.1900.

Simmons throws a further complication into the matter by quoting a reference to Thomas Starkie, corn miller at Clatterback Mill in 1851. It is tempting to think this has merely been confused with the nearby Bedcote Mill, but this cannot be the case, since we have already a reference to Edwin Blundell there in the same year.

While there can be no doubt that Clatterbatch Forge existed, the matter of its exact location must for the present remain in the 'Doubtful' category.

Stamber Mill c.SO 914845

The name is a very old one, and now refers to an area rather than a site. But it must once have referred to a mill, presumably a water mill, and it might well have been on the Shepherd's Brook as indicated by the grid reference above. This site is supported by the clear indication in a map of 1812. (12) Joseph Fellows was listed as corn-miller at Stamber Mill in Pigot's Directory, 1828 and 1830. There was a 'Spade and Shovel Works' here on the 1st-edition 6-inch O.S. map of c.1840. There was a Forge and Blade Mill at Stamber Mill in 1814, and a Blade Mill from 1825 to 1835, (13) but the exact sites are not known.

Shepherd's Brook Iron Works c.SO 919840

This site, on the headwaters of the Shepherd's Brook, is very unlikely to have been one using water power, as the supply would have been so small. On the 1st-edition one-inch O.S. map of c.1830, there appear only to have been some coal mines here; on the 1st-edition 6-inch O.S. map of c.1880 there is the Shepherd's Brook Iron Works, covering quite a large area. This works would certainly have been steam-powered.

32. Shepherd's Brook Corn Mill SO 915842

The existence of a corn mill at this point is quite unambiguous on the 1st-edition 6-inch O.S. map of c.1880, and it is shown quite clearly as having a large mill-pond fed by a leat from the Shepherd's Brook.

33. Bagley's Mill or Lye Mill SO 914847

Dudley Bagley was the miller at Lye Mill in 1785, and was still there in 1813 according to the London Gazette of 20 November that year. Although John Davey was miller there by 1820 according to Lewis's Directory, and the 1st-edition one-inch O.S. map of c.1830 shows 'Lye Mill' and Lye Mill was again named in a directory entry of 1876 (Miss M.Warr, miller), yet Bagley's name was given to the mill on the 2nd-edition 2½-inch O.S. map of c.1900, which showed 'Bagley's Mill (Corn, Disused)'. The road leading to and beyond the mill was by 1900 known as Bagley Street, leading into Bagley Road, and still is so named. So Bagley's name is well perpetuated.

The site has a much longer history, however, given (with references) in the V.C.H. Staffs., Vol.XX, p.55. There was a blade mill here in the early 17th century, and a fulling mill by 1688 (14) which certainly continued until at least 1719. Then there was a corn mill, worked by the Richards family until 1785, when Bagley took the lease. It is stated to have had three water wheels, although the water supply was inadequate to work all three regularly. In the early 19th century a blade mill was operated as well as the corn mill, and in 1832 Scott listed the site as the 'Amblecoat Corn and Iron Work'. (15) It is, of course, possible that the blade mill had operated all through the 17th and 18th centuries, although there appears to be no proof of this. A map of c.1750 (16) shows a large mill and elongated mill-pond at this site, but does not give it a name.

There is some conflict between the outline of the 19th-century history given in the first paragraph above and that given in the V.C.H. The latter states that Bagley operated the corn and blade mills until 1822, when a firm of clay merchants, Littlewood, King & Co., took the lease, followed by Joseph and William King, coal and clay masters, who remodelled the interior in 1831, and were still there in 1844. It then had only one water wheel. In the middle of the century it was not in use, but was worked in the early 1870s by the Silvester family. It finally went out of use in 1875 when the South Staffordshire Mines Drainage Commissioners took the lease in order to be able to reduce the water level in the river.

This mill is particularly interesting as being the only one in the Stourbridge-Cradley stretch of the Stour to have survived to the middle of the present century. Simmons visited it in 1945 and recorded a detailed description of it and its machinery. It is worth giving some of this description. It was then only a corn mill.

'For 50 or 60 years at least Bagley's Mill has been in ruins... It is a 3-

floor brick building evidently of some age... The wheel is enclosed at the west end: it is an all-iron high breast 14ft. diameter by 12ft. wide, with six ribbed arms aside tapering from 8in. to 7in., and is on an 18in. cruciform-pattern shaft. The naves are 2ft. 6in. across. The pit wheel in two sections is the same diameter as the wheel, with a 6in. face geared to a 3ft. wheel on a 7½in. square horizontal shaft which carries two 6ft. all-iron spur wheels geared to 18in. wood and iron nuts on 2½in. square spindles on wooden bridge-trees and uprights. The bridge-trees are lifted by screws and slots. This gear occupies a central position against the north wall, and of the two pairs of stones the west pair are still in situ, peaks of 4ft. 6in. diameter.

'An unusual feature here, one of only two examples in Worcestershire, is the addition of an upright shaft and crown wheel gear worked off the same pit wheel. A 3ft. iron wheel with 4½in. face is geared to the top of the pit wheel, and is mounted on a short 4in. square shaft which carries a 2ft. 6in. bevel engaging with a 2ft. wallower on the upright shaft. This wallower is 2ft. 6in. above the brass and is flush with the stone floor. The upright shaft is 10in. round below the wallower, 11in. octagonal above and square at the wallower and crown wheel, with its brass on a 7½in. timber. The crown wheel is a 5ft. 6in. wooden clasp-arm with teeth on top. This drives on the south side a 15in. cart-wheel-hub type of wooden nut on a 7in. octagonal wooden shaft to a 4ft. 6in. by 9in. wooden clasp-arm pulley for belt-driving a small bolter suspended from the ceiling at the west end, the nut being lifted in and out of gear by slot and wooden lever. Bolted on to the top of the crown wheel is a toothed solid wooden ring 3ft. diameter which drives a narrow wooden nut, also 15in. diameter, and an 8in. octagonal wood shaft against the east wall for an inclined dresser in the south-east corner.

'The watercourse to the iron pentrough has long since been filled in, and of the floors of the mill only the joists remain.'

Since Simmons' survey the mill has disappeared completely.

34. Lye Forge SO 923848

There may have been a forge here as early as 1699, for a map of that date (17) shows 'Downing's Forge' in this vicinity. There was another reference to a forge at Lye in 1724, (18) and a Lye Forge was founded by Joseph Fookes in 1791. A probably-different Lye Forge was in the hands of J.Forrest & Co. in 1811. (19) Fookes's Lye Forge has a continuous history, in the same family, up to the present day; (20) but the earlier water-powered forge was gradually abandoned during the 19th century as the steam-powered works expanded on a higher site out of the way of floods.

At the present day the site and water-power arrangements of the old forge, i.e. Fookes's, can still be traced. The former Forge Pond is detectable as a swampy patch, and it can be seen where the river course was diverted to provide a leat. Nothing is known of the other sites.

35. Cradley Mill SO 931852

The positive location of this site comes from the 1st-edition 6-inch O.S. map of c.1880, which shows 'Cradley Mill (Blacking)' on the Staffordshire side of the river (Quarry Bank parish now), and with a tail-race channel coloured blue making it definite that the mill had at some time been water-powered even if not at the date of the map.

Earlier evidence from maps is of a Slitting Mill here in 1775, (21) and of a Mill with a very large Mill Pool in the river in 1812. (22) The former existence of the very large mill pool is vouched for by the clear indication of embankments in the 2½-inch O.S. maps of 1919.

It is possible that the mill on this site might have been Daniel Winwood's 'Blade Mill or Boring Mill' which was advertised for sale 'with a good pool of water' in c.1771. (23) That it later became a slitting mill is supported by the inclusion of 'Cradley Slitting Mill' in Scott's list of 1832, between Cradley Forges and Lye Forge. (24)

All remains of the mill itself had gone by the time of Simmon's visit in 1945, but the mill is commemorated in the name of the road - 'Cradley Mill'.

36. Cradley Furnace/Forge SO 935857

This site has acquired some fame as being the supposed location of Dud Dudley's experiments in the smelting of iron ore with pit coal in about 1620. (25) There is little doubt that Dudley had a furnace at Cradley. However, documentary evidence that this was the actual site is slight. It depends mainly on the reported recollections of a Mr. Swindell in 1907, when he was 90. (26) He stated that he pulled down in or about the 1830s what remained of 'Dud Dudley's Blast Furnace' at Cradley. It was square inside and outside, about 8 feet square inside above the boshes. It was built of stone entirely: no firebrick lining. An enquiry in 1907 showed that the claimed site was also that of the old Cradley Forge (undoubtedly at or near the location given above), which had by then also been demolished.

There is ample evidence of the existence of both a forge and slitting mill at Cradley in the 17th century, and the records of Philip Foley's Stour Valley iron works in 1668-1674 (27) contain many references to both. The exact locations are uncertain, but it is likely that the forge was driven by the water of the Mouseweat Brook - as was the later one - while the slitting mill was possibly a little further up the river at SO 942855 where the present Mill Street is.

Taylor's crude map of 1772 confirms that there was a 'Cradley Furnace' somewhere in this vicinity, but by 1820 the Birmingham Gazette of 11 December was advertising the lease of a 'newly-erected forge and mill, with two water wheels, situate at Cradley ...' Evidently the old works had been replaced. The 1st-edition 6-inch O.S. map of c.1880 shows a mill-pond on the Mouseweat Brook just on the north side of the R. Stour, and the words 'Cradley Forge', but what looks like a tail-race on the south side of the Stour, suggesting that the water from the mill-pond may have been brought across the river to a forge on the south side. By 1919, the 25-inch O.S. map shows another, later, Cradley Forge obliterating the mill-pond site, and nothing remaining on the south bank of the Stour. The later forge is now commemorated by the name 'Forge Lane'.

37. Withymere Mill SO 954877

This mill is marked on most of the early maps, e.g. Taylor, 1772, the 1st-edition one-inch O.S. map of c.1830, and a map of 1862. (28) It was on the headwaters of the Mouseweat Brook, and it is surprising that it could have got enough water. By c.1880 it appears from the 1st-edition 6-inch O.S. map that the mill had been completely obliterated by colliery works.

Possible additional forge/mill at Cradley SO 942855

The only evidence for a site here is the name 'Mill Street' running on the south side of the R. Stour, as shown on the 25-inch O.S. map of 1919 and on present-day street maps. The 1st-edition 6-inch O.S. map of c.1880 shows 'Anchor Works' here but no indication of a weir or leat. While it is possible that this was the site of the early Cradley slitting mill (see above, No. 36), it must at present be classified as a doubtful site of a water-powered works.

