THE MIDLAND WIND AND WATER MILLS GROUP

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 with their preservation and restoration. its area is the region loosely defined as the Midlands, especially the central counties of Staffordshire, Shropshire, Worcestershire and Warwickshire.

The group holds monthly meetings, with talks and discussions, during the winter, and arranges mill tours and open days during the spring and summer. Members periodically receive a Newsletter and the Journal.

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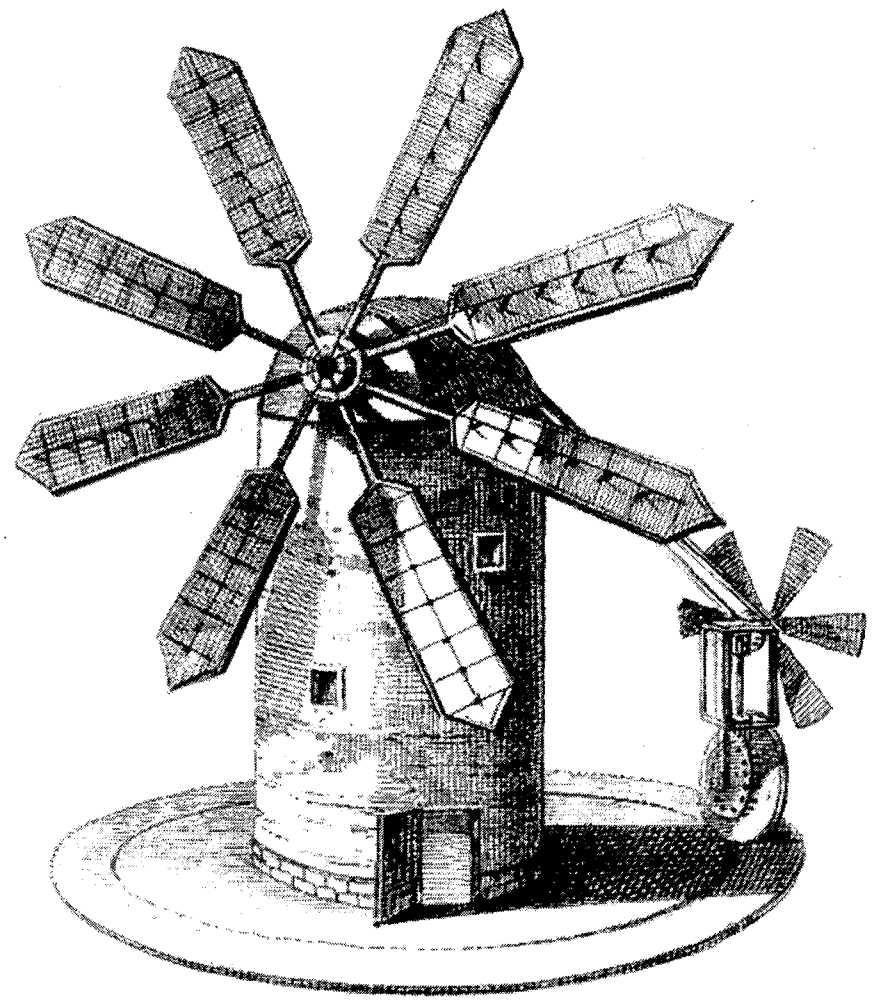

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Wind and Water Mills is the Journal of the Midland Wind and Water Mills Group and is therefore naturally concerned with the mills of the Midlands, but it is not intended to be narrowly parochial. Interesting and important articles relating to mill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

Cover Illustration: A drawing of a windmill visited by Reinhold Rücker Angerstein in 1754. (See pages 49 - 56)

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TEWKESBURY'S FLOUR MILLS

by Anthea Jones

Tewkesbury's flour mills have at least three claims to fame. The first is that in 2002, flour is still milled in the building erected on the Quay in 1865 by Samuel Healing and is distributed widely. The second is the fictional resonance of the Abbey Mill, a water mill which formed the central place for the 19th century novel *John Halifax, Gentleman* written by Mrs Craik (Dinah Mulock) in 1856. In the novel, there is a reflection of the events of 1795 in the town, when the extremely high price of wheat, and so of flour, led to riots. But in the story the author conflated what happened in more than one place, describing how rioters attacked the mill and the miller defiantly threw his bags of wheat into the river. In fact, on 21st July "a mob of women assembled at the Quay and seized a quantity of flour, in order to prevent its being sent off by water. Five of the most active of them were tried at the Gloucester assizes, and sentenced to six months imprisonment each".[1] The novelist has introduced the attack on the mill; as it will be shown in this article, there was no mill on the Quay at this date. The third item of note is the considerable early feat of civil engineering which brought a flow of water in a major river, the Avon, to work the water mills, by linking it with the small river Swilgate which in turn flowed into the Severn. This article will explore some historical puzzles concerning Tewkesbury's flour mills, and also indicate sources which maybe used to throw light on their history.[2]

The Abbey or Town Mills

Like many water mills, Tewkesbury's can claim to be mentioned in Domesday Book. Two mills were part of the large manorial estate which in 1086 was held by King William. Shortly afterwards, the manor of Tewkesbury was granted to a faithful Norman baron, who in turn in 1105 endowed his newly-founded Benedictine abbey with two corn mills, and it is clear that these two mills, which continued in the abbey's possession until its dissolution in 1540, were side by side on the Mill Avon. Maps of Tewkesbury show the how the rivers almost surround the town, and the site of the abbey's mills on its south side. At some time, presumably before 1086, a long cut was made which linked the Avon and the Swilgate; the cut is now known as the Mill Avon but often in the past was called simply the Avon. The name itself is a fruitful source of confusion. The cut necessitated construction of a weir in the Avon close to its confluence with the Severn, where the flow is considerable, and the creation of canal banks to hold the water at a higher level than the land lying to westwards. A great deal of surplus water poured over the weir into the Stanchard Pit, and continued past Tewkesbury Quay to the Severn. This arm has always accurately been called

the Old Avon. The weir blocked navigation above Tewkesbury Quay, with the result that cargoes transported on the Severn had to be transhipped at the Quay onto the Mill Avon for destinations like Evesham and Stratford higher up the Avon. After turning the mill wheels the water flowed into the Swilgate and thence into the Severn, and a bypass channel carried surplus water past the mills. It should be noted that the cut followed closely the contour of the slightly higher ground along which Tewkesbury's main streets ran. To the west of the town is the great meadow or "Ham" which frequently floods. A big flood covers the banks of the Mill Avon and joins it to the Severn in a great sheet of water which completely surrounds the mills.

There are not many medieval references to the Tewkesbury mills, but some are rather puzzling. In 1211 "the mills of the town" were referred to as belonging to the honour of Gloucester.[3] As the lord of Tewkesbury was also the patron of the abbey this must explain the reference. Only a windmill was mentioned in the enquiries which were held into the estates of the earls of Gloucester on their deaths, the *Inquisition Post Mortem*.[4] The purpose of these enquiries was to establish the extent of an estate held directly from the king, and who was the rightful heir; enquiries were held in Tewkesbury seven times in 80 years, between 1296 and 1375, as first De Clares and then Despensers died young.

Probably there were two early medieval mills, each with a waterwheel, to which the abbey added a third mill which was a fulling mill. Two mills belonging to the abbot of Tewkesbury were amongst the taxable assets of the church recorded in 1291, in a list prepared to help the king collect papal taxes; the tax had been assigned to Edward I for six years to encourage him to enter a crusade, and hence is known as the *Pope Nicholas Taxation* or *Taxatio Ecclesiastica.* The same document recorded a fulling mill, the profits of which went to the abbey's Kitchener.[5] In 1535 another survey of church wealth, the *Valor Ecclesiasticus*, also recorded "Mills at Tewkesbury: two water corn mils at the end of the town of Tewkesbury situated on the River Avon occupied by the monastery" and worth £10 a year; in addition, £2 rent from "Barcocke's Mill" went to the Kitchener, which therefore seems to be the fulling mill referred to in 1291. There is no specific reference to a fulling mill after 1291; but in mid-16th century an important citizen of Tewkesbury, Giles Geast, was a clothier and mercer who owned looms and houses occupied by weavers, and had Letters Patent granting him the right to "seal" cloths,[6] and there were many other trades associated with the cloth industry, so that a fulling mill might still have been in use. The woollen cloth industry declined in the 17th and 18th centuries.

The monastery's extensive property was in the Crown's hands following the dissolution of the abbey in January 1540, and a survey was prepared, written on many sheets of parchment. It included "all those mills formerly the abbey's" which had been leased in June 1540, together with Tewkesbury Park, to Henry Jernyngham. This house, often called "The Lodge", and the park had for some centuries been the centre of the royal manor of Tewkesbury; the Crown had leased this estate to the Abbey in 1504.[7] It was sold by the Crown in 1550. Sometime later there are leases of the mills by the owners of Tewkesbury Park; throughout the 17th and 18th centuries this was a member of the Popham family. The mills were called the "Town Mills" in the

description of the bounds of the borough in the charter of Elizabeth I to the town in 1575;[8] the name "Abbey Mill" became fashionable in the 19th century. Towards the end of the 16th century, one of the mills was enlarged by adding a water wheel; by 1594 there were certainly four mills.[9] Moreover in 1619 the Court of Sewers for the River Avon ordered the demolition of a fifth water grist mill, one of Sir Frances Popham's five mills "being a great nuisance in the river".[10]

Four mills, that is four water wheels, survived on this site from 1616 until the present. Whether the physical layout of the mills altered before the late 18th century is not known. There is some indication that they continued to form two units; in 1694 Alexander Popham's lease to Isaac Merrill and Joseph Blackborne bakers, referred to "All those three water corn mills being under one roof";[11] the fourth mill was therefore probably separate. The first certain record of a reconstruction, in 1793, was reported by James Bennett, the historian of Tewkesbury who collected so much valuable information together; "Tewkesbury abbey mills were rebuilt by Mr. Richard Jenkins, who placed therein eight pair of millstones which were worked by four large water wheels".[12] He had purchased the mills and other property in the immediate area from John Wall, the husband of a Popham who inherited the Tewkesbury Park estate. The mills were from this time grouped into an Upper and a Lower Mill. The first map of Tewkesbury, which William Dyde placed at the beginning of his *History and Antiquities of Tewkesbury* in 1790 shows clearly the footpath passing between the Upper and Lower Mills, giving access from Church Street and Mill Bank to the Ham.

Until the later 18th century, men were rarely described simply as millers; their stated occupation was either "baker" or "maltster", even though the production of flour must have been of significance in a town of about 2000 inhabitants in mid-16th century, and 2866 in 1723 (an exact census). In 1575, when Tewkesbury obtained a royal charter of incorporation, 25 maltmakers, out of 245 whose occupations were stated, were the second largest group amongst the first freemen of the borough. No wonder that at the same date, inhabitants within the town were forbidden to make malt between the last day of May and the first day of September - barley must have been used to make bread flour at least before the new year's harvest of wheat was available. Eight of the first freemen were bakers, and probably one of the bakers was a miller, though this was not stated specifically.[13] Similarly when a new town charter was obtained in 1686, the list of freemen included nine bakers, though only three maltsters. Richard Cooke, was named in 1694 as the lessee of the mills prior to the new lease granted to Merrill and Blackborne, bakers. He was described as a baker in 1672 and 1674 when taking an apprentice; on the first occasion it was his own son, which was a way of ensuring he became a freeman without extra payment. But when Isaac Merill and Richard Cooke jointly signed a covenant with Alexander Popham in 1694, they were described as "millers of Tewkesbury", as also were Joseph and John Blackburne in a similar document.