38. Lodge Forge SO 944853

Early maps leave some ambiguity in respect of this site. Taylor, 1772, shows 'Coles Mill' about here. A map of 1775 (29) shows 'Troyal'. The 1st-edition one-inch O.S. map of c.1830 shows 'Lodge Forge', and a large-scale map of the same period (30) shows 'Lodge Pool' feeding an obviously water-powered works. The name 'Lodge Forge' is shown consistently thereafter on maps of 1862, (31) on the 1st-edition 6-inch O.S. map of c.1880, and on the 25-inch O.S. map of 1919, still with the large pool. The 1919 map actually marks 'Lodge Forge (Anchor &c.)'.

39. Corngreaves Iron Works SO 947854

This site was shown as 'Corngreaves' on a map of 1775, as 'Corngreaves Forge' on the 1st-edition one-inch O.S. map of c.1830, and as 'Corngreaves Iron Works' on a map of 1862. (32) Even on the 1862 map the works were quite definitely water-powered, although lying on a small tributary of the R. Stour. By the time of the 1st-edition 6-inch O.S. map of c.1880, the works appear to have developed greatly and no longer look likely to use the limited water power available at this site.

40. Hedges Mill SO 950851

Taylor showed this mill by this name on his map of 1772, and it appeared similarly on the 1st-edition one-inch O.S. map of c.1830. It was called 'Hedger's Mill' on a map of 1862, (33) and 'Rag Mill' on the 1st-edition 6-inch O.S. map of c.1880. On the 1862 map it was shown as water-powered by the R. Stour; the later map was not clear on this point. On the 25-inch O.S. map of 1919 it was a 'Blacking Mill' and fairly definitely not water-powered.

ACKNOWLEDGEMENTS

The idea of the survey of water-powered mill and works sites on the River Stour is very much due to Mr. H.W.Gwilliam, and I am grateful to him for letting me have the use of his typed notes on the subject. Mr. M.V.Cooksley and Dr. E. Hopkins have both given me valuable items of information from old maps of Amblecote and Stourbridge. I would like to acknowledge the help obtained from the Science Museum Library in London, the Birmingham Central Reference Library and the Library of the University of Birmingham.

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# HURCOTT PAPER MILL near Kidderminster RECENT CHANGES

Photographs by H. W. GWILLIAM

The huge industrial complex known as Hurcott Mill (map grid reference SO 852778), which was once water-powered, and has had its history briefly told in a previous article; had to cease work through lack of business in the 1960s. Any hope of recovery was destroyed by a serious fire in 1974. However, the peak of its activity as a paper mill had been much earlier, in the middle of the nineteenth century; and we are fortunate to be able to reproduce in the next article, through the courtesy of Mr. A.F.Brown, a Probate Inventory and Valuation of 1877 which gives a clear picture of the extent of the main mill.

The fire-damaged buildings and the ancillary buildings, such as housing and coach-house, have now been incorporated into a modern housing conversion organised by Messrs. Cattell and Young of Kidderminster. This aims to preserve some of the character of the buildings and the complex, with the old large mill-pond as an attractive landscape feature. The 'desirable residences' that have been created are attractive in their own right, but it is no concern of the Midland Wind and Water Mills Group to advertise them, so interested readers are referred to the firm for details. What we present here is a series of photographs of the mill complex taken by Mr. Bill Gwilliam in August 1979, just as the conversion was about to start. Thus we record the last days of the mill site in its industrial form.

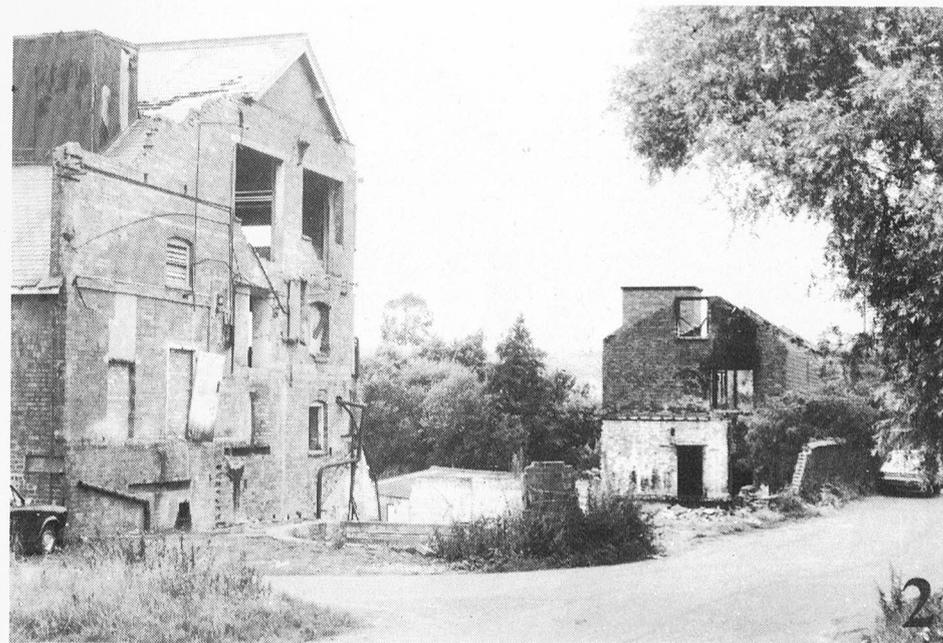
It seems to the Editors that this project is highly commendable, in preserving something of the mill complex and its atmosphere in circumstances where further industrial use seemed out of the question.

#### Reference:

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#### CAPTIONS OF PHOTOGRAPHS

1. Hurcott Mill. The main mill building from the pond. August 1979.
2. Hurcott Mill. Another view of the main building seen from the road over the dam.
3. Hurcott Mill. Another large building beside the dam.
4. Hurcott Mill. Another main building.
5. Hurcott Mill. A fine block of employees' housing.
6. Hurcott Mill. The coach house already in process of conversion to housing.
7. Hurcott Mill. Caves in the sandstone cliffs used for storage and stabling.
8. Hurcott Mill. Great concrete vats; the boys indicate the size.

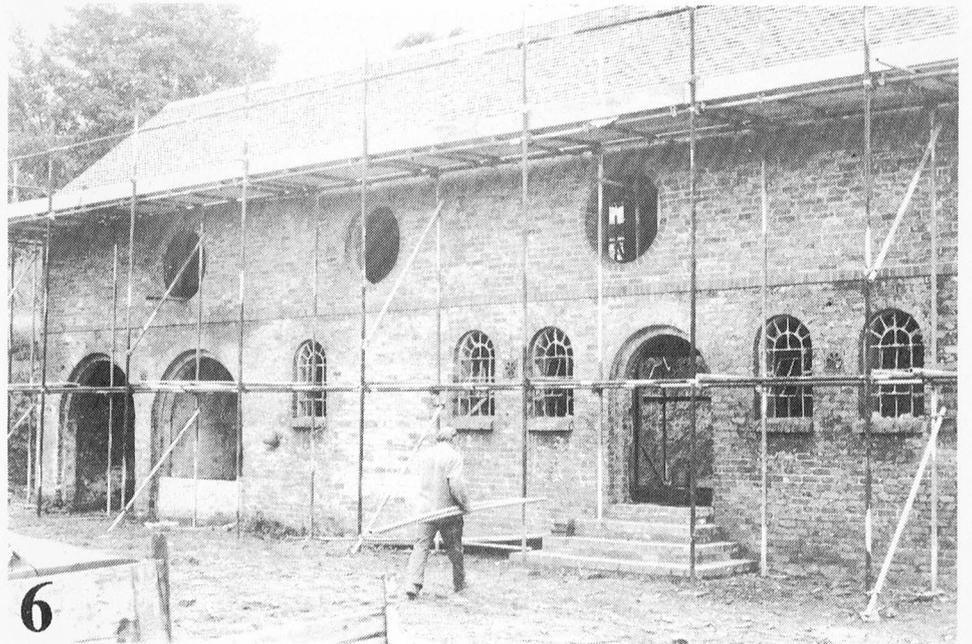


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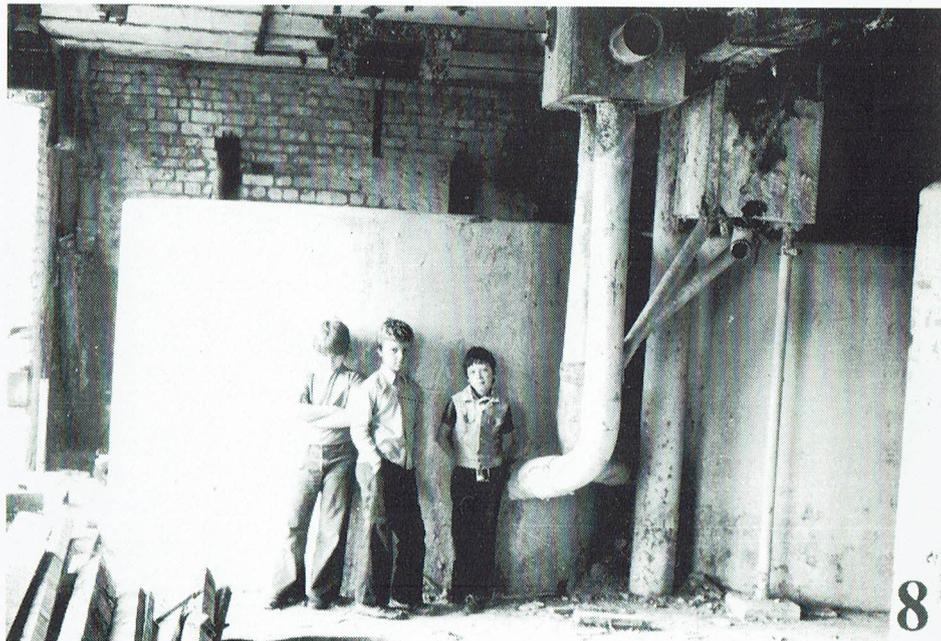


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## HURCOTT PAPER MILL INVENTORY OF ITS EQUIPMENT 1877

Based on the original 'find' by A. F. BROWN  
Transcription completed and edited by R. V. CLARKE

It is unusual to have available a list of paper-mill equipment in the detail found in this inventory, the original of which is in the Worcester County Record Office. Its publication is therefore a matter of some importance. Although the complete inventory and valuation includes the house and its contents and the farm as well as the mills, only the sections relating to the mills are included here.