In the 18th century, milling appears to have been more often linked with malting than with baking. On the bank of the Mill Avon adjacent to the Abbey Mills there was a "great barn'" which had belonged to the abbey, and this was adapted as a malthouse and on occasions was certainly occupied by the lessee of the mills; it was still marked

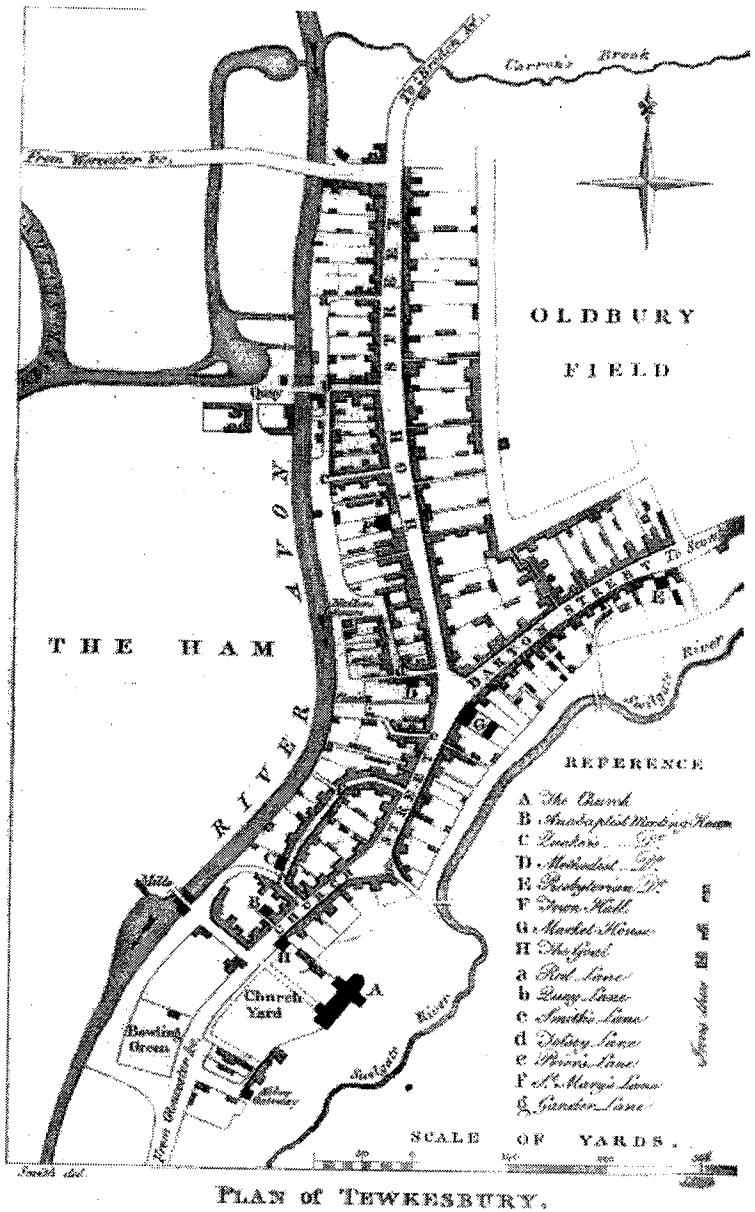

Figure 1. The map of Tewkesbury which accompanied William Dyde's *History and Antiquities of Tewkesbury* (1790), showing the Abbey Mills to the south, divided into Upper and Lower Mills, and the Quay to the north.

as a malt house on later 19th century maps. In 1757 William Mew the elder, for example, was a maltster, miller and flourman. He was one of eight men refusing to pay tolls to Tewkesbury Borough Council, which had the power to charge for corn loaded at the Quay or passing to and from the town over the Quay Bridge which crossed the Mill Avon; the tolls formed the major part of the Council's income. Thomas Mew, maltster and dealer in corn and grain and Samuel Mew the younger, bargemaster and maltster, also objected, forming quite a family cartel.[14] A settlement was achieved and they agreed to make some payments to the Council, but tolls were again a subject of dispute in 1800.

Information on occupations becomes more common as Trade Directories began to be published and *Bailey's Directory* of 1784 is an early example. It listed William Mew, "miller and maltster", and he was one of only 27 men named in the Directory; he was probably the younger William at the time of the tolls protest. He was also a member of the Borough Council, a small self-selecting body of men. In the Borough rating assessment of 1780 and again in 1791 he was recorded as the occupier of the corn mills and land, rented of John Wall Esq., and of a house and malthouse.[15] The mills were considerably more valuable than any other property in Tewkesbury and were rated at £72; the largest inn in the town, the *Swan*, was rated at £40 and only six houses exceeded £20. Where they have survived, rating lists, especially for the collection of money to support the poor (Overseers' rates) are a particularly useful source of information on owners and occupiers.

An order of the local justices of the peace in the period of exceptionally high corn prices in January 1802 gives an indication of the quality of flour made at this period: bread for the next three months was not to be any finer in quality than standard wheaten bread *viz.* made of the flour of wheat without any admixture or division, and was to be "the whole produce of the grain, the bran or hull thereof only excepted, and shall weigh three out of four parts of the weight of the wheat whereof it shall be made". The order was repeated many times in the following few years.[16]

An unusual source of information on the mills, and indeed on many aspects of everyday life in Tewkesbury, is the long series of notebooks, starting in 1800, of the local firm of Moore & Sons, Estate Agents and Auctioneers.[17] The 20th century novelist, John Moore, was a member of the family, and briefly worked in the family firm. In *Portrait of Elmbury*, a thinly disguised portrait of his home town, he described the premises at 46, High Street;

> "The walls of this office - and indeed of every room in the building - were lined with books: books in red morocco bindings, several thousand of them, which contained the 'Particulars of Sale' of every property that had passed through the firm's hands - almost every dwelling-house, in fact, every farm, smallholding, shop, pub, orchard and meadow within six miles of Elmbury."

Valuations were recorded using various codes.

The first reference to the mills is dated 1807, and is a valuation of the effects of Michael Proctor, deceased. In the *British Universal Directory* of about 1790 he was identified as a maltster. The Upper Mill contained six pairs of stones, the Lower Mill

Figure 2. The Abbey Mills from the Ham; the footpath runs under the white clapboard north end of the mill.

five pairs. A small frigate and two other boats were included with the Upper Mill, with 38 bolting cloths; 23 bolting cloths and a house boat were included with the Lower Mill, also pigsties, a cider mill house with cider mill, a cow house, rick yard, dwelling house, brew house etc. His house in Tewkesbury was large and well-equipped. He was also a farmer, and there were cows and calves, lots of pigs, sheep and lambs, hay, five cart horses, and all the implements of husbandry in and around Tewkesbury. It is interesting to note that his farming interests were worth over £7000, but the effects in the mills only £256.

A great deal of information is available on the estate of John Jenkins. In 1821 the stock in the malthouse was valued on being transferred from Jenkins and Butts to Mr John Jenkins. It included 100 bushells of malt, £40, 4½ sacks of flour, double ground, £13, and 4 sacks of bread flour, 23½ of meal and 2 of oats. Eighteen months later, in May 1823, a first sale of his property was held at the *Bell and Bowling Green*. The first item was "a stack of mills, the Abbey or Town Mills", with which was a pound of water a mile long; this described the Mill Avon from the weir above King John's Bridge on the north side of the town to the Abbey Mills on the south. The supply of water was said to be more than sufficient for the present machinery, and a net income of £500 a year was taken from the grinding. The machinery was of cast iron of the "best construction". The mills were "newly built", and "admirably arranged". The malthouse

Figure 3. Abbey Mills viewed from the south with the rivers in flood. To the right of the mill there is the end of the Great Barn or malthouse.

and counting house was "stone-built" and "very strong", and contained two kilns, and a large leaded cistern and pump; the floors were well-laid and there was room on the site for eight tenements in addition to the very large malthouse. Jenkins also owned the Bell Inn, the Bowling Green behind the inn, four cottages, stable, fold yard, cow stalls and piggery on Mill Bank. To those who know Tewkesbury, this summons up a surprising picture of the rural nature of the area, which has now a neat row of houses facing the mill pond.

Despite the agent's helpful descriptions, only the *Bell* was sold on this occasion, for £1100. In September 1823, the sale of a number of mill items followed - bushells of excellent flour, a mahogany miller's staff and an oak one, a "very capital malt bruising mill with a pair of six inch steel rollers, frame, hopper etc", and 200 sacks. What were the 14 bushells of lime used for? In July 1824, this time at the *Swan*, the other properties were successfully offered for sale; the double malt house went for £520 and Jenkin's house for £840. The price of the mills is coded, but was perhaps £5000. The final sale of John Jenkin's "effects" was in March 1825: the frigate of 20 tons, a fishing boat, a capital winnowing machine by Chambers, six dressing machines covered with wire, a capital malt mill, writing desk and stool and pigeon holes - a glimpse of an old-fashioned office. Mr. Thomas Arkell had probably become the miller as in 1826 he passed the mill stock over to Mr. Joseph Bird. Soon after, the viability of the Abbey mills was challenged by the erection about 1830 of a steam mill on Tewkesbury Quay. It was a small enterprise but it pointed the way, introducing the potential for a quite different scale of operation which has continued to increase to the present day. However, the challenge was not yet clear.

One William Proctor was at the Abbey Mills in 1839 according to a rating assessment, and he or another William continued there until 1858; John Stanton was the owner. It is an indication of the traps in statements in *Directories* that while John Stanton was stated to be a miller in Tewkesbury in *Slater's Directory* in 1852, in the Borough rating assessment he was the owner of the Abbey Mills while William Proctor was the occupier. A table of wages for the week ending 17th March 1854 shows 17 men and 13 women who were '"doublers" employed in Room C; there was one engineer, one gasman, and one carpenter.[18] Seven men living in Mill Court or Mill Bank gave their occupation as "miller" in the 1851 Census, and one living in Church Street, as well as Samuel Healing and John Stanton. About 1854 the mills again underwent an extensive work of reconstruction on the upper or Pound side, "up to which time the approach to the Ham ran directly through the centre of the Mill".[19] The path was diverted to the northern side, and is still in constant use.

A decade later, the much larger Borough steam mill was erected on the Quay. The scale of operation outclassed the Abbey Mills, but still they continued to work into the 20th century. William Rice occupied the Abbey Mills by 1881, and then William Rice and Company.[20] A large turbine was installed, while two water wheels were still used to drive eight pairs of stones, and to produce the mill's electric lighting which also supplied part of the town.[21] There was said to be a local demand for stone ground meal. Rices were entered in *Kelly's directory* in 1914 and 1923 as millers and corn merchants, with premises in High Street, the Quay and the Abbey Mills. But they were no longer in business in Tewkesbury in 1927. Before 1933 the mills had become a luncheon and tea room, though the water wheels were still intact. It was the death of grindstone milling which finally stopped the Abbey Mills.

The Borough Mills at the Quay

It is sometimes suggested, for example in the authoritative *Victoria History of the County of Gloucester* that there were water mills on the Quay prior to the erection of a steam mill there about 1830, and the history of Healings' Mill (published about 1980) also assumes that the mills were located to make use of water power. Water transport was certainly a factor in the siting of the new steam mill, but not water power.[22] Tewkesbury Quay was close to the junction of the Old Avon with the Severn, and was a scene of busy activity, particularly in sending malt up and down the river and receiving corn and coal. To reach the Abbey Mills, boats had to pass through the lock into the Mill Avon. The churchwardens' rating assessment for 1839 noted a mill on the Quay occupied by Thomas Bluck; but in the overseers' rating list of 1842 Thomas Bluck was the owner of a "steam flour mill" at the Quay, making the situation clear, and Richard Proctor was the occupier.[23]

Meanwhile the Healing family had come to Tewkesbury. Samuel Healing, maltster, lived in Church Street in 1820. Samuel Healing and Sons were millers in 1852, the mills being at Strensham north of Tewkesbury and at Cox's mill, Evesham. According to T. W. Hibbard in a later account of Gloucestershire flour milling, Samuel Healing took over the Abbey Mills and the Quay Mills in 1858.[24] If so, he soon wished to increase the size of his operation in Tewkesbury. In the Register of 12th December

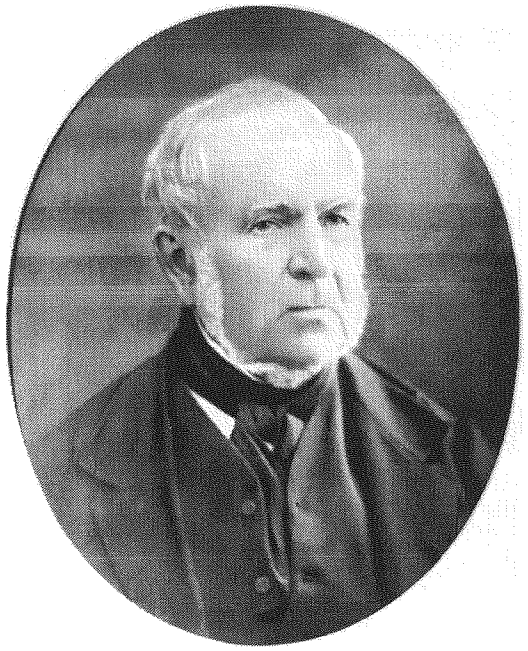

Figure 4. Samuel Healing (1799 - 1883)

1863 there was an item headed "Board of Health. Proposed Improvements on the Quay" and it continued:

> "Mr. Lewis (of the firm of Moore, Lewis and Moore) said he attended on behalf of Messrs. Healing, to submit to the notice of the Board, a work of great public improvement and importance. Messrs. Healing proposed to erect on the site of the warehouse, lately in the occupation of Messrs. Rice, just over the Quay Bridge, and leading towards the Locks, a large steam mill."

Samuel Healing, the founder of the firm, was in his mid sixties and was one of the leading townsmen of Tewkesbury. His sons, William and Alfred, were in their early thirties and their names appear on an indenture of 1864 as taking possession of the site for the new mill from William and Michael Procter, whose tenant was Messrs. Rice. They acquired also a basin on the Old Avon where barges are moored, and there was a branch railway linking the Quay with the main Gloucester-Birmingham line.

Early in 1866 the paper reported that

> "Messrs. Samuel Healing and Sons' Borough Flour Mills are now completed and in operation. The mill building is 80 feet by 40 feet, and contains seven floors, all of good height. The whole of the works have been executed by Mr. W. H. James of Tewkesbury, who has furnished the designs and has had the sole charge and superintendence throughout. The mill contains 12 pairs of stones and the most approved description of

> machinery for elevating and cleansing the wheat and dressing the flour. The whole is driven by a MacNaught engine of 30 nominal horse power, supplied from two 30 foot double tubed boilers, seven feet in diameter."[25]

W.H.James was a partner in the firm of Collins and Cullis. The building was a handsome one, of brick, with a prominent inscription "Borough Flour Mills". The name was a nice variation from "Town Mills" which was the name used so often of the Abbey Mills. A few years later, in 1874, a similar large storehouse was erected on the other side of Quay Lane; the building has long had a remarkable tilt, very obvious from the other side of the river: the brick courses which are not parallel to the water give the impression that the water runs uphill.

A flour mill with 12 pairs of millstones could have supplied a substantial market. For instance, with two pairs idle for stone dressing and the mill running for only 40 hours per week, enough flour could have been produced to supply 11,000 people at the rate of 5 lbs. of flour per person per week. As the population of Tewkesbury was at its maximum in 1861, 5876, but then began to fall a little, the new mill had sufficient capacity to supply not only the whole town, but an extensive additional market. Healings' site at Tewkesbury placed them in the category of "country millers", compared with the increasingly important firms at the large ports. Economic milling became partly a problem of transport costs, so improved river navigation and good rail links were vital, to allow flexible strategies in wheat buying and flour selling. In the later 1850's nearly three quarters of the wheat available for consumption was produced at home, and just over a quarter came from overseas suppliers, but the pattern of wheat supply was gradually changing. In the early and mid 1860's 40% was imported and the trend continued, spurred by rapid technical change in the milling industry, and later in the century imported wheat made up nearly 70% of the total. Much of the foreign wheat was harder than English; the home-grown varieties produced bread of superior taste, but the foreign wheats gave stronger flours and bolder, well-piled loaves. The popular criteria had become appearance and economy.

Healings' new Borough Flour Mills represented a major development, not only by their size in 1865 but, notably, for the technical changes introduced 20 years later. In 1885 Healings introduced Carter's automatic roller system into the Borough Mills, thereby associating themselves with the more progressive millers in the country. Radical changes in British milling practice had begun in the late 1870's with successful experiments by Henry Simon of Manchester who became the leading milling engineer; next in prominence as consultant and contractor was Harrison Carter. Hard wheats could not be milled effectively by millstones without producing large quantities of bran fragments. The problem was overcome by using roller mills, with pairs of chilled cast iron, fluted rolls to break open the grain. Roller mills were introduced particularly between 1883 and 1885, with another major phase of development around 1890. Smooth iron rolls were used to reduce the interior of the grain to flour and numerous designs of sieving and purifying machine were developed to separate components and eliminate the bran.[26] In the early and mid 1880's millstones were gradually replaced and in the early 1890's they became obsolescent. Referring to the decay of the country water mills that had previously supplied the smaller towns and rural communities,

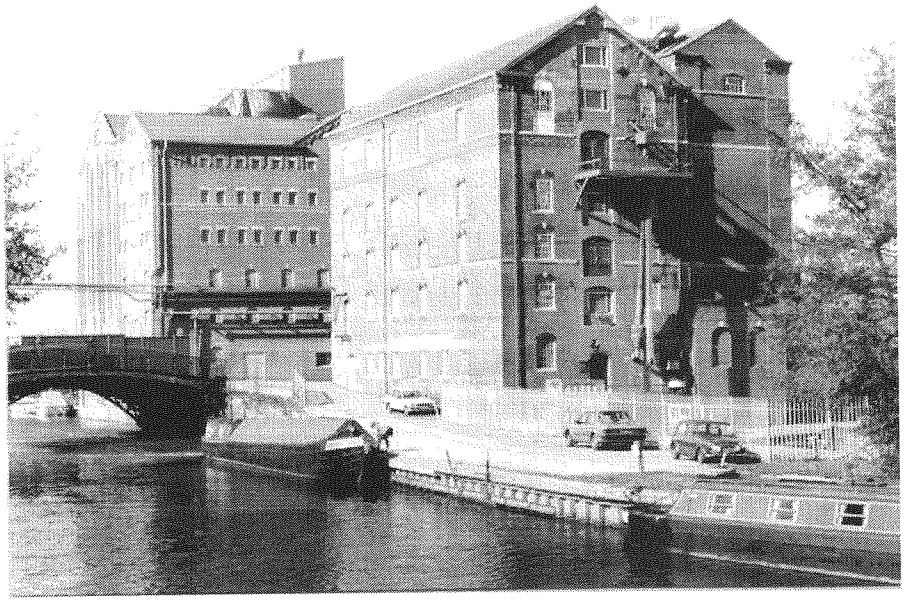

Figure 5. Healings' Borough Mills with the Quay Bridge over the Mill Avon. The original mill is on the right and the oldest warehouse is beyond the bridge.

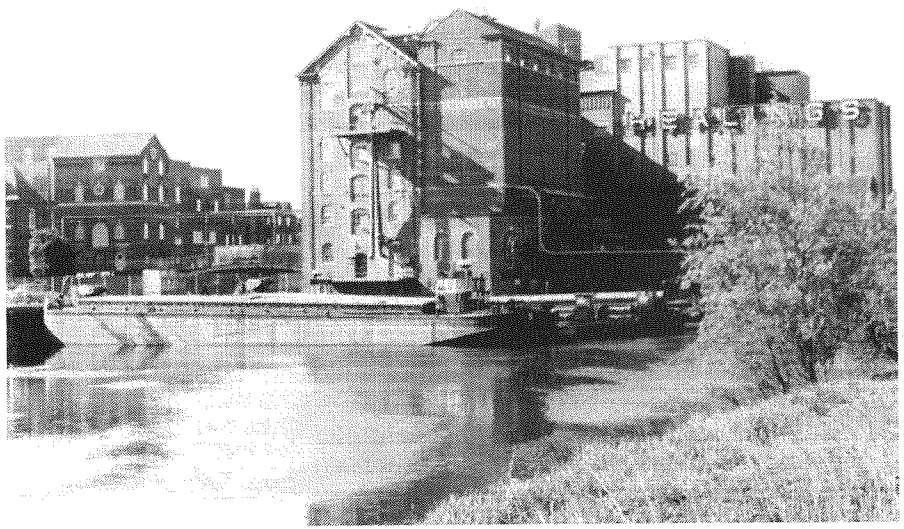

Figure 6. Healings' Mill from across the Old Avon with barges now unused moored in the basin.

T. W. Hibbard, principal of J. Reynolds & Company of Gloucester, observed in 1897 that "there is scarcely one now making flour for sale". Whereas the small mills either stopped or survived on provender trade, Healings' business prospered and the tall brick buildings still dominate the view along the Mill Avon.

There was a major extension to the wheat storage building in 1889 and probably improvements in the main mill at the same time. Gardner's 1891 *Visitors Guide to Tewkesbury* noted the "huge block of buildings known as the Borough Flour Mills. These mills are capable of turning out between 3,000 and 4,000 sacks of flour per week, being fitted with the most approved machinery, and lighted by the electric light". A more accurate report was that the mills had a productive capacity of 25 sacks per hour or 3,500 sacks per week. In comparison, J. Reynolds & Company's Albert flour mill at Gloucester then had a capacity of 20 sacks of flour per hour and Priday Metford's City flour mills could produce 15 sacks per hour. A sack was 280 lbs of flour. These were the three principal mills in the area. Gardner's *Guide* in 1903 amplified the description: "Messrs Healings' Borough Flour Mills, which are fitted up with admirable modern machinery and lighted with electric light - a great desideratum in the interests of health - and which supply in a great measure the Midlands and South Wales with flour". The extent of Healings' market ensured their survival in the fiercely competitive conditions of the English industry.

The 1892 Convention of the National Association of British and Irish Millers met in Gloucester. An excursion to Tewkesbury by river steamer was planned for one afternoon and Healings' Mills were open to visitors. The programme and account of the mills was published in *The Miller* on 6th June 1892. Healings' silo a little further down the Mill Avon was said to hold 7,500 quarters of wheat. The next time a convention met in Gloucester was 1927. Once again members inspected the Tewkesbury Borough Flour Mills, by this date operating on the Simon "Alphega-Plansifter" system, following remodelling in 1922. "Practically all the foreign wheat used at the Borough Mills is brought along the Severn direct from Avonmouth and Sharpness, and the same route is used for the despatch of a large proportion of the finished products". Rail and canal transport routes were also used and there was a fleet of road wagons. The report in *Milling* on 11th June 1927 emphasised the cleanliness of the mill, and the high proportion of "top patents" produced.

After a further remodelling in 1932, another account appeared in *Milling* on 10th June 1933. Messrs. Simon had increased capacity to 30 sacks per hour. The perfect cleanliness of the mill and machinery "is an outstanding feature". Steamers and barges brought corn to the mill and storage bins had a capacity of 10,000 quarters. The Woodhouse and Mitchell engine now developed 500 i.h.p. At the same time the business became a private limited company, S. Healing & Sons Ltd.

In 1961 the business was acquired by Allied Mills Limited and in the mid 1970's the mill was again remodelled, with the installation of a large new milling plant of the latest modern design. In 2003, Healings was bought by ADM of the United States, the Archer Daniels Midland Company. Although the branch railway has gone, and water transport is not important, Healings is still well-sited for supplying inland markets, and continues to be an important business in Tewkesbury.

References

1. Bennett, James, *Tewkesbury*, 1830, p.313.
2. This article is a much expanded version of the account in Jones, A., *Tewkesbury*, 1987.
3. *Victoria County History of Gloucestershire* (*VCH Glos.*), 8, assumes that there were both town mills and abbey mills at this date.
4. Abstracts of *Inquisition Post Mortem for Gloucestershire* were published by the British Record Society and Goucestershire Archaeological Society between 1893 and 1914.
5. The "*molendin follat*" is abbreviated from *molendinum follatio* (or *fullatio*); *follat'* should not be read as *sollat'*, and so does not refer to the River Swilgate as was suggested in *VCH Glos.*, p. 139.
6. Gloucestershire Record Office (GRO) Hockaday Abstracts 369/will of 1558.
7. *VCH Glos*, 8, p.132.
8. Bennett, p.379/80.
9. *VCH Glos*, 8, p.139.
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25. *The Tewkesbury Register,* 31st March 1866. The full report was drawn from *The Builder*.
26. See Jones, G., *The Millers*, 2001, for a full account of this crucial period in English flour milling.

Acknowledgement

Photographs are by Glyn Jones and I am pleased to record my gratitude for much help in assembling material on the flour mills of Tewkesbury.

MILLSTONE QUARRIES AT WHITTLE HILLS, LANCASHIRE

by Robin Clarke

Although the best millstones used for producing flour were imported into this country there was also a thriving indigenous industry of millstone making. The best of the English millstones, and certainly the best known, came from the millstone grit quarries of Derbyshire. In spite of their almost universal use throughout the country, such was the demand for millstones that local production also took place wherever the stone was suitable. Many of these locally produced millstones were not of sufficient quality for it to be worthwhile transporting them any distance, but occasionally, when transport factors were favourable, some of these millstone quarries supplied a wider market. One such group of quarries producing millstones was to be found at Whittle Hills, Whittle-le-Woods (SD 5821) in Lancashire, which is three miles north of Chorley, six miles south of Preston and two miles east of Leyland.