Valuation for probate of the Household Furniture, plate, Wine, Pictures, Linen, Horses, Carriages, Farming stock, Implements of Husbandry, Machinery in paper Mills, Stock in Trade and other effects, late belonging to Thomas James, Esq. deceased of Hurcott, near Kidderminster made August 15th and following days by Messrs Tovey and Elgood

### Mills

#### Rag Boiling House

Two cast iron steam rag boilers 6 feet x 6 feet  $\frac{3}{4}$  inch thick and 3 feet 6 inches deep, with steampipes inside, and with cast iron covers and supports, 38 feet of cast iron piping to supply steam to - do - and six brass taps

Small cast iron reservoir connected with pipes

Deal rag box lined with Zinc 4 feet x 2 feet 14 rag tubs  
Wood spout

#### Rag Engine House

One rag engine of wood lined with lead 10ft 8in x 4ft 9in with culling cylinder, plate adjusting Bridge, wrought (t) iron shaft, 7ft 4in in diameter

Driving wheel and pinion with wrought (iron) shaft, 10ft  $4\frac{1}{2}$ in in diameter and pinion on end of do, working into internal driving wheel with Carriages & Cast iron supply pipes to this engine with wood troughs and deal fences to wheels

Large stone cistern 13ft x 8ft and 3ft deep, divided into 3 compartments

Wood Bin 6ft 9in x 3ft 6in and 2ft 8in deep

Wood cistern 8ft x 6ft and 4ft 8in deep

Wood Bin 8ft 6in by 3ft 6in and 2ft 10in deep

Wrought iron bleach cistern 4ft in diameter

29ft of Gutta percha piping  $\frac{1}{2}$  inch in diameter

20ft of 2in lead piping to cisterns

5 brass taps to - do -

Cast iron steam pipe 7ft 5in

7ft of  $\frac{3}{4}$ in wrought (iron) piping and 3 taps

Stone Cistern in 2 divisions 7ft x 4ft, 3ft 6in deep

5 half pulp boxes

Carriage for do

2 strainers

Bowls and buckets

2 Tubs

Lamp & sundries

#### Blue Room

Sundry deal boards and Rag bins  
26 paper Moulds  
150 lbs of Ultra Marine Blue  
250 lbs of smelt Blue  
60 cwt of Wrapping  
Scales & weights  
56 lbs of Soft soap  
112 lbs anti Chloride  
Bag of Twine  
Piece of flannel  
Oil cans and contents

#### Drying Room under Blue Room

3 deal drying Racks with upright bearers and cross rods  
Two deal step ladders  
128ft of 5in cast iron steam pipes and 20ft of 1 inch - do - to the Room  
2 small tables

#### Rag Cutting Room

Twenty four wire lattice cutting boxes, with drawers underneath  
Twenty four rag Boxes

#### Overlooking Rag Room

2 rag dusting machines complete, one with wood case, and one with wrought iron case with spindles and pulleys to - do -  
21ft of 2 $\frac{1}{2}$ in wrought iron overhead shafting with 4 carriages to - do -  
3 pairs of Bevil (i.e. Bevel) wheels 1ft 4in in diameter  
Two pulleys 2ft in diameter to dusting Machine  
8 $\frac{1}{2}$  feet of 2 $\frac{1}{2}$ in upright shafting with top bracket and step carriage  
Feeders to dust machines with wire lattice bottoms

#### Rag sorting & dusting Room

One large rag duster 4ft x 4ft covered with copper wire as erected  
Averys scales & weights  
Rag duster lattice wire  
4 Bins and boxes  
Rag teasing machine as fixed  
3 deal bins with divisions  
Deal sorting table with wire/lattice bottom 16ft x 3ft  
12 feet of 5in cast iron steam pipes under - do -  
Deal step ladder 8ft x 2ft  
Rope and windlass to top floor  
9 Boxes and Casks  
50 old rag Bags

#### Room over water wheel

Wrought iron horizontal shaft 2ft 6in x 2in  
One pair of do to drive upright (sic) shaft  
Wrought iron shaft 14ft x 1in square to drive the Rag delivering pipe to boilers  
1 pair of small spur wheels and 1 pair of small bevel wheels to do  
Carriages & wood framing to shaft  
2 cwt soda  
Avery's patent scales & weights  
Box and table

#### Large Vat House

Cast iron spur wheel 5ft 6in in diameter and 3in face on small wrought iron shaft  
Do - do - 2ft 6in in diameter on intermediate shaft to drive sifter  
Do - do - 2ft 6in in diameter working into last and drive agitator in long server  
2 shafts & carriages to wheels  
130 large post filts (felts), 130 demy - do, 130 foolscap - do, 130 double foolscap - do  
130 sheets & half - do, 130 Imperial - do, 130 sheet & third - do  
5 pairs of moulds  
140 Zinc pressing Bds (Boards)  
1 stone paper Vat 5ft 5in x 5ft with agitator complete and driving gear  
1 Pulp sifter & machinery  
1 pulp sifter & motion to shake - do - with shaft & racket (ratchet) wheels to - do  
1 server tub 3ft in diameter with agitator & motion on do  
1 other new paper Vat with machinery and sundries as described above  
Two other sifters and lifters to the original vats all complete as above with small wheel and shaft to give motion to - do  
3 large tub servers 6ft in diameter & 4ft deep with pair of Bevel wheels under & upright shaft through the tub, to work agitator  
32ft of 2in lead piping, 10ft of 2in - do, - to 3rd Vat  
142ft of wrought iron steam pipes round Vat house and 4 brass taps to - do  
Water cistern lead  
Cast iron winch with wheel and pinion & bracket attached to wall and rope to - do  
Heavy paper press, cast iron frame, screw & box  
6 trucks 3 lay stools 3 paper presses  
Machinery to drive Vat press:-  
Pair of Bevel wheels in sizing room 1ft & 2ft 6in in diameter  
29 $\frac{1}{2}$ ft of 3in wrought iron shafting into drying Room  
5 cast iron carriages to - do with pins & c & 1 wall box  
Cast iron friction clutch box, with strap to - do  
pair of Bevel wheels to work screwpress 1ft & 2ft 3in in diameter  
Cast clutch Crab & wrought iron lever to pull out of gear  
Cast iron wheel 4in diameter & pinion 1ft diameter to work back motion  
Wrought iron shaft 10ft long & 2in diameter  
2 cast iron hangers and 2 carriages to - do with wrought iron lever lift out of gear  
Pair of Bevel wheels to wind back the press 12in & 18in in diameter

#### Dry Room over Vat House

138ft of 5in steam pipes, 30 feet of 2in do and one tap  
Two step ladders  
Hanging rods and 7 sets of uprights  
Table

#### Sizing Room

Two sizing machines complete with troughs and rollers covered with flannel  
52ft of 3in and 5ft of 2in shafting with 9 Bevel wheels and 2 pairs of spur wheels with shafts, carriages and iron framing for driving the same, all complete  
36ft of 3in steam piping  
60ft of lead - do attached to pump in size house  
100ft of 1in lead piping from size boilers to sizing machine  
Pair of Bevel wheels 1ft 8in diameter at end of long shafting  
Three large tables

Rooms under Sizing House

24ft of 1 inch steam piping, 6ft of 8 inch - do  
2 benches 20ft x 2ft  
13ft of 3 inch steam piping  
Bench 14ft x 3ft  
2 stools

Size boiling House

Wrought iron boiler - 5ft diameter and 3ft 2in deep with Brass tap  
42ft of 3in steam pipes from Boiler  
2 iron taps in - do  
Brass 3in pump in size tub with shaft, lever, and gearing & 4 small spur wheels to drive same  
Wood size chest 7ft 6in x 4ft and 3ft deep  
Do - 3ft x 2ft and 2ft deep  
24ft of 1 inch steampiping and Brass tap  
5ft of 2in wrought iron shafting with carriages to work balance fly wheel  
Pair of steps  
Cast pulley 2ft 6in diameter with shaft carriages & fly wheel 4ft 8in diameter  
Five tubs  
Wrought iron tank 5ft 10in and 3ft 4in deep  
2 wood spokes

Steam Engine and Machinery

Portable high pressure steam engine with 2 cylinders 13in diameter working 2ft stroke with direct action to overhead shaft  
Cast iron Bed plate with 4 columns & framing to support the flywheel and gearing with valves, governors &c  
Cast iron spur wheel on fly shaft 1ft 6in diameter  
Do - do - 3ft diameter on counter shaft and geared with wood  
Wrought iron shafting 8ft 6in long and 5½in diameter with carriages &c to connect the fly wheel  
Cast iron spur wheel on end of last mentioned shaft 4ft diameter to drive shaft over water wheel  
Spur wheel 4ft diameter on end of long shaft working into last  
Wrought iron shaft over water wheel 9in diameter in the middle with 2 carriages- and wall boxes  
Cast iron spur wheel on water wheel shaft 8ft diameter to drive rolls and sizing machinery  
Spur wheel 4ft diameter on end of long shaft to drive rag engine  
Wrought iron gearing to drive wheel out of gear  
Spur wheel 6ft diameter on end of fly shaft to connect steam engine with rag machine  
Steam boiler 33ft long x 5ft 6in with 3 fool (i.e. foot) internal flue & 2 steam chests on top  
Cast iron grate and fire doors in flue  
Boiler fittings viz:-  
2 steam stop valves, safety valve  
Feed apparatus & indicator  
Brick boiler seating with flues & damper  
Range of steam pipes from boiler to steam engine 96ft - 4in diameter  
Boiler force pump 2ft x 5in with eccentric and gearing  
Cast iron supply pipes to the pump 53ft of 3in  
Do - pipes from pump to boiler 47ft of 3 inch  
Escape valve on pipes with weight and gearing  
Wood step ladder to boiler seating

Rolling Room over Steam engine

Cast iron spur wheel 4ft 6in diameter 5 inch face working into driving wheel on water wheel shaft  
Cast iron shaft 16ft x 5½in diameter with carriages  
Cast iron spur wheel 5ft 6in diameter and 1 do - 3ft 6in diameter to drive rolls  
Wrought iron shaft 6ft long 3in diameter with 3 Bevel wheels and levers for reversing motion to rolls  
Cast iron pinion 2ft diameter working 5ft wheel on end of rolls