This area produced millstones for at least 400 years until the trade died around 1920. One of the first references to activity here was that of John Leland, librarian and Chaplain to Henry VIII. He was appointed in 1533 to search for records, manuscripts and relics of antiquity in all cathedrals, colleges and religious houses in England. For eight years, from 1535, he made a series of journeys for this purpose, leaving an account in eight manuscript volumes. These were edited and published by Thomas Hearne, a librarian at the Bodleian Library, Oxford, in 1710-12. A modern edition was produced by Lucy Toulmin Smith in the first decade of the 20th century, which has since been reprinted.[1] John Leland noted that "*Under the foote of Chorle rennith a litle flat brooke. A mile and half from Chorle I saw on a hille side a great quarre, owt of the wich men digge veri great and good mille stones ...*". This appears to be Leland's only reference to millstone activity, despite his travels in Derbyshire and elsewhere. This quote by Leland has been repeated in very similar words ever since.

Edward Baines, who was born at Walton-le-Dale in the adjacent parish of Blackburn, became proprietor of the Leeds Mercury, as well as an M.P. for Leeds in 1834-41. In 1824, he wrote that Whittle-le-Woods, which he recorded under Leyland, "*contains four valuable millstone quarries*".[2] However, Baines only listed two millstone makers, namely Thomas Colton and William Snape. Twenty years later the first edition of the six inch O.S. map marked and named four millstone grit quarries at

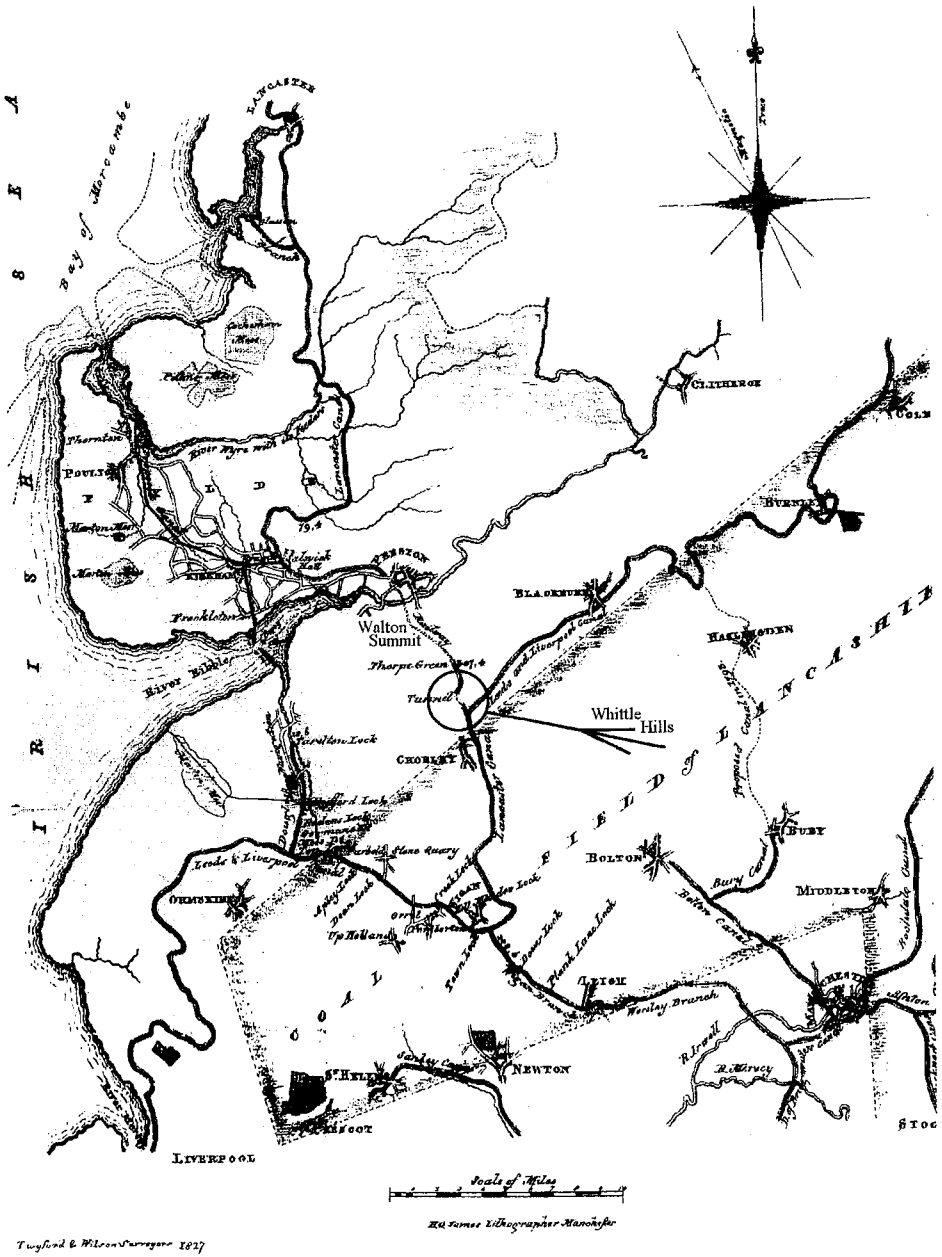

Figure 1. Map of the Leeeds & Liverpool Canal and the Lancaster Canal, 1827. The location of Whittle Hills is indicated by the circle. (L.R.O. DDHe 69/3 in *The Leeds and Liverpool Canal* by Mike Clarke, Carnegie Press, 1990)

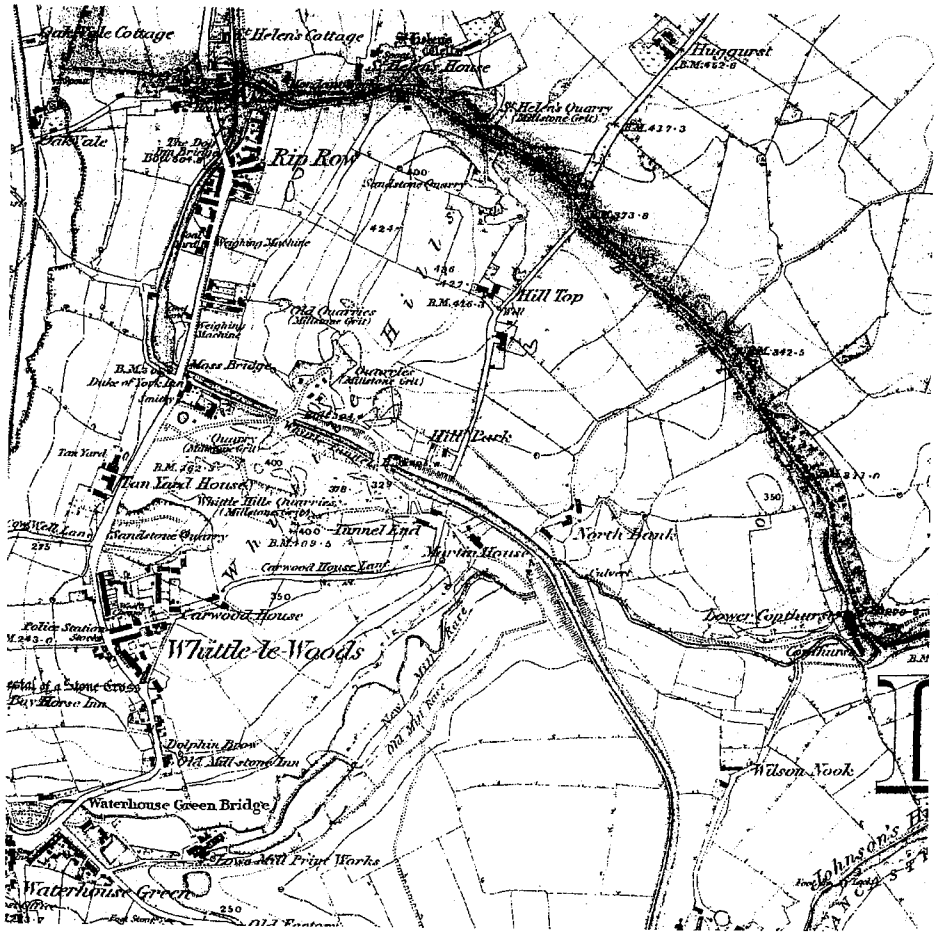

Figure 2. Part of the first edition six inch O. S. map, 1848, showing the four millstone grit quarries at Whittle-le-Woods and also the one at St. Helens.

Whittle Hills and a further one at St. Helens (SD 587224), about a third of a mile to the north-east.[3]

Around the middle of the 19th century, Samuel Lewis states that at Whittle-le-Woods *"There are also extensive quarries, producing an abundance of millstones for grinding, which are sent to Sheffield and other districts."*[4] Unfortunately, this sentence only perpetuates the confusion between true millstones which are face-grinders and other types of grindstones.

The Geological Survey of Great Britain produced a Memoir in 1860, which listed quarries (which made a return) on a county basis. These statistics were compiled by Robert Hunt, the Keeper of Mining Records, who recorded each quarry by its name, the name of the freeholder and the quarryman, the local name of the stone,

and its geological formation. Other columns stated the buildings in which the stone was used or the purposes to which applied, the price per ton or per cubic foot and the average annual production. Finally the name of the nearest railway station was listed, although this is much less useful today than in former times. Whittle Hills was the last quarry to be listed (no. 121) in Lancashire and the entry named Thomas Dewhurst as the quarryman and sandstone as the local name for the Millstone Grit formation. The other columns for Whittle Hills are, unfortunately, blank, however Leicester Mill quarry and Whittle Hill, which were jointly operated, were recorded as having a joint average annual output of 3500 tons.[5]

The quarries at Whittle are in the Revidge Grit, part of the Middle Grit Group of rocks, which lies between the Kinderscout Group and the Rough Rock, which are the two main millstone sources in Derbyshire. This horizon was also worked at Denham Hill (SD 591228) and Hough Hill (SD 592230), two parts of the same ridge, one mile to the north-east, where building stone and some millstones have been quarried. The rock here was a coarse current-bedded and occasionally pebbly gritstone.[6] Millstones from Duxon Hill quarry near Houghton Towers are said to have been frequently exported to Ireland and are shown prominently on an engraving dated 1832 (see Figure 3).[7]

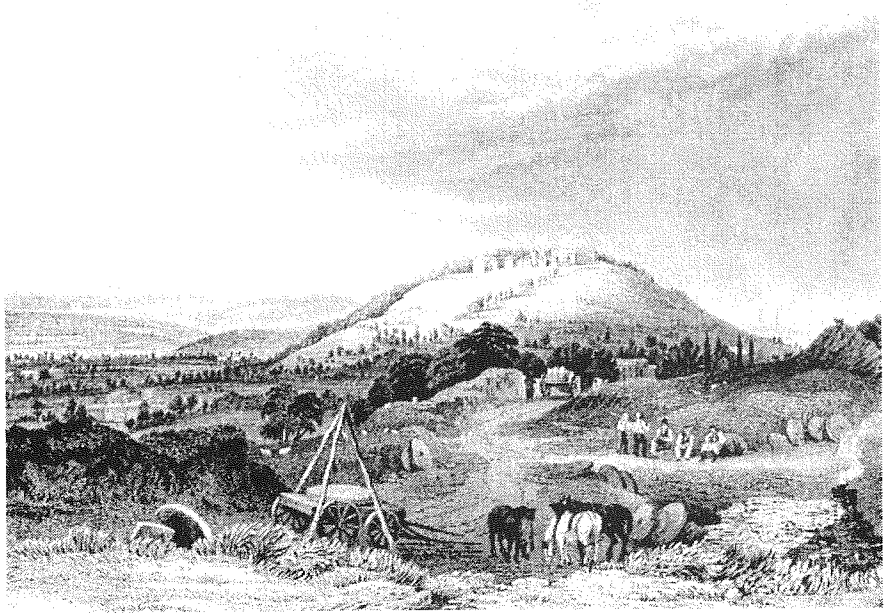

Figure 3. Engraving of Houghton Towers with Duxon Hill quarry in the foreground.

In 1928 an account of the industry appeared in the local paper under the heading "*Old Whittle Hill, Tales of the Palmy Days of the Delphs, by a Delpher*".[8] A delph (or delf) is a north country term for a quarry or a hole in the ground, which dates back to at least John Wyclif's time in the late 14th century. This early translator of the New

Testament wrote of "*To bie stoonys hewid out of the delues*".[9] Alternatively the sites were just called "holes" or even "delph-holes" just to make sure. Although by 1928 the only activity in the quarries consisted of breaking small stones for concrete and sifting out a bit of sand using a petrol engine to drive machinery, it is obvious that the "Delpher" had first hand experience of the quarries in busier times.

"A Delpher" describes the early 19th century houses for the workers: two up, two down, stone cottages with flagged floors, no damp course and outside stairs leading to the living rooms above. In its heyday the area had over 400 men working in the industry; one quarry alone supplying over 90,000 tons of building stone.

Whittle stone had a nice working texture, rather too coarse for delicate tracery and rather soft, but readily dressed and capable of bearing a good crushing load. It was also free from sulphur, which could shorten the life of the quarrymen and masons. Whittle stone was used in building Liverpool Docks, and many of the big mill engines in the cotton industry, which could weigh up to 1000 tons, were anchored onto beds of Whittle stone. The stone was usually a dirty yellow colour, which weathered to a pleasing shade. It sometimes had occasional dark brown bands, and very rarely it could be almost white. The various layers of stone in a delph vary very much in texture and colour. The bottom rock was usually the finest in grain and purest in colour. The delphman used his finest rock for the best purposes. "A Delpher" also stated that "*The Boss of the big delph always tried to keep a lump of his very best rock lying on one side, ready to be cut up into any size of millstone that might be required at short notice. Then, when an order had been obtained, there was the keenest rivalry among the men as to who should have the honour of cutting up the rock into the rough dimensions. Then the best scapplers were called in to finish it off, ready for the expert millstone masons*". (A "scappler" or "scabbler" was the man who dressed the stone before its final finish so that it was ready to leave the quarry.)

"*A good millstone maker generally stood above his brethren, and could command, say, a halfpenny, or a penny, an hour more than the ordinary wage. No wonder then that the lads gravitated to the hillock where millstones were being dressed. If they were permitted to hold their straight edge or assist in the fixing of the centre pin of the trammel, as the radius rod which determined the circumference of the stone was called, they felt highly honoured*".

Many of these millstones were shipped off via the Lancaster Canal from the canal basin opposite the Duke of York Inn at Moss Bridge (SD 582219) where there was a stone crane, reputedly made from the old Whittle Cross. Northwards they would proceed three miles to Walton Summit, and then be transferred to the tramway, which crossed the River Ribble on a wooden trestle bridge to join the northern section of the Lancaster Canal. (The building of a stone aqueduct over the River Ribble, such as that built by John Rennie to carry the Canal across the River Lune, was considered too expensive by the Lancaster Canal Company.) Southwards, the Lancaster Canal joined the Leeds & Liverpool Canal, one mile to the south-east at Johnson's Hillock (SD591207). The northern route to Preston was effectively out of use by 1880 and a century later was carved into disconnected pieces by the construction of the M61 motorway and its associated road works, although the line

of the canal can still be traced. This motorway construction also obliterated the quarry at St. Helens. Overall it appears that the Leeds & Liverpool Canal was the main artery used, in both directions, for the distribution of millstones.

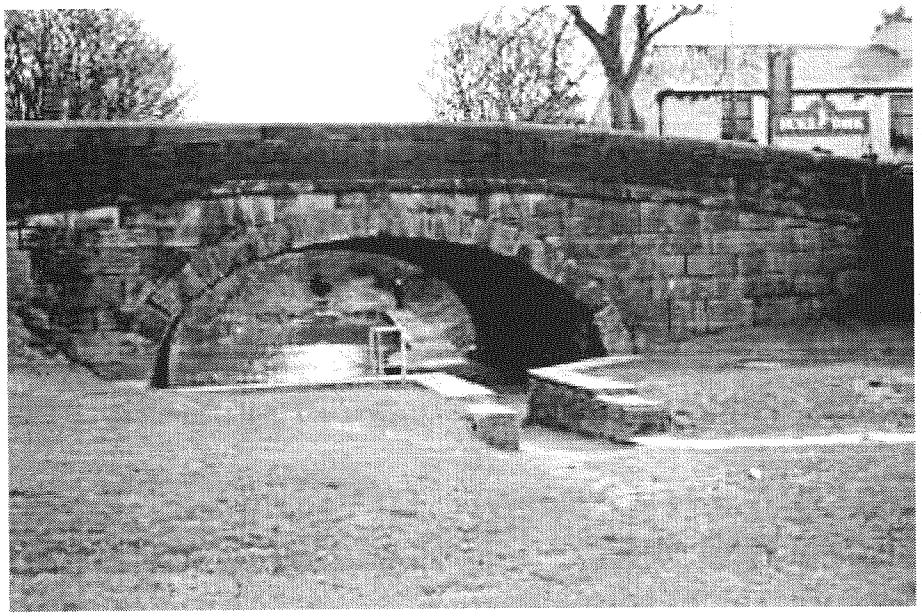

Figure 4. The Duke of York Inn with the former canal basin, March 2003.

Then, in the account of "A Delpher", there is one of those infuriating statements which drive researchers mad (or even madder): " ... *if I had time I might tell you of the memorable journey that Sam Rowley took with a pair of his very best stones far north to Old Coniston and what he was destined to find there waiting for him*", Unfortunately he does not give any further details. "A Delpher" then continues to indulge in nostalgia for the days of constant activity, reminiscing that "*gone is the ringing musical sound of the old blacksmith's hammer on the anvil, as he skilfully sharpened or tempered the men's tools or picks; or the heavy thud of his striker's sledge when he joined in with the smith as they smartly welded some bigger job or steeled some of the larger tools.*"

"*Gone also the wonderfully varied tones of the picks of the different men as they gave the final dressing to the ashlar [square hewn stones for building purposes] on the hillock before it was carted away. We lads, when we could creep away for a minute, used to stand out of sight, generally in the smithy, and guess whose were the various pick sounds, judging only by the ear. We got quite smart at that. Gone also are those far-resounding sounds 'clunk-clink, clunk-clink' made by the big heavy hammers of the cutters-up, or rock-getters, as they drove a long line of wedges home in a big piece of rock. I have often seen 30 or 40 wedges set in a row. Looking along it before they started they were as straight as a die, and all set at exactly the same angle so that the split, or cut, to be made would go just where they intended.*"

"*Then the two men would begin, one from each end, and with alternate blows from their bigger hammers, tap each wedge lightly all along the row, just to set the wedges tight. Returning each to his own end once more, they would begin to strike heavier and heavier, till each was putting his whole weight to each blow, and their breath bursting out with the blow, they would again meet in the centre.*"

"*If the stone had not been split by then, this was the chance of us youngsters, when to the cry of "*Let her sup, let her sup*" we would, from an old quart kit, pour a little drop of water into each wedge-hole. With wondering eyes we would then watch the big stone in a few seconds split up into two pieces. This was invariably accompanied by an uncanny sound, like a heavy human sigh or a soft crack. This was known as "the stone's dying breath". A similar series of operations was used to separate (potential) millstones from the main rock face or suitable large block.*

"*There was little waste in Whittle stone, for any sound pieces too small for rubble were put under the old millstone of which there were one or two in every delph, where an aged horse pulled an old six feet or seven feet upright millstone round and round at the end of a pole about 12 feet long. This was fixed to an upright pole with a shackle, and driven by a little boy. The old horse would grind in a day a few tons of nice sand, which used to be in great demand among housewives for sanding flagged floors.*" (see Figure 5)

Figure 5. The horse powered edge runner producing sand for flagged floors, c1920.

In the early 1980's Chorley Borough Council's Community Programme helped set up a permanent memorial to the industry at the old canal basin opposite the Duke of York public house. The two firms still working, Ashcroft's and Williams's,

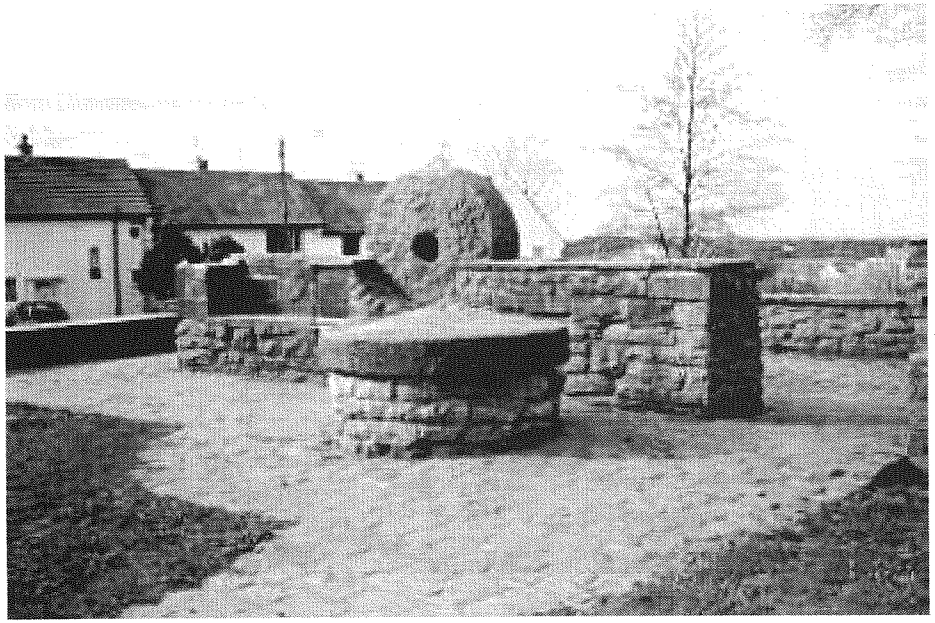

Figure 6. The millstone display near the Duke of York Inn.

Figure 7. A Whittle Hills quarry today. (March 2003)

donated millstones found in their respective quarries. Both these stones were probably rejects as faults are clearly discernible. Another stone, 4 feet 4 inch in diameter, was found in the canal basin while excavating for a branch sewer in May 1983. It has been suggested that the large 6 feet diameter millstone found may have been intended for Marsh Mill at Thornton Cleveleys which is supposed to have used large stones.[10] Marsh Mill (SD335425) is about 20 crow-miles away on the Fylde near Blackpool. However, information from Marsh Mill claims that when the mill was built in 1794 it had two sets of millstone grit stones (as well as two sets of French burrs) one 5 feet, the other 5 feet 3 inch in diameter,[11] so the intended destination of the 6 feet diameter millstone must remain doubtful. The size would seem to indicate a pre-1800 use, according to Gordon Tucker who discusses the sites at Whittle-le-Woods in his article about millstone making in England.[12] Another possibility is that the stone was destined for a local tannery. The main line of the Leeds & Liverpool Canal is still functioning but is now dedicated to the leisure industry as part of the Inland Waterways network. The quarries themselves, which are now disused, form excellent unofficial nature reserves, their cliffs and ponds providing a variety of habitats for flora and fauna.

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Acknowledgement

The author would like to thank Eric Bell of Whittle-le-Woods for much background information and then photograph showing the sand crushing. Also thanks are due to the staff of the local studies section at Chorley Public Library who produced the material on which this article is based.

EMSCOTE MILL, WARWICK

by Tim Booth

One of the most precious and zealously guarded commodities of any canal system is its water supply. Many canal companies spent vast amounts of shareholders' money increasing and maintaining such supplies, however, in certain circumstances, a surplus of water was generated and often ran to waste back into the river system. Emscote Mill, at first known as the Navigation Mill, was constructed to make use of such a surplus and continued to do so for nearly one hundred and twenty-five years.

Two canals which were to meet at Warwick, the Warwick and Birmingham Canal and the Warwick and Braunston Canal, were promoted in the early 1790s as part of a much grander scheme to provide a direct trading route between Birmingham and London. The idea wasn't entirely new as a canal from Birmingham to Napton had been proposed as early as 1774. Royal Assent for the Warwick and Birmingham Canal was received on 6th March 1793 and for the Warwick and Braunston Canal on 28th March, 1794. An amendment to the route of the latter received Royal Assent on 14th May, 1796 and resulted in the change of name to the Warwick and Napton Canal. The formal opening of both canals took place on Thursday, 19th December, 1799 though neither was quite complete. Through working actually commenced on 19th March, 1800.