Rolling Room

pair of cast iron pressing rolls 3ft 8in long x 1ft 6in diameter with small pinions on the end and fitted in cast iron frames, with brasses, top screws & hand wheel complete  
Wood bench to rolls 8ft x 3ft  
2 sorting and finishing benches 8ft x 3ft  
2 drying presses with wrought iron corner Bars, plates & screws  
Table  
quantity of Brass glazing plates  
Quantity of Zinc plating

Motion to Rolls in Large Salla (i.e. Salle)

Wrought iron shafting 68ft x 3¼in diameter from steam engine to large Salla (i.e. Salle) with couplings and 13 carriages & 4 cast iron brackets  
Pair of Bevel wheels in engine house 3ft and 1ft diameter  
Cast eccentric on shaft to work force pump to supply house with water  
2 small Bevel wheels on shaft, not used

In large Salla (i.e. Salle)

Pair of Bevel wheels at end of long shaft 2ft into 1ft with wood framing, upright spindle and 3 bevel wheels for reversing gear - with levers &c  
Pinion 9in diameter working into wheel 4ft diameter on end of rolls  
pair of cast iron pressing rolls 2ft long x 10in diameter in cast iron frames, with pinions on end of rolls, with Brasses, set of screws & steam heating box under Rolls  
Sorting table to rolls 8ft 6in x 2ft 6in  
Wood wind post with lever and rope  
Cast iron oven for heating press plates  
Cast iron winch attached to wall for press lever  
Deal table for picking paper in top room 30ft x 2ft 8in  
37ft of 4in steam pipes & one escape Valve outside the wall  
27ft of 3in steam pipes  
127ft of 1 inch - do  
Ream press with 6 wrought iron 2in bars, cast iron top plate, screw & lever box  
2 other presses with 7 wrought iron flat bars, wood heads & screw lever box  
Table  
Set of Avery's scales & weights  
Two boundary tables  
8 stools  
Quantity of glazed boards

Drying Loft over Size House

About 500ft of framing and hanging poles  
66ft of 3in pipes

New large drying stove

84ft of 8in steam pipes  
126ft of 3in - do and two taps  
58ft of 4in - do  
47 Hair line tussells (i.e. tribbles or trebles) and frames  
5 deal tables 5ft x 2ft  
4 ladders to loft

Drying loft by Carpenters shop  
112ft of 5 inch steam pipes  
6 hanging trestles  
500 hanging poles  
step ladder 8ft x 2ft  
2 small tables

Sella (i.e. Cellar) Washing place  
38ft of 1 inch steam piping  
Shaft of 12ft x 2 $\frac{1}{2}$ in diameter with 4 Bevel wheels for driving glazing machine  
40ft of 5in piping in Rag House  
40ft of 3in piping from Rag House to double pumps  
70ft of 3in piping down to the well  
Sella (i.e. Cellar) washing machines & fittings  
Washing Vat  
Rinsing Vat  
Beating stools & troughs

Yard  
Quantity of old iron  
Fire grate  
Old furnace  
Old timber and sundries

Smith's Shop  
Anvil & Block  
Pair of Smith's Bellows  
Vice and Bench  
Sundry Smiths tools  
Grind stone & frame  
Quantity of wrought scrap iron  
Quantity of old scrap cast iron

Carpenters Shop  
2 Work Benches  
Vat  
Odd timber  
Sundry tools

Stock of Rags  
13 tons of rags  
2 $\frac{1}{2}$  tons of half stuff  
7 cwt of Beat stuff

Stock of Paper  
52 Reams of 25 lb Fine demy  
67 Reams of 35 lb Medium  
9 Reams of 44 lb Royal  
45 Reams of 23 lb Large post (unfinished)  
280 reams of 15 lb contract Cap  
111 reams of 34 lb Medium  
78 reams of 24 lb sheet & half foolscap  
42 Reams of 16 lb line foolscap  
100 reams of 16 lb Lion cap  
140 Reams of 16 lbs line foolscap (unfinished)  
24 Reams of 23 lb Large post  
22 Reams of 34 lb double foolscap  
45 Reams of 22 lb sheet & third (unfinished)  
90 Reams of 16 lb line foolscap  
50 Reams of 16 lb 36 line - do  
26 Reams of 25 lb demy

35 Reams of 16 lb H & H demy  
40 Reams of 34 lb double foolscap  
46 Reams of broken and outsides of demy, Medium, double foolscap  
averaging 20 lbs per ream

Mill office  
Desk & tables, stool  
Shelving & cupboard  
paper scales & weights  
Tin Candlesticks

Lower Mill  
New Fly wheel  
Cast iron bleach chest 8ft x 5ft and 4ft deep - with deal cover to - do  
Rag Washer  
Wood spout & boarding  
3 Rag Boxes 2 sets steps Wood spout Long - do  
2 sets steps  
Stove & piping  
Extra cog wheel  
3 spanners tongs & sundry tools  
Stool, spout & ladder  
Quantity old iron  
Two deal drawers with iron bands & plates  
Wood bin 12 feet long with 3 drawers  
Lattice on warehouse 8ft x 3ft  
Deal winch with 2 wheels & rope  
About 15 cwt of Rags  
About 2 tons Pulp  
Rinsing Box and carriage to - do - on wheels  
About 40 yds of iron piping from spring to Mill and from Settler to Mill  
About 8 yards of iron piping under gravel  
About 15 yards from settler to pool  
Iron palley (i.e. pulley) with wood cogs  
4 iron hurdles  
Grindstone and frame  
Bone crusher  
Driving wheel, pulley, spur wheel & shafting with two pulleys & banding  
Extra spur wheel  
Long rake  
Bench & lot of ropes  
3 wooden boxes  
About 16 cwt of bleach & Barrels  
A quantity of glue pieces - do of dustings (no use)  
Set of Beam scales & weights  
quantity of ropes  
Chaff cutting machine, shafting & pulley  
10 step ladder  
Wood partition dividing warehouse  
Rag Lattice

We value the above at the sum of Three thousand, Six hundred & eight pounds,  
sixteen shillings & ninepence  
£3608.16.9

Tovey & Elgood  
Licensed Appraisers

# WATERMILLS AND WATER-POWERED WORKS ON THE RIVER STOUR, WORCESTERSHIRE AND STAFFORDSHIRE

## PART 4. HALESOWEN

by D.T.N. BOOTH

### INTRODUCTION

This part of the series of articles surveying the water-powered sites of the River Stour completes the main stream and is contiguous with Part 3. It is hoped that it provides a complete list of the sites but is by no means a comprehensive survey of their development.

### AREA

The majority of the mills lie within the parish of Halesowen though the streams which flow together to form the Stour rise in Hunnington, Frankley and Illey. From its source on the north side of the Clent Hills the River Stour flows roughly northwards through Halesowen. About one mile north of the town it bears to the west towards Lye and Stourbridge, covered in Part 3 of this survey. There are many tributaries joining the main stream in this small area but only three, Illey Brook, Lutley Brook and Coombes Brook contribute to the list of water-powered sites. In all there are sixteen mill sites in the area, but on only two do the mill buildings survive, one empty and semi-derelict, and the other converted into a house with machinery drawn from many sources.

It would appear that there were no mills in this area at the time of the Domesday Survey. Indeed there was no mill included in the manor of Halesowen when it was granted to the Bishop of Winchester in 1215. However, once the Abbey was built a mill soon followed, for in the reign of Henry III Roger, son of Roger the Clerk of Hales, gave permission to erect a mill and mill pool. This was probably on the site of Grange Mill. The Abbott had two mills worth 20s. in 1291, one perhaps being Notwic Mill, first mentioned in 1278. The new mill of Hales is mentioned in a court roll of 1293, though it was burnt down in the same year. After the Dissolution the surviving mills seem to have passed with the manor to the Lyttleton family. In 1672, besides the manor mills, there were also three mills belonging to Harry Haden.

Several of these early mill sites were used for metal working from the middle of the 18th century. As demand for iron wares increased new sites were created. Six sites remained as corn mills to the end of their use in the 19th or early 20th centuries. Two of the early sites did not even survive to the industrial era.

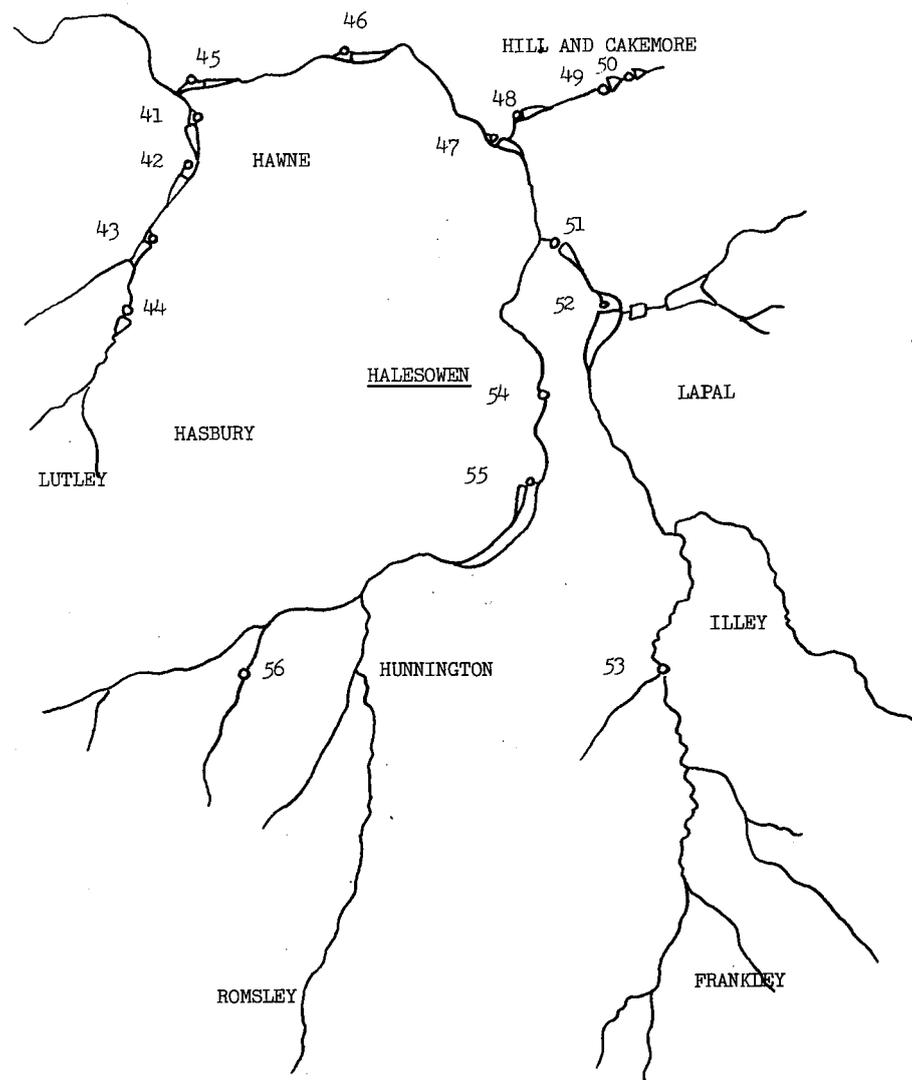
### REFERENCES AND ACKNOWLEDGEMENTS

As with the other parts of this survey, the notes of the late H.E.S. Simmons have proved a valuable foundation. The work of H.W.Gwilliam, 'Forges, Furnaces and Mills on the Upper Reaches of the River Stour', has also proved most useful. The detailed histories of Lutley Mill and Shilton Forge are taken from articles by Peter Barnsley, 'Two Old Cradley Mills', published in *The Blackcountryman*, Vol.2. No.1. Winter 1969, and 'Water-mill Reborn' in *Warwickshire and Worcestershire Life*, Feb. 1972. Much of the remaining information about Halesowen's mills comes from the notes of K.R.Gregory which are kept in Halesowen's Reference Library. Details about individual mills have been supplied by members of the Halesowen Local History Group and Gordon and Mary Tucker.