The route of the Warwick and Birmingham Canal involves a climb from Birmingham via six locks at Bordesley to a long summit followed by a descent to the Avon valley at Warwick in two stages, five (originally six) locks at Knowle and twenty-one at Hatton. The canal once terminated in a basin at Saltisford, just west of Warwick, but the last three hundred yards to the basin has now been infilled. Obtaining an adequate water supply for the 9¾ mile summit was partially solved by pumping water from the bottom of the locks at Bordesley back up to the top using a Boulton and Watt steam engine as well as tapping several streams. However, it was realised that this would be inadequate to supply the long Hatton flight of locks so a feeder reservoir was constructed at Olton (see Figure 1).

The Warwick and Napton Canal commences about half a mile west of the former basin at Saltisford and runs across the north of Warwick, descending through two locks to the Leamington pound across the Avon valley. This traverse includes two aqueducts, one over the River Avon and another over the railway from Birmingham to London. Beyond Royal Leamingon Spa, the level continues east to Radford Semele, the site of the first of twenty-three locks needed to lift the canal out of the Avon valley to its junction with the Oxford Canal at Napton-on-the-Hill. The Warwick and Napton Canal also initially suffered from an acute water shortage, again being

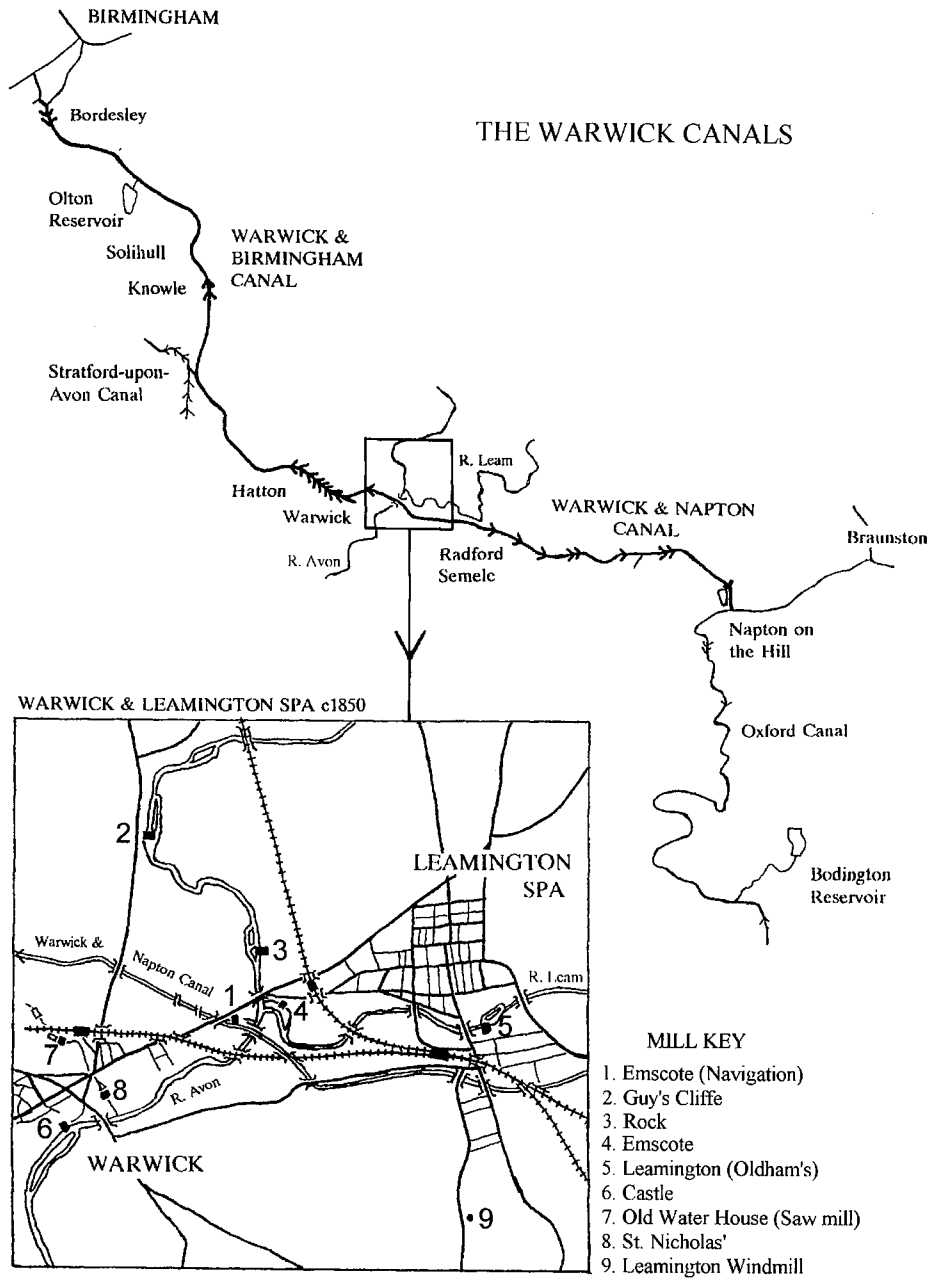

Figure 1. A map showing the canals around Warwick. The insert shows the location of the various mills in the Leamington area.

resolved by the provision of reservoirs at the summit near Napton and, via the Oxford Canal, from a reservoir at Boddington.

Despite the shortage of water at the summits of the two canals there was always plenty of water at the lowest point, the five mile long Leamington pound. Indeed, a combination of lockage and leakage must have resulted in a considerable overflow into the River Avon. At the committee meeting of the Warwick and Napton Canal Company on 9th March 1803 it was ordered;

> "That the waste water on the Warwick and Napton Canal be let to Messrs. John Tomes and Charles Handley at a perpetual annual rent of £30 payable half yearly - the rent to commence from the time that the said John Tomes and Charles Handley may begin to make use of the said water for the purpose of working a Mill purposed[sic] to be erected by them on the side of the said canal - the said Messrs. Tomes and Handley to have power of making a proper way for conveying the water to the Mill - the Company to have the right to take the said waste water at any future period if they shall want it for the use of the Navigation on the said Canal upon giving six months notice thereof to the said Messrs. Tomes and Handley - and that they shall never draw the water more than two inches below the top of the weirs - and the said Messrs. Tomes and Handley to have power at any time of determining the Agreement by giving six months notice in writing to the Company.
>
> Ordered
>
> That a proper Agreement be prepared pursuant to the above Order."

These Orders were signed by Dr. William Lambe, chairman of the canal company.[1] Unfortunately, a copy of the "proper Agreement" could not be found among the surviving company papers. The terms seem very generous, offering a water supply in perpetuity from a five mile long "mill pond" which was supplied by reservoirs and streams at both ends with minimal maintenance costs falling to the lessees.

The promoters of the new mill at Emscote, Charles Handley and John Tomes, were both heavily involved in the construction and management of the Warwick and Napton Canal, perhaps explaining the generous terms of the Agreement. Charles Handley, an engineer who lived at Barford, a few miles south of Warwick, had been involved from the start. He had proposed a possible route for the canal and initially acted as a works valuer. In 1795 he suggested the amended route to Napton and became the company engineer from October 1796 until 1805 when the major works were complete, after which he acted as a consultant for a few years. John Tomes was a Warwick solicitor who, in 1799, loaned the company £2900 to enable the work to be completed in time for the official opening of the two canals. He was solicitor to both canal companies until 1815 when he gave up his legal practice. Indeed, he served on the committees of both companies from their inception until his death in 1844, being very highly regarded for his unswerving commitment. He was often chairman of the Warwick and Napton Canal Company and to mark his services, the company even presented him with a "piece of plate" in 1808.

Tomes and Handley had bought various pieces of surplus land adjoining the Warwick and Napton Canal once construction was completed. This doubtless gained the company much needed capital for necessary improvement works as well as proving a sound investment for the purchasers. In January 1803 they had purchased the land beside of the canal just south of where it passed under the Warwick to Leamington road, here called Emscote Road, and about 350 yards west of the Avon aqueduct.[2] The chosen site for the mill was immediately east of the bridge carrying the road over the canal, roughly midway between the two town centres. This strategic site must have caused much complaint from the established millers serving the towns. A new mill must have been seen as a serious threat to trade by the millers of Castle Mill at Warwick, Guy's Cliffe Mill at Milverton, the old Emscote Mill on the River Leam and Leamington Mill as well as one or two smaller concerns. There was certainly a long history of disputes over mill soke between the millers serving Warwick.[3] In mitigation, Rock Mill had recently been rebuilt as a cotton mill by Benjamin Smart, perhaps anticipating the improved trading route offered by the canal. Equally, the populations of both towns increased rapidly through the 19th century. Warwick's population almost doubled between 1801 and 1851, from 5,592 to 10,973 and over the same period, the population of Leamington rose from 315 to 15,724.[4] This meteoric rise was due to the discovery of important mineral springs in the 1780s which led to Leamington becoming a very fashionable spa town, the Royal Pump Room opening in 1814 and the town being known as Royal Leamington Spa from 1838.

The task of designing the Navigation Mill at Emscote was assigned to a local millwright called Thomas Roberts. Quite how Roberts came to be selected for this job is not known. The business was only established in 1804[5] so the design of Emscote Mill must have been one of his first contracts. Later trade directories describe him as an engineer, iron and brass founder with his works on Coventry Road in Warwick. By 1835 the firm had become Thomas Roberts & Son, then, by 1864, James Gregory Roberts and lastly Roberts & Son to 1896. No other references to millwork supplied by this firm have been found so it is assumed that the majority of their trade was in more general engineering. Fortunately, two of Thomas Roberts' designs for the mill have survived. They are both sections through the length of the mill, from the canal towpath to the road, with the machinery coloured to show which parts were to be of iron or wood. They are far from the professional drawings produced by many other millwrights of the period, perhaps as would be expected from someone not long in the business. However, they are both full of detail and have keys giving additional information. Although the basic arrangement of the machinery is the same in both drawings, there are many differences and it is difficult to tell which is the earlier especially as only one is dated. The dated drawing (see Figure 2) was signed by Thomas Roberts on 2nd June, 1804 and shows a building 66 feet long by 25 feet 6 inch wide with a lucam at both the canal and road ends. There is an internal wooden waterwheel, 22 feet diameter by 5 feet 6 inch wide mounted on a timber shaft 2 feet 2 inch square which also carries an iron bevel pitwheel 11 feet diameter. It is not entirely clear whether the waterwheel is

intended to be overshot or pitchback. There is a timber upright shaft carrying an iron wallower 3 feet 7 inch diameter, an iron spur wheel 11 feet diameter and an iron crown wheel 5 feet diameter. The disposition of the iron stone nuts, 15¾ inch diameter, shows that the intention was to have three pairs of stones mounted on the timber hurst. Two auxiliary drives are shown driven by bevel gears from the crown wheel. One was to be used for belt drives to operate the hoists while the other was to provide power for two "machines" via intermediate pulleys. The purpose of the two "machines" is not specified though, as neither is shown with a drive to a fan, it is assumed that they are dressing machines.

On the other surviving drawing, the building is slightly longer at 70 feet overall and there is no lucam on the road side. The waterwheel has the same dimensions but now the buckets are shown as being of iron. The dimensions of the main gears have changed, the pitwheel now being 10 feet diameter with 94 teeth, the wallower 5 feet diameter with 47 teeth and the spur wheel 10 feet diameter with 150 teeth. The stone nuts are now 16¾ inch diameter with 21 teeth and their disposition suggests that there are four pairs of millstones. These changes produce a significant difference in gearing ratios which mean that, whereas for the sizes shown on the dated drawing the waterwheel would have to turn at about 5 r.p.m. to achieve a millstone speed of 120 r.p.m., those on the other drawing imply a waterwheel speed of 8½ r.p.m. The crown wheel remains the same size on the undated drawing but both hoist belts are to be run off a single wide drum and the intermediate pulleys taking the belt drives to the "machines" has been dispensed with. The "machines" are still not identified.

Ultimately, it would appear that neither drawing was the final one. The description which appeared in the *Warwick and Warwickshire Advertiser* on 4th January, 1806, shortly after the mill opened for business, is incomplete but shows that much had been changed before (or possibly after) construction commenced.