GAZETTEER - see Fig.17.

- 41. Bellevalle Forge
- 42. Shelton Forge
- 43. Drew's Forge
- 44. Lutley Mill
- 45. Corngreaves Bridge Forge

Fig.17. Water-powered sites in the Halesowen area.



- 46. Hayseeh Forge
- 47. Halesowen Furnace
- 48. Golden Orchard Mill
- 49. Lower Coombes Mill
- 50. Upper Coombes Mill
- 51. Halesowen Forge
- 52. Halesowen Mill
- 53. Illey Mill
- 54. Unnamed site
- 55. Grange Mill
- 56. Notwic Mill

41. Bellevalle Forge - Lutley Brook SO 953847

This was called Pastons Mill on Taylor's map of 1772. By 1843 it was known as Bellevalle Forge, owned by George Attwood. John Millward is recorded as a spade and shovel maker there in 1878. The Forge became part of the Corngreaves Ironworks and was sold with the rest of the company's property in 1893. It was described as 'Bellevalle Forge & dwelling house, comprising a three-storey dwelling house, containing six rooms, kitchen, scullery, etc., brick-built mill, one and two-storey shopping, stack, etc.' The forge had a 12 ft. diameter cast-iron waterwheel and wrought iron penstock with a 16 ft. shaft, an 8 ft. driving wheel and a 4 ft. pinion. There were two tilt hammers, shears, a grindstone and a 12h.p. horizontal engine with a cylindrical egg-ended boiler, fire blast pipe and stack. The tenant was a Mr. E. Blackwell paying a rent of £12 per annum.

By 1919 the pool had been drained though the forge was still in operation - presumably steam powered.

It is now the site of a large engineering works and none of the old forge buildings remain. The site of the pond is now a car park.

42. Shelton Forge - Lutley Brook SO 953844

Though marked as Beeters Mill on Taylor's map of 1772, it was known as Shilton Mill by 1777. On August 11th of that year Shilton Water Corn Mill was leased to Daniel Winwood by Thomas Brettell who had recently purchased it from Lord Lyttleton. Winwood was a 'chapemaker' - a chape being the hook of a scabbard, the metal cap of a scabbard-point, or the plate on the back of a buckle. On July 7th, 1778, Winwood mortgaged his property to John Taylor, Sampson Lloyd, Nehemiah Lloyd and Charles Lloyd for £1000 and interest on that sum. Despite selling other properties, including a 'Blade Mill' in Halesowen, he could not pay his creditors. By 1787 Winwood was bankrupt and at a public auction his lease on Shilton Mill was bought by Richard Eaton, the miller at Lutley Mill (44). Both mills had passed to his son Richard Augustus Eaton by 1807. Paying legacies of £200 each to his three sisters, decreed in his father's will, and improving Lutley Mill forced R.A. Eaton deeply into debt. In 1832, he sold the freehold of the mills to Francis Rufford, his chief creditor, with the right to re-purchase within fourteen years. In the meantime Eaton would rent the mills from Rufford in accordance with the valuation of two local surveyors John Davies and John Burr.

A schedule drawn up at this time shows that Shilton Mill had a steam engine and two waterwheels, one of 17 ft. diameter and the other 15 ft. diameter. The machinery was for edge tool manufacture, possibly scythes, but a footnote states that it would take an estimated £50 to put the mill in working order.

By 1837 Eaton was having trouble paying his rent and on December 18th 1837 he was declared bankrupt. All his remaining property was bought by Francis Rufford on April 23rd, 1838. The sale catalogue describes the forge as follows: 'Occupied by Richard Augustus Eaton. An Over-shut Water Forge, with 21 ft. or more of head and fall. This forge is adapted for plating Spades, Shovels and Scythes, or Tilting Steel, together with the Grind Mill. It has a 14h.p. Steam Engine, erected within the last few years and is connected with the Forge and Mill. It has two small tenements.' Rufford leased Shilton Mill to James Griffin and James Avery Griffin in 1839. It was described as a 'plating forge and mill, formerly a water corn mill' and the rent was to be £120, payable half-yearly. The Griffins

were still there in 1855 but the mill was occupied by Thomas Eades, a chain maker, in 1878 and had become a spade, shovel and anchor forge by 1884, now called Shelton Forge. It finally ceased work in the mid 1890's.

The pool was drained in c.1914 though its outline and dam remain. All the forge buildings have been demolished.

43. Drew's Forge - Lutley Brook SO 951841

The forge is shown on Taylor's map of 1772 on the south side of the Stourbridge Road. However, all subsequent maps show the buildings on the north side. The forge was advertised in the Midland Counties Herald of 1842. 'To be let and entered upon immediately, a powerful forge called 'Drew's Forge, in good repair, on a never failing stream with a 16 feet head and fall, one mile from Hales Owen and near to the Dudley Canal. Apply to Mr. Homfray on the premises.'

John Vaughan was forging spades and shovels there in 1844, followed by William Vaughan in 1845. Subsequent occupiers were Job Mills and Son in 1878 and Charles Edwards & Co. in 1895.

Water power continued to be used until c. 1914 when mining subsidence is said to have damaged the wheelpit. The forge closed in 1932, by this time using a gas engine, and subsequently demolished.

An open space at the junction of Bellevalle and Stourbridge Road marks the site of the forge. Its pond was on the south side of the main road but has been infilled.

44. Lutley Mill - Lutley Brook SO 949837

A Survey of Sir John Lyttleton's land during the reign of Elizabeth I mentions 'Birch's Millpond'. This is likely to have been on this site as the lane leading to Lutley Mill was known as Birch's Lane until housing development largely obliterated it in the 1950's.

In the 1780's it was occupied by Richard Eaton who, on October 2nd, 1786, renewed his lease for forty years. The lessor was Bate Richards, a Stourbridge maltster. Lutley and Shilton Mills passed to Richard Augustus Eaton by 1807. He mortgaged his property to Miss Mary Richards in 1822, probably to raise money to rebuild, or at least greatly improve, Lutley Mill. Much of the existing brickwork seems to date from this period and two plaques marking the Shropshire-Worcestershire boundary, which passed through the mill, are dated 1823. In July 1824 the mortgage was transferred to Messrs. Rufford and Biggs. Further debt led to the sale of the freehold of Eaton's property to Francis Rufford in 1832. Eaton rented the mill from Rufford until 1838 when he was declared bankrupt and all his property sold. The sale notice, dated April 23rd, 1838, gives the following description of the property:

'Overshut Water Corn Mill, five storey high, Three pairs of French stones, Machines and Dressing Mills, very complete and capable of grinding and clearing 300 Bags of Flour a week, with Bakehouse and Ovens, adjoining are sufficiently capacious for Baking upwards of 100 sacks of flour weekly.

The Gun-barrel Mill is in every respect complete, and in a present working state capable of boring and grinding 500 barrels weekly. The Steam Engine is 9 h.p. and connected with both mills, affording power to each, and in an excellent working state. The Water Wheel is 23 ft dia., Cast Iron Shafts, and wheels with a head and fall of 26 ft, and receives an abundant supply of water from a regular Stream and thus very rarely requires the aid of the engine. With the residence is 35 Acres, 2 Rods, 13 poles. Now belonging to Richard Augustus Eaton, a Bankrupt.'

Lutley Corn Mill was tenanted by James Morris in 1841 but was advertised in the Midland Counties Herald on January 20th, 1842. 'To be let and entered upon immediately. A Water Corn Mill with overshot wheel and working three pairs of stones with a bakehouse attached, called Lutley Corn Mill and Forge, one mile from Hales Owen. To view the same and for particulars apply to Mr. James Morris, on the premises.'

In 1844, while Joseph Morris is recorded as miller, John Starling tenanted the 'shearing and boring room etc' at Lutley Mill. William Hulstun became the miller in 1845 and in the census of 1851, the returns for Lutley list William Hulstone, aged 76, as farmer and miller. The forge may still have been in operation as two

gun barrel forgers and a gun borer lived nearby. Particulars of an auction sale in February 1870 refer only to the corn mill so perhaps the forge had gone by then. The last miller was Richard Fletcher, recorded in the trade directories from 1884 until 1896, though it is thought locally that the mill actually ceased working by 1890.

Although stripped of its machinery the mill building survived as a hay store. In 1963 it was bought by Michael Hubbard who converted the upper floors into an attractive house, retaining all the original features, and set about finding replacements for the machinery. Much of the gearing came from Pinkham Mill near Cleobury Mortimer while the main axle and sluice gates came from Eardiston Mill. A waterwheel was obtained from the mill at Welford-on-Avon - though entirely the wrong type for the wheel pit at Lutley. Lutley Mill's wheel was overshot whereas the wheels at Welford were undershot with open floats. Sadly Michael Hubbard died before completing his project but the mill stands as a tribute to his enthusiasm and energy.

The mill is a brick building of four storeys plus an attic. It has attractive iron framed semi-circular headed windows, no doubt dating from the reconstruction of 1822/3. The wheel was fed by a large pond, now dry, created by a dam across the Lutley Brook. The bottom two floors of the mill are below the level of the dam. There is a fine mill house adjacent. The gun barrel forge is thought to have stood between the house and the corn mill.