> "**THE NEW MILL.** - Last week the new Corn-mill belonging to Messrs. Tomes and Handley, erected on the side of the Warwick and Napton Canal, near the town, began to work in the presence of many respectable millers and mechanics, who expressed the highest satisfaction at the complete manner in which it went off. The mill is constructed to be worked by a small quantity of superfluous water from the canal, and has power to drive five pairs of stones with suitable machinery, grinding and dressing 500 sacks of flour weekly; and promises to be productive of a considerable increase of trade both upon the canal and to the market. The great water-wheel is 24 feet in diameter and 7 feet wide, the pit-wheel 14 feet diameter, the spur wheel 12, and the crown wheel 14. The shaft and wheels are of iron, and to such perfection is the art of iron-casting now arrived, that the great wheel is no heavier than one constructed of wood of the same dimensions. The works, we understand, were executed by Mr. Roberts, millwright of Warwick, whose ingenuity, care and attention, has been such as to entitle him to much praise. It is with considerable pleasure we observe that cast iron can, with so much effect, be applied to those purposes in

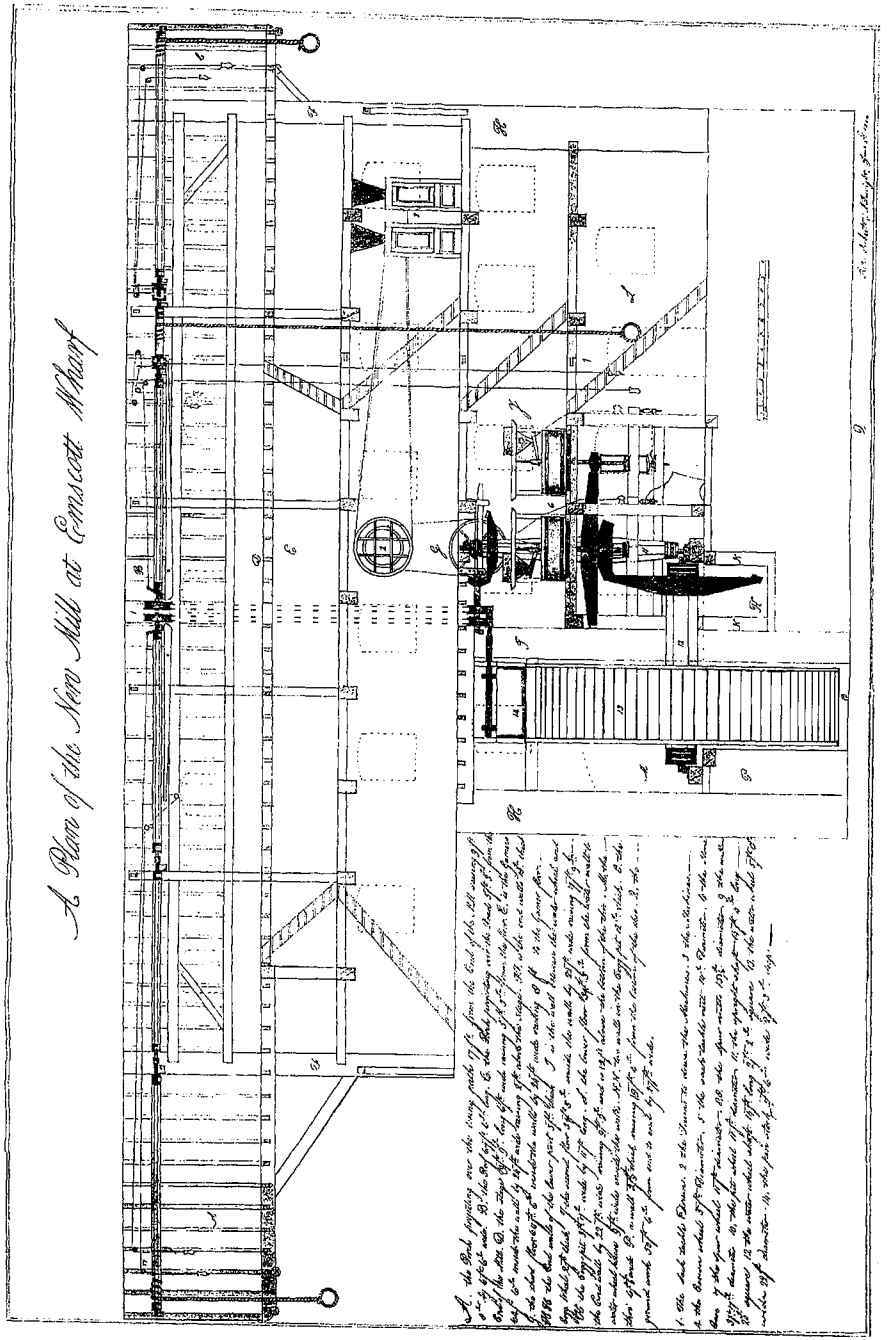

Figure 2. Thomas Roberts' proposal for Emscote Mill, dated 2nd June, 1804

mills, that have heretofore consumed such large quantities of the best oak in the kingdom, and which may be appropriated to ship-building and other useful purposes."

Presumably the "many respectable millers and mechanics" had come to see how well the cast iron waterwheel and machinery performed but, despite their "highest satisfaction", most of them wouldn't operate such machinery for at least another twenty years. Although cast iron had been increasingly used from the middle of the eighteenth century, its spread from the major industrial centres was slow and patchy. Equally, a miller's desire to have the most up-to-date machinery was usually tempered by the mill owner's reluctance to invest in what was still a more expensive and not entirely proven alternative to wood.

Even allowing for journalistic exageration, a crown wheel measuring 14 feet diameter seems unlikely. However, the sizes of the pit wheel and spur wheel indicate that the aim was to reduce the speed of the waterwheel to a minimum, suggesting that surplus water from the canal might have been perceived to be less plentiful after a long dry summer. This would be even more important as the width of the wheel had been increased by 18 inch and, of course, with a potentially more powerful wheel an extra pair of stones had been added. A few more details of the mill are given in W. Field's *An Historical Description of the Town and Castle of Warwick* which was published in 1815.

"NAVIGATION MILL

This is situated near the Navigation Bridge, on the *Emscote Road*. It was erected in the year 1805, by Messrs. TOMES and HANDLEY. The wheel is of that kind which is called back-shot, and is turned by the superfluous water, flowing from the *Warwick and Napton Canal*, down a fall of 27 feet, and thence runs into the *Avon*. This great wheel is of cast iron and excellent construction, which does credit to the maker, Mr. ROBERTS, of *Warwick*; measuring in diameter 24 feet. The mill is furnished with five pairs of stones; three of which are kept constantly in motion. The apparatus is, in every part, well constructed: and the contrivance is singularly good for loading and unloading. This mill is capable of grinding and dressing, for bread flour, upwards of 300 bushels per day."

This last report seems to confirm that Thomas Roberts not only designed the millwork but also cast the ironwork, quite remarkable for someone so recently established. However, there has to be some doubt about this as the same book claims that Roberts' foundry was built in 1810. If they were made locally, it is interesting that there should be a foundry capable of producing such castings of the necessary size and quality in a small town like Warwick. Of course, it is possible that Roberts had relocated from elsewhere, attracted by the commercial opportunities that the canal was bringing to the town. For example, as well as Benjamin Smart's enterprise at Rock Mill, a large worsted mill which was built near the canal at Saltisford by Parkes Brookhouse and Crompton, powered by a Boulton and Watt steam engine, was opened in 1796 followed by a cotton mill for Messrs. Parker in 1797.[6]

Neither the drawings nor the above descriptions give any information about the

watercourses to and from the mill but surviving features and map evidence give some indication of the system. The water certainly passed through nine low semi-circular arches beneath a raised section of towpath into a small pond beside the mill. Presumably a weir or sill within the arches restricted the amount of water to the agreed maximum. Both Roberts' drawings show a penstock depth of 2 feet 3 inch which suggests a head of water of about 2 feet and it is unlikely that the pond was much deeper. The tail water flowed through a culvert for about the first 175 yards from the mill followed by an open channel of about 140 yards through the field north of the canal embankment until it entered the Avon close to the aqueduct. There may also have been a bypass sluice which allowed the surplus water to enter the culvert when the wheel was not in use. Later photographs show that the new mill had a lucam at both ends, as shown on the dated drawing.

One piece of information that none of these sources provides is the identity of the first miller. While it is absolutely certain that John Tomes was only involved in the financial and legal side of the business, it is conceivable that Charles Handley played some part in its physical management and may even have left his position with the canal company in November 1805 for this reason. However, it seems most likely that the day to day running of the mill was entrusted to experienced millers. The first people known to have occupied this position are Messrs. Kench and Cattell who were noted as millers at Emscote trading on the canal from 1825 and are recorded in Pigot and Co.'s *National Commercial Directory* of 1828. Nothing is known about the milling experience of these two gentlemen, or the basis of their partnership. Philip Kench was born in Thurlaston, a few miles south-west of Rugby, in 1779 and lived there or in nearby Dunchurch until at least 1817.[7] It is possible that he learned his trade at one of the windmills in that area. An inventory of "Stones and Machinery in the New Mill at Emscote", drawn up in 1830, implies that Kench and Cattell were lessees rather than employees of Tomes and Handley as they had invested in equipment for the mill. Of the ten millstones in use, Kench and Cattell owned seven. Presumably the seven millstones "not in use", belonging to Tomes and Handley, were part of the original installation twenty-five years previously and were now worn out. It is interesting to note that Kench and Cattell had found it necessary to purchase a smut machine. It seemed rather odd that the original installation did not include any means of grain cleaning. The total value of equipment owned by Kench and Cattell is put at £460-10s-6d. There is nothing to indicate the purpose of the inventory though it might have been of use to Kench and Cattell in a claim for a rent rebate.

For reasons unknown, the partnership between Kench and Cattell had ended by 1841 when P. Kench and Son are recorded as millers.[8] Philip Kench's son was named Phillip so the title of the business remained unchanged until the 1880s. By 1851 Phillip Kench was living in the mill house on Emscote Road so it is likely that he had assumed control of the business.[9] By this time his father was seventy-two years old and living some distance away in Leamington Spa. Although still described as a miller in the census it must have been largely in an advisory capacity. The business had prospered sufficiently by 1856 to finance the purchase of the mill for £3000 from the respective estates of John Tomes and Charles Handley. However,

payment was delayed until the middle of 1857, incurring over £100 interest.

"P. Kench in a/c with the representatives of the late Mr. Tomes

1856. Sept. 29th. To Purchase of Mill and Land	£1450 .. 0 .. 0
Interest from Sept. to 13th. June 1857	51 .. 0 .. 0
	£1501 .. 0 .. 0

P. Kench in a/c with the Trustees of Mrs. J. Handley

1856. Sept. 29th. To Purchase of Mill and land	£1550 .. 0 .. 0
Interest from Sept. to 13th. June 1857	54 .. 11 .. 4
	£1604 .. 11 .. 4
Overpaid Mrs. Handley Rent to M'mas	2 .. 11 .. 4
	£1602 .. 0 .. 4"

The continuing rapid increase in the population of the area through the 1860s, and the demise of one or two of the smaller local mills, encouraged Phillip Kench to look for a way to increase the capacity of the mill. He also had additional help with the business as his second son, Sheldon Kench, joined him in about 1866. As there was clearly no possibility of increased water power, the chosen solution was to erect a steam powered mill adjoining the water mill and fronting onto Emscote Road, construction and fitting out being completed in 1868. There were four pairs of millstones and additional dressing machines, probably fitted by Lampitts of Banbury who certainly supplied the horizontal engine. Elevators and meal creepers were fitted by John Bruce, a millwright from Birmingham. The new mill building was somewhat smaller than the watermill but had the same floor arrangement. Shafting ran from the engine through to the waterwheel, so all the machinery could be steam driven if required, though this appears to have given some trouble.