#### 45. Corngreaves Bridge Forge - R. Stour SO 954848

This was a spade and shovel works operated by Charles Edwards & Co. in 1878, being part of the Corngreaves Ironworks properties. It appears to have still been in use in the 1880's. In 1893 it was sold with the rest of the company's property being described as:

'A two-storey cottage and outhouse, also a lot of old brick buildings, formerly a spade and shovel works.'  
J. Webster was the tenant paying rent of £7 per annum.

The site of the works had been cleared by 1919 and the remaining buildings, including the cottage, went some years later. All that remains are some brick foundations by the river and the remains of the sluice gate housing which held back the river to provide the head of water for the waterwheel.

#### 46. Haysech Gunbarrel Mill - R. Stour SO 959849

The gunbarrel works is said to have been built in 1801, presumably on the site of an existing mill. The adjacent farm house, dating from 1770, became the master's house. The mill was sold in 1802, advertised in the Birmingham Gazette on October 18th.

'To be sold by auction. Haysech Mill, situate on the River Stour, near Hales Owen, in the county of Salop, late the property of Mr. Gill of Birmingham, about half a mile from the turnpike road leading to Stourbridge held for a term of 99 years of which 91 will be unexpired on 16th February next. There are two water-wheels of 16 feet diameter and machinery for boring and grinding gun barrels, polishing sword blades etc., supplied with water from a pool of two acres with 18 feet head and fall. Haysech Mill is universally allowed to be the best and most substantial mill on the River Stour. Apply to Mr. Robinson on the premises.'

The mill had been acquired by Benjamin Attwood by 1878 and still making gun barrels. It was later the premises of the Birmingham Gun Barrel Co. Ltd. who still operate from modern buildings adjacent to the mill, manufacturing metal pipework. Part of the new works is built on land reclaimed when the mill pond was drained after the use of waterpower was abandoned.

Much of the old works still survives, now converted into small factory units. The conversion has been sympathetic to the age and importance of the site. Three grindstones, a trip hammer and a small hearth are being retained as reminders of its former use. The grinding shop, at the west end of the site, carries the name 'Burr' on its datestone of 1801. This is likely to have been John Burr who ordered the shrouding and arms for a 16 ft. diameter waterwheel, a bevil wheel of 118 cogs and a pinion of 36 cogs from G. and R. Turton of Kidderminster on September 24th 1850.

#### 47. Halesowen Furnace - R. Stour SO 967845

The blast furnace was built in 1602 and finally closed in 1772. It was being operated by Humphrey Lowe in 1606. In 1692 it was held by the 'Iron Works in Partnership' which controlled six forges, four slitting mills and two furnaces along the R. Stour. Sir Thomas Lyttleton was the most important partner at Halesowen Furnace, the other members of the group being John Wheeler of Wollaston, Richard Wheeler, Richard Avenant of Shelsley, Paul Foley of Stoke Edith, Hereford and his brother, Philip Foley of Prestwood. Zachary Downing was in charge of the furnace at this time.

A wide range of castings was produced including heavy hammers, anvils, fire-backs, stoves, smoothing irons, cast plates for furnace floors, finery forges and mills and hearths for chafery forges. The furnace also supplied pigs to Wilden and Whittington Forges and further afield.

After the furnace closed down the water power was used to operate a rolling and slitting mill. This was offered to be let in July, 1814.

'To be let. A Rolling and Slitting Mill and Steel Furnace called Hales Owen Furnace, situated near Hales Owen in the county of Shropshire. Apply to the agent to the Right Hon. Lord Lyttleton.'

By 1827 the mill was out of use and again advertised.

'To be let or sold. The iron works lately used by Mr. John Burr as a forge and Rolling Mill, situate at or near a place called Hales Owen Furnace, in the parish of Hales Owen.'

In 1844 the site was being used by Wood Brothers as an anvil, vice, chain and spade forge. Reuben Lewis was a 'manufacturer of Hammered Iron' in 1852 and by 1878 the site was shared by Edward Davis and Joseph Sidaway, spade and shovel manufacturers. It was still marked as a spade and shovel works on the 1919 O.S. 25in. map. By 1926 the mill was being used by A.L. Grove as a button works. Its last use was the grinding of waste horn from the main button works on the Stour-bridge Road to produce fertiliser.

In 1945, when the site was visited by the late H.E.S. Simmons, he found the buildings largely demolished but the remains of the waterwheel and some gearing. His description of the site is as follows:

'...this forge is at the bottom of Furnace Hill near its junction with the main Dudley road, and from what remains to be seen one can imagine these works to have been fairly extensive, with large flood gates spanning the stream on the north side and additional buildings on the opposite side of the road. The largest of these latter, a well built 3 storey brick structure, bears a tablet inscribed "J.S. 1881", the initials referring to the Sidaways family who were spade and shovel manufacturers and the last to occupy the premises.

The wheel was a 20 ft. by 4 ft. all-iron high breast fed by a shaped iron pentrough from a channel cut under the road, and had an 8in. rim and two sets of eight arms tapering from 4in. to 3in. There also remains the pit wheel 10 ft. diameter by 8in. face engaging a smaller wheel, and some shafting with pulleys running along the east wall above the wheel and pentrough.'

Today even less remains. Some ancillary buildings still stand, occupied by a variety of small firms. The pond has been infilled though the weir and flood gate supports remain. The site of Sidaway's building is now a car sales depot.

#### 48. Golden Orchard Mill - Coombes Brook SO 968846

Little is known about this mill. It was certainly working in c. 1822 when it was tenanted by Thomas Hodgetts of Golden Orchard Farm. The owner was the Rev. Cornelius Cartwright. Presumably it was a farm mill always associated with Golden Orchard Farm as no references to millers occur in the trade directories of the period. The mill disappeared during the construction of the mineral railway to Coombes Wood Mine. However, the pond survived well into this century. It has now been drained and the site is part of a large industrial estate.

49. & 50. Upper and Lower Coombes Mills - Coombes Brook SO 972848

Both were in use as corn mills in c. 1822, occupied by Benjamin Wakeman and owned by George Attwood. Lower Coombes mill was then known as Peppers Mill. Upper Coombes Mill had been demolished by 1887 but the lower mill continued until 1908. It was used by Thomas Parrish in 1884, followed by his widow Mrs. E. Parrish in 1888 and finally by John Grainger from 1892.

When the late H.E.S. Simmons visited the site in 1945 he found some remains. (The mill) was fed by a pond on its east side. The pipe feeding the wheel still projects from the bank, but of the mill only the east wall, the wheel pit and part of the wheel remains. The wheel was an overshot, 2ft. 6in. wide with naves 2ft. 6in. across carrying sockets for eight wooden arms, and there was a 16in. round metal shaft. The mill ceased working in 1908 when the colliery was opened (Coombes Wood) and was demolished in 1922 when the cart shed to the west of it was converted into a cottage, the mill having stood idle in the meantime.

Even these few remains have since been swept away. A slight hollow now marks the site of the mill, between two modern factories.

51. Halesowen Forge - Illey Brook SO 969841

This was shown as a forge and mill on Sherriff's map of 1812. By 1844 the forge was occupied by Wood Brothers, anvil, hammer, vice and edge tool makers. They were followed by Joseph Hipkiss, hammered iron manufacturer, in 1853 and Samuel Sidaway, iron founder and anvil butt maker, in 1878. The buildings were still standing in 1918 but the mill pond was heavily silted and much reduced in size, suggesting that the forge no longer operated.

The site has now been completely cleared. A slight hollow marks the site of the forge next to the Dudley Road.

52. Halesowen Mill - Illey Brook SO 973838

This mill was advertised in the Birmingham Gazette, March 10th, 1800. 'To be sold by auction. A new erected Water Mill now used for drawing wire and situate at Hales Owen, one mile from that place on the Bromsgrove road, and now in the occupation of Messrs. Bedford and Kempster. Apply to Solicitors.'

The new mill presumably replaced an earlier structure but early use of the site is unknown. By 1845 Halesowen Mill was occupied by Aaron Rose, gun barrel manufacturer. It continued to be used as a gun barrel mill and tube works until the 1970's. By that time the old water powered forge had long since been abandoned, a large new works being erected at the beginning of this century.

Nothing remains of this building today. The whole site, including the pool, is occupied by modern factory units. The position of the pool dam is still detectable by a marked change in ground level.

53. Illey Mill - Illey Brook SO 974820

On January 20th, 1806 this mill was offered for sale, being 'a freehold Water Corn Mill with two pairs of stones and all machinery, situate at Illey, near the Grange, Hales Owen.' It was offered again on January 11th, 1819 now described as 'a powerful Corn Mill working two pairs of French Stones and dressing machines ... lately occupied by Mr. John Crutchley, deceased. The water wheel is entirely new.'

By 1834 the mill was owned by Mr. Charles Eyland of St. George Street, Walsall and occupied by a Mr. Bell. John Potter was the miller in 1844, followed by William Baylis. He used the mill until about 1900. By the time Mr. William Tibbitts (Tibbett) bought the property in c. 1905 the wheel was broken and the machinery in poor state. The wheel was said to be an iron overshot with a wooden shaft. This and the machinery was removed c. 1910.

The building still stands, though rather derelict, adjoining the mill cottage which is occupied. The site of the wheel and the watercourses are clearly visible.

54. Unnamed site - R. Stour SO 968833

There is a clear mill site at this point with a weir and sluices dating from the nineteenth century but no doubt renewing an existing system of watercourses. There seems to be no direct evidence to link the site with early corn mills in Halesowen, but that roads called Great Cornbow and Little Cornbow lead to the site must be significant.

55. Grange Mill - R. Stour SO 968828

It seems likely that Grange Mill stood on the site of the mill built by the Abbott of Halesowen Abbey in the reign of Henry III.

The last structure dated from c. 1800, for in that year it was advertised as 'a capital and new erected substantial Water Corn Mill, with two pairs of new grinding stones, machinery, etc. .... Now in the possession of the proprietor Mark Grove who will show the premises. Apply to Mr. John Burr, Millwright, in Hales Owen.'

In 1844 the miller was Joseph Moss, followed by W.Green in 1854, B.Wakeman in 1860 and Charles Richard Moseley in 1876. C.R.Moseley ran the mill until it closed c. 1905. Most of the machinery had been removed by 1945 when H.E.S. Simmons visited the site. A photograph of 1925 shows the mill disused but the external high-breast shot iron waterwheel and penstock in position. The three storey brick-built mill adjoined the mill cottage.

All this has now completely disappeared under new housing development.

56. Notwic Mill - R. Stour SO 955820

This was one of the earliest mill sites in the region and probably the first to fall out of use. It was mentioned in 1278 but seems to have had a short life. Local historian K.R.Gregory found the site of the mill while researching the history of Hasbury. Fields in the vicinity of the site had retained the name, corrupted to 'Knot Wig' through to the 19th century. The outline of the mill pond is still visible with a large part of the dam intact with some stonework.

# THE RISE AND FALL OF THE FULLING STOCKS

by A. J. PARKINSON

Fulling is one of the final processes in the production of woollen cloth. Before cloth can be used, it has to be scoured to clean out grease and dirt, and (in the case of heavy fabrics such as mediaeval broadcloth or the later 'Welsh webs') shrunk and felted so as to close up the fabric. Until the Middle Ages this was effected by pounding or treading the cloth in a suitable detergent; but by the end of the 12th century this tedious and time-consuming process had been mechanised by the development of the fulling stocks. They were powered by water, and were to be found in a fulling mill, tucking mill or walk mill. (Three names for the same thing.) In Wales the vernacular term was 'pandy' or 'felin ban' - the meaning is the same, a house or mill where pounding was done.

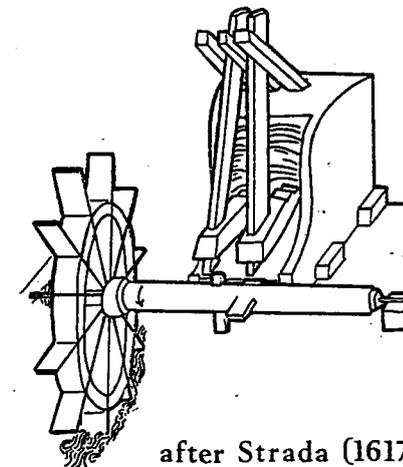
The earliest references in England to a fulling mill seem to be in 12th century documents<sup>4</sup>, and the 'fulling stocks' are specifically mentioned in the poem 'Piers Plowman' of 1346<sup>5</sup>. The earliest illustration of the mechanism of a fulling mill seems to be dated 1607<sup>3</sup>, and it shows machinery to all intents and purposes identical to that illustrated in Rees' 'Cyclopaedia' of 1819<sup>6</sup>. The stocks consist of two long inclined wooden beams pivoted on the upper end and having heavy shaped wooden 'feet' on the lower ends, each weighing about 2½ cwt. A tappet wheel driven by a waterwheel raises the extreme bottom end of each stock alternately and lets it fall so that the 'foot' drops into a shaped wooden trough. Cloth to be scoured or shrunk is carefully folded into this trough, and left for anything up to twelve hours pounding in water and detergent. The traditional detergent in Wales for scouring was stale urine and pig's dung; soap or fuller's earth was also used, but was more expensive<sup>7</sup>.

Other designs of fulling stocks are known; in Denmark<sup>6</sup> and Romania stocks were in use which dropped vertically or nearly vertically, in appearance rather like the Cornish ore-stamp. These had the advantage of a simpler framework and design of foot, but it is doubtful that they were actually more efficient, since the shaped foot turns the cloth slightly as it strikes, so that every part of the fabric is pounded equally. Direct derivatives are the Irish 'wash-mill' and the Scottish 'beetling mill', used to finish linen cloth<sup>8</sup>.

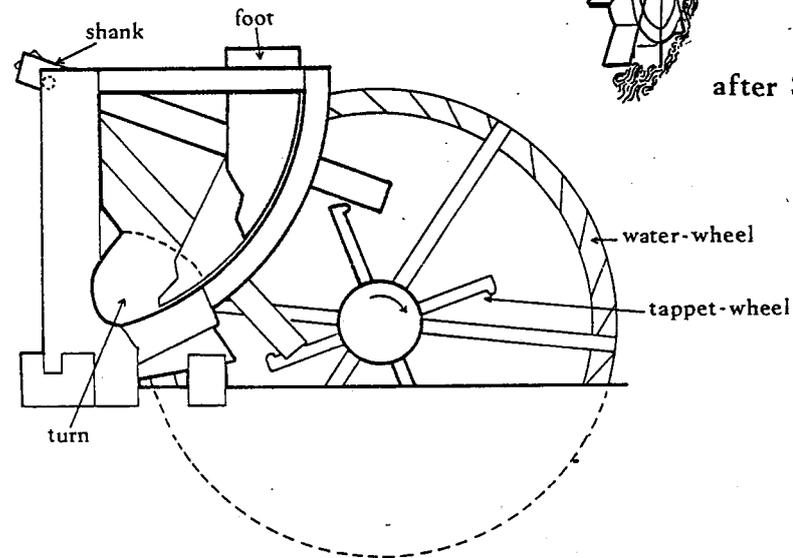
A fulling mill is mechanically very simple - a waterwheel and a tappet-wheel, with no need for intermediate gearing. To date only two mills are known to survive in Wales; one is of the archetypal simple form, in the woollen mill from Esgair-moel (Breconshire), now in the Welsh Folk Museum (but currently dismantled because unsafe). The other, Moelwyn Mill, Tanygrisiau (Merioneth), is more complex; belts and gears connect the tappet-wheel to the waterwheel partly because local conditions meant that the waterwheel was set below the level of the mill floor, partly because the same power-source drove a lot of other equipment in the upper floor. The fulling stocks at Moelwyn Mill are of a late-19th century design developed by the millwrights Kilburn of Holbeck; the trough and pivot-support are of cast iron, so that the stocks may be placed anywhere in the mill, instead of having to be braced against a solid wall to reduce vibration.

But in addition to these two complete survivors, there are references to and ruins of hundreds of other examples in the wool-producing counties of Wales. In Merionethshire alone (which was one of the chief areas for the manufacture of 'Welsh webs' in the 18th century) about 60 sites are known, and at least another

## FULLING-STOCKS

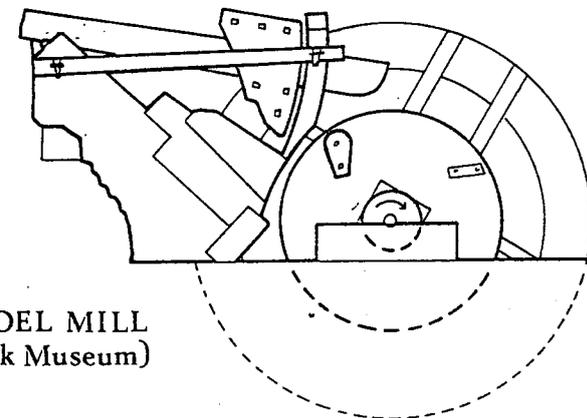


after Evans (1850)

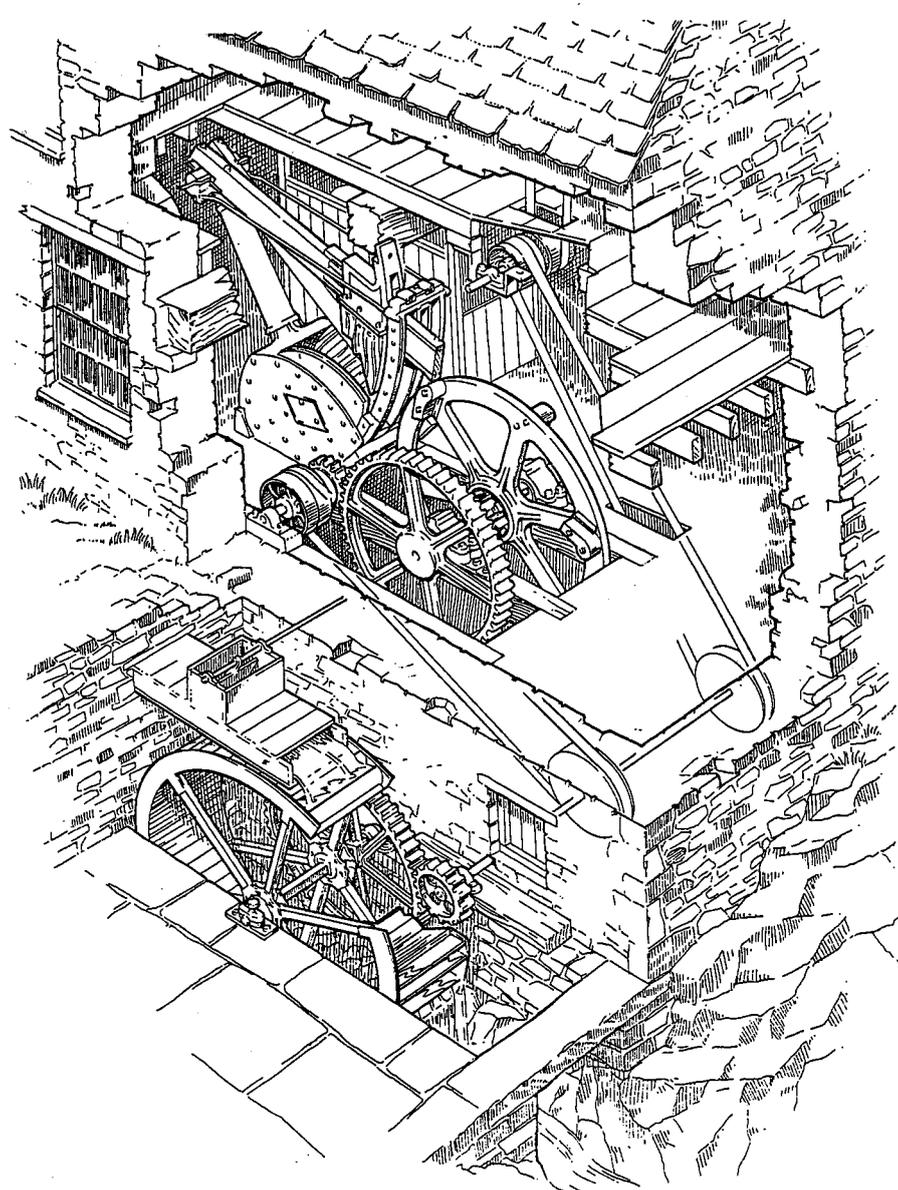


5ft

2m



ESGAIR-MOEL MILL  
(Welsh Folk Museum)



MOELWYN MILL

twenty from Cardiganshire. The few surviving photographs indicate that the old-style wooden stocks were generally used, and fragments of machinery from two Cardiganshire sites confirm this. Another set of Kilburn stocks was photographed before it was dismantled, and it is probable that others were in use in the large factories of Montgomeryshire and Carmarthenshire.

Fulling mills were in use in Wales at least by the end of the Middle Ages - two were included in the former grange farms of the abbey of Strata Florida in the 16th century documents<sup>11</sup> - and a few continued to operate commercially until after the Second World War<sup>12</sup>. But place-names and documentary references indicate that there were literally hundreds of them; how can this information be interpreted?

Geraint Jenkins implied that very large numbers of mills may have been in use at once<sup>13</sup>. This is in direct contradiction of contemporary evidence, at least in respect of Merionethshire, where Lewis Morris stated in 1748<sup>14</sup> that there were eighteen mills at work in the county, not the sixty known to have existed at one time or another. The Tithe Award maps of the 1840s suggest that no more than a handful of mills were then active.

This discrepancy in numbers may be explained by the interaction of several different factors. On the one hand, the history of the woollen industry in Wales has been one of boom and slump: in Merionethshire the combination of a collapse in the export trade of heavy 'webs' due to the Napoleonic War and the contemporary growth in popularity of the new lighter worsted cloths of Yorkshire led to a catastrophic decline from which commercial woollen production never really recovered. In Carmarthenshire and Montgomeryshire the industry rapidly expanded in the late 19th century, using the 'new technology' of power looms and other machines to produce blankets and light woollen cloth; but by the 1930s this area was also in decline, because fashions changed again and cheaper, more desirable fabrics could be obtained from England.<sup>15</sup> These lighter fabrics did not require so much fulling; instead they could be finished in a 'milling machine' first patented by John Dyer in 1833 and subsequently improved by Kilburn of Holbeck.<sup>16</sup> This machine squeezed the cloth between two rollers instead of thumping it; it was also less messy, and much safer. Lerry Mills, in Cardiganshire, bought its first milling machine in about 1870 after a (presumably fatal) accident when one of the fullers slipped on the greasy floor and fell under the stocks. By the end of the 19th century the old-style fulling mills were only patronised by weavers whose customers preferred or required the old-fashioned heavy woollens.

On the other hand, the design of the fulling mills themselves contained the seeds of their own destruction. According to Rees in 1819<sup>17</sup> the fulling stocks delivered thirty to thirty-six blows per minute, and a length of cloth would be fullered for up to twelve hours continuously. As noted above, the construction of the machinery was very simple; at Esgair-moel the stocks are pivoted on a massive oak framework bedded into the wall of the mill, which is itself built into the slope of the ground. This has the effect of minimising the very considerable shocks of operation - thirty-plus blows of 2½cwt per minute, even delivered on to wet cloth, must set up inherently destructive vibrations. A number of ruined mills had the stocks similarly located - for instance, Pandy Rhydypanyd (Llangeitho, Cardiganshire), and Pandy Esgairwen (Llanfachreth, Merionethshire). Esgair-moel was rebuilt at the Welsh Folk Museum in about 1951; the machinery is already in such a condition that it cannot be used, and has been dismantled for eventual reconstruction. Photographs of other mills suggest that the feet of the stocks had to be replaced or repaired at intervals: perhaps after a period of time the constant hammering weakened not only the wooden parts but also the actual buildings beyond repair.

Finally, it is clear that the actual organisation of the industry altered over time. Until the 19th century most of the processes of woollen manufacture were dispersed, cottage industries; the modern factory industry was impossible before the invention of carding mills, spinning machines and finally power looms. But fulling mills were a different matter, since they always required a major capital outlay combined with relatively heavy running costs. In Wales at least the fuller (who was in some cases a dyer as well) seems to have been the local organiser

and focus for the outworkers. He would buy in raw wool, dye it, send it out for carding, spinning and weaving, bring it back for finishing and then sell it.<sup>19</sup> During the 16th century most Welsh cloth went to Shrewsbury for resale; but as the export trade contracted, more was made to customers' orders only. As more machines became available, the fuller either became a manufacturer (in the 18th century sense of the word) and extended his activities - as probably happened at Llan uwchllyn, where the former pandy became a 'factory' with at least one spinning jenny - or he declined in local importance to become just another outworker, eventually becoming redundant as the new lighter fabrics and the new larger factories became dominant.

#### Appendix - Power requirement

According to Rees,<sup>20</sup> Smeaton discovered by experiment that a pair of fulling-stocks required 4hp. His breast-shot waterwheel used 1200 - 1400 cu. ft. of water per minute falling one foot - that is, between 74,784 and 87,248 ft. lbs. per min. By Smeaton's own definition of horsepower (the work done to raise 352 cu. ft. of water through 1 foot per minute, i.e. 21,936 ft. lbs. / min.), the stocks would require 3.4 - 4hp; but using the modern definition (1hp = 33,000 ft. lbs. / min.) the requirement would be 2.26 - 2.64hp.

Using the standard formula for calculating the work required to lift a weight of S lbs. through H ft. X times per minute ( $W = XSH$ ), the work required to operate the fulling-stocks at Esgair-moel would be as follows:-

$$S = 280 \text{ lbs.}$$

$$H = 1.5 \text{ ft.}$$

$$X = 72 \text{ (2 hammers, 36 beats per hammer per minute)}$$

$$W = 72 \times 280 \times 1.5 \text{ ft. lbs. / min.}$$

$$= 30,240 \text{ ft. lbs. / min.}$$

$$= 0.916 \text{ hp.}$$

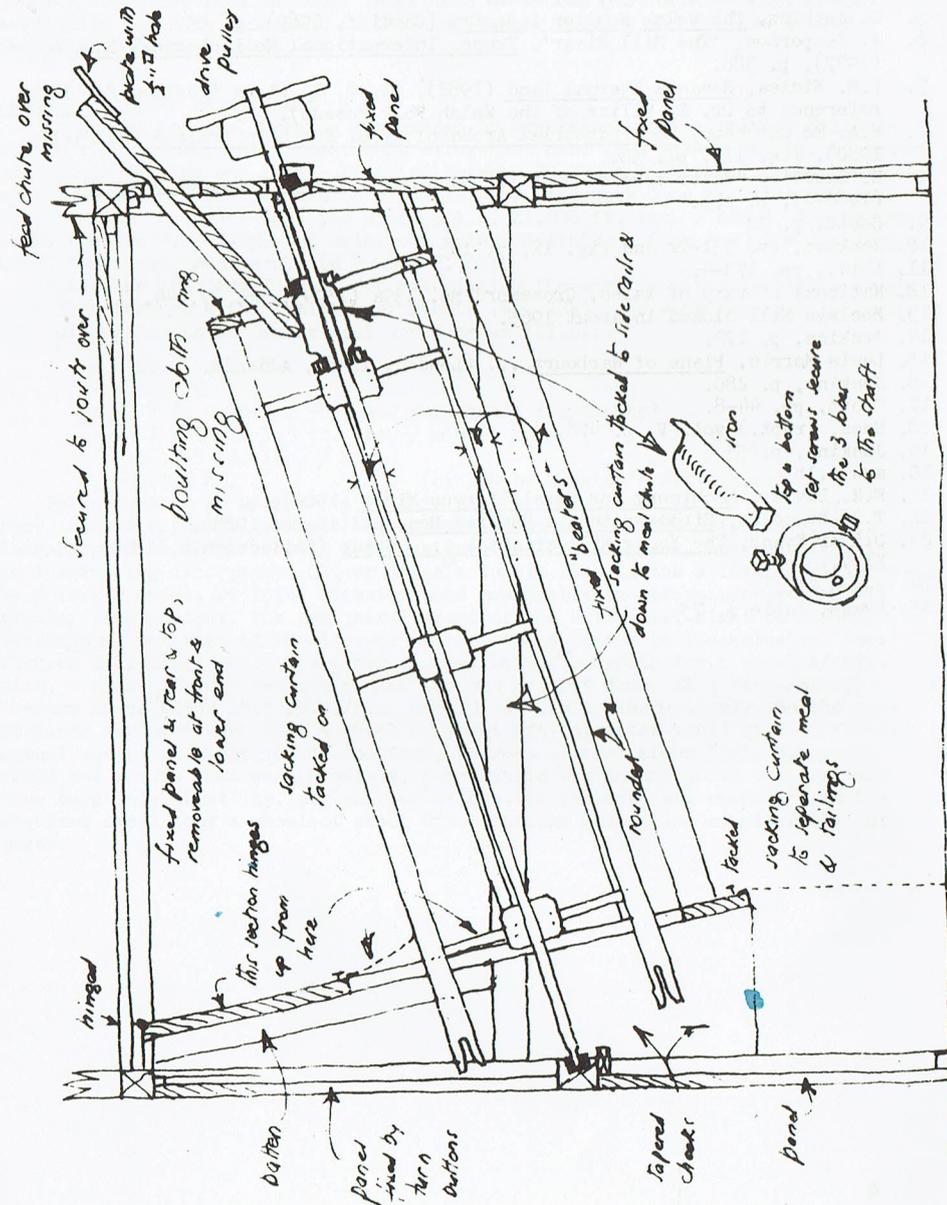
(or 1.4 by Smeaton's definition).

But according to Davies' table<sup>21</sup> this size of waterwheel (8' 6" diam. by 2' 9" face) should actually generate approximately 4hp at 50 - 70% efficiency.<sup>22</sup> Frictional losses would no doubt account for considerable loss of power, but that is still an interesting discrepancy. Oliver Evans<sup>23</sup> actually illustrates a fulling-mill driven by a larger wheel, of 10ft. diameter, and presumably therefore proportionately greater power output. The peripheral speed of the waterwheel might be a factor determining the size of wheel used; however the evidence is inconclusive. Rees' figures indicate 15 - 18 revs. per minute; Davies<sup>24</sup> suggests for a wheel of 8ft. diam. a speed of 18.3 revs./min. and for one of 10ft diam. 12.3 revs./min., whereas Evans<sup>25</sup> gives 14.7 revs./min. and 13 revs./min. respectively. So the constraints may have been that a wheel of about 6ft. diameter would give sufficient actual power but might rotate too fast, whereas a wheel above 10ft. diameter would not rotate fast enough safely. Hence while the actual power required may have been only about 1hp. per pair of stocks, to activate the machinery at the required speed took a wheel of about 8ft. diameter generating considerably more power.

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