"Upper Windsor Street, Birmingham, March 7th. '68

Mr. Kench & Son

Sirs

In receipt of yours concerning the speed of horizontal shafting &c. the revolutions per minute of horizontal shafting at the top of mill will be 130 the upright will make the same number likewise the mill stones, by increasing the speed of the engine from 44 to 49 per minute -

the shaft from engine to water wheel was not leveled throughout but by putting in the new brasses in bottom would fetch the shaft back to the former position

if the wheels still work rough in gear the only plan will be to give them less hold

I have not received the upright shaft as yet but it is probable that I may receive it on Monday morning

I Remain Yours Respectfully

John Bruce"

In 1882 the mill was valued following a proposal that Sheldon Kench, who was by then in occupation as miller, should buy the whole property from "the Executors of the late Philip Kench Esqr. of Leamington". If the spelling of "Philip" is significant, this would suggest that ownership had not been settled since the death of Sheldon

Kench's grandfather. Equally, it might well have been necessary for Sheldon Kench to purchase the property to comply with bequests in his father's will. Two valuations were made and they are most useful in presenting a full inventory of the mill property. The first, dated 29th. March 1882, says very little about the mill machinery but includes the mill's seven horses, Lion, Tommy, Punch, Trooper, Turpin, Short and Charlie as well as the various carts, vans and a waggon that they pulled. The total value of the mills, outbuildings, mill house, land and all appurtenances is given as £7,705-16s-6d. The second valuation, dated 31st May, 1882, omits the horses and carts but gives full details of the mills and their machinery. The watermill measured 68 feet by 25 feet 6 inch and 37 feet high and had four floors, including the roof space. There was a 24 feet diameter pitchback waterwheel and five pairs of millstones, four pairs were French and one pair of Peaks. There was said to be sufficient water power to drive three pairs of stones for twelve hours per day. The rent payable to the canal company for use of the surplus water was still £30 per annum. Grain and meal were moved by an elevator and creepers and the stones were fitted with exhaust pipes. The watermill also housed a smutter, a bolter by Savory, a Benthall oat crusher and a Child's separator. The steam mill measured 46 feet by 23 feet and 37 feet high and also had four floors. It contained four pairs of French stones, a 29 feet long silk reel flour dressing machine, an offal mixing machine and a bran duster by J. Walworth & Co. Once again, all the stones were fitted with exhaust pipes, the extraction fan for both mills being on the third floor of the steam mill. Movement of grain and meal was again by elevator or creeper. The engine, supplied by Lampitt, is described as a "36 horse power high pressure condensing engine 26 inch stroke" though an added note puts its actual rating at 20 to 25 horse power. It had a 10 feet diameter flywheel and a 6 feet 4 inch driving pulley with a 10 inch face. There is no mention of the troublesome connection between the engine and the waterwheel so perhaps this had been removed. The boiler house contained a single flue Cornish boiler 5 feet diameter and 22 feet long. There was also a chaff house with a two-knife chaff cutter driven by the engine. It seems likely that this machine provided bedding for the horses while the pair of Peak millstones, the oat roller and the bean splitter provided their feed. The only commercial product of Emscote Mill was flour.

The outbuildings comprised an office with tack room beneath, a long stable and "coach house" plus a separate cart shed. The property also included the mill house with service rooms in the basement and a drawing room, a dining room and a breakfast room on the ground floor. There were four bedrooms, a dressing room and a water closet on the first floor and two further bedrooms on the second floor. Both house and mill were fitted with gas appliances. The house had a large garden to the rear and there was a two acre meadow running down to the river. All this was valued at £6300. It seems most unlikely that the livestock, carts and a few loose implements could account for the difference in the two valuations but Sheldon Kench was probably pleased to accept the lower one.

Sheldon Kench acquired the business at a time of great change in the flour milling industry. Despite considerable oppositon from the traditionalists, chilled iron roller mills were increasingly seen as the only means of producing high quality fine

flour by the new process of gradual reduction milling. It was not long before Sheldon Kench felt the need to respond to these changes or see the business so patiently developed by his father and grandfather begin to decline. However, he had probably used all his capital in the purchase of the mill so modifications were always likely to be on a modest scale. There was no convenient fire, as happened elsewhere, which would have allowed insurance money to provide a purpose built roller mill. Instead, in 1885, he called on local millwrights Messrs. Lampitt & Son to replace the millstones with roller mills and upgrade the cleaning and dressing machinery. Lampitts of Todenham and Banbury, who probably fitted out the steam mill, had been millwrights since at least the late eighteenth century and produced much well-engineered machinery, some of which still survives. Although thought to be the same family, Lampitt and Son of Warwick was a separate company, first noted in the 1870s, and had made their name supplying and fitting improved dressing machinery. The move into total refurnishing of mills seems to date from 1884 and their advertisements in

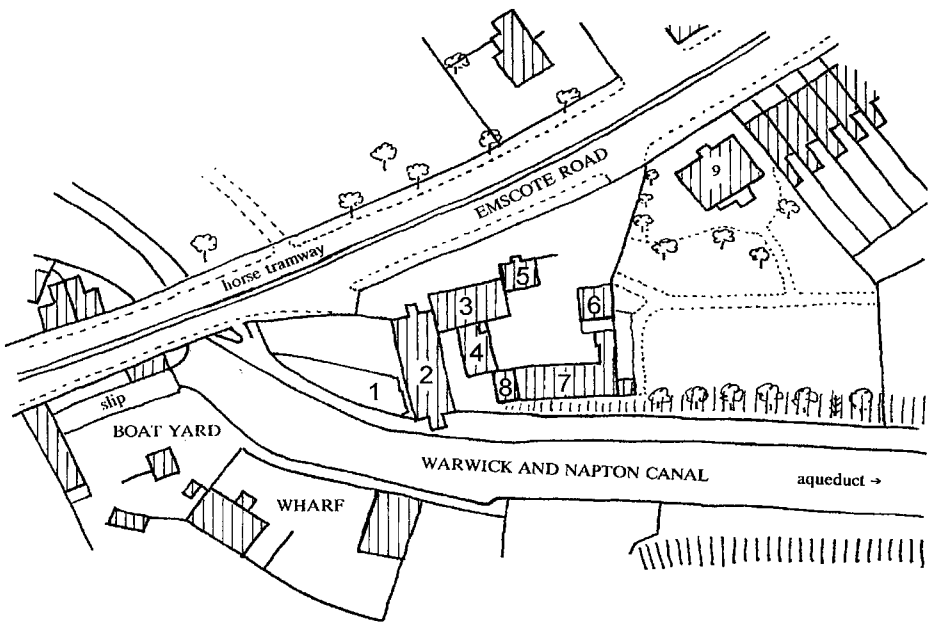

Figure 3. The mill site in the 1880s, based on the O.S. 25 inch map of 1889.

KEY

1. The mill pond.
2. The 1805 waterpowered mill.
3. The 1868 steam mill.
4. The engine house, boiler house. & chimney.
5. The office with the tack room below.
6. The cart shed.
7. The stables & carriage shed.
8. The chaff house.
9. The mill house

The Miller give some idea of what they offered (see Figure 4). It appears that all the millstones were dispensed with and many used to pave the mill yard. From this time it is thought that the watermill became largely a grain store with the waterwheel only used to operate the hoists. The completion of the new machinery was marked by a short article in the *Warwick and Warwickshire Advertiser and Leamington Gazette* on 19th September, 1885.

"NEW PROCESS OF ROLLER MILLING AT WARWICK.

Through the invitation of Mr. Sheldon Kench, of the old-established firm of Messrs. Kench & Son, of the Emscote Flour Mills in this town, we have availed ourselves of the opportunity afforded of visiting and inspecting that establishment. The premises have just been entirely re-modelled on the new roller milling system. This is now rapidly superseding the old millstone, which until the last few years has been exclusively used in the manufacture of flour, but which now promises soon to become one of the things of the past. It may, perhaps, interest some of our readers if we explain what is meant by "new process flour", or flour manufactured by roller mills instead of stones. It is well-known that flour has been made from time immemorial by simply grinding or crushing the wheat between the two surfaces of a pair of stones. This method simply reduced the grain and all it contained to a fine meal, which was afterwards passed into a reel covered with silk or cloth and then separated from the bran and small particles called "sharps". The balance of fine meal passing through the silk or cloth was then sacked off as finished flour. Thus the germ and other impurities were all ground up together, and, of course, a great percentage passed into the flour. By the new process the wheat, after being thoroughly cleaned, is passed onto an automatic weighing machine, regulated at will to weigh and deliver the wheat to the greatest exactness into a grader - a machine that grades or separates the wheat into two sizes. Each size is then passed between a separate pair of chilled iron grooved rolls. These simply crack or open the grain, principally down the crease, thus liberating the germ and dirt it contains. It is next passed on to a reel covered with wire. That separates the germ and dirt from the grain, the latter passing on to other rolls of a similar description, but rather closer together. The grain is again cracked or reduced to another degree of fineness, and so until it has passed six pairs of rolls and reels, each one reducing the grain until the bran leaves without making any fine flour. The product, or what is taken through the wires of the above mentioned reels, is a granulated or coarse hard material, composed of and containing the different portions of the grain of several different qualities. The whole of this once more goes through a reel, which again divides it. This also is passed on to another reel, covered with silk, separating the flour from the semolina, which proceeds to a reel covered with silk. This separates the various sizes of semolina, and these are passed on to purifiers - machines which take out the impurities, consisting of light, fluffy, and brown particles.

Each size of the purified semolina is delivered on to smooth chilled iron rolls, next separately crushed and passed into centrifugal flour-dressing machines, fitted up with reels covered with fine silk gauze, inside which is a rapidly-revolving beater. The beater breaks up the crushed semolina, so that it passes freely through the silk. This process is followed out with all the different separations that are severally made through the whole system, until the finished flour is delivered into the sacking-up apparatus in the three grades, namely, 1st patent, 2nd patent, and baker's flour, which may be changed at pleasure, so that each can be taken separately or all run together if required. The whole of this complicated system is entirely automatic, from the receiving of the grain into the mill until it leaves as finished flour. It should be stated that Messrs. Lampitt and Son (Limited) deserve very great credit for the excellent and finished manner in which the whole of the machinery has been made and fixed; and we heartily join in wishing that the enterprise here displayed may be productive of results alike beneficial to the public and those directly interested in the undertaking."

The reporter's remarkable grasp of this new process may have owed something to either Sheldon Kench or Messrs. Lampitt and Son, perhaps the latter judging by the last sentence, but it does give the only indication of what machinery was fitted at this time. The change to roller milling at Emscote Mill was certainly not beneficial to everyone as it seems to have finished off at least one local flour mill. Castle Mill at Warwick had already gone in a disastrous fire in 1880[10] but Norman and Co. gave up at Rock Mill in about 1886. J. Oldham and Co. lingered on at Leamington Mill until about 1892[11] when other factors, mentioned below, were probably "the last straw". Those that continued to operate had already largely turned to provender milling. Of course, this was far from being just being a local trend; the decline of the small country mill had begun. The only loss to Kench and Son was no longer having the facility to produce their own animal feed but this was soon overcome by leasing Rock Mill, then equipping and operating it as a commercial provender mill.

This new machinery seems to have sufficed for the next twenty years which is a considerable testament to the quality of Lampitt and Son's installation. Despite this, their business was very short lived, as an advertisement in *The Miller* of 5th April, 1886 records that "Mr. C. Lampitt, Milling Engineer, formerly of Warwick, now of the firm of VAN GELDER, APSIMON & Co., Ltd., having a thorough practical knowledge of Mill Machinery, is prepared to undertake ARBITRATIONS & VALUATIONS OF FLOUR MILLS, MILL MACHINERY, &c." An important factor which affected investment in new machinery at this time was the amount of imported flour, particularly from America, which was flooding the British market and made milling less profitable. Also, the quantity and quality of English wheat had diminished making it harder for inland mills to produce a competitive product. However, it is still quite surprising that Lampitt's machinery was retained for so long. As with any new process, the machinery for gradual reduction milling developed very rapidly in the first years after its introduction. Particular attention was paid to the dressing machines as some early

Figure 4. Advertisement for Lampitt & Sons Ltd. in *The Miller*, 7th September, 1885.

reels were thought to be too vigorous in their action, producing fine flour too early in the process. However, if improvements were made no record of them has survived. Indeed, there seems to be very little documentary evidence of the mill's more recent history apart from notes jotted on the mill calendar which was faithfully maintained, with a new sheet pasted up year after year, from 1818 to 1954. It was probably Sheldon Kench who started recording family and local events in the 1880s and some information about the mill from 1890. For example, they note the dates in May and September when the horses were turned out or brought in, the dates when employees started or left, when floods on the Avon stopped Rock Mill and when continual frost caused the canal to freeze thus disrupting deliveries at Emscote Mill. A note every August gives the date when the first delivery of the new season's wheat was received. However, notes about alterations to the mill are often not entirely helpful. Against 6th January, 1894 is recorded "crown wheel regeared" without giving its location. Equally, a note on 27th May, 1895 says "Hursting took out by Glovers men" but fails to say whether from the watermill or the steam mill. William Glover is recorded as an agricultural implement maker, based in Warwick, from the 1860s and as a millwright from the 1890s.[12]

On 14th April 1902 it is noted "about 6 p.m. - A Registration Duty imposed by H.M. Government (Sir M.H. Beach - chancellor) of 3d per cwt. on all kinds of Grain or Cereals & 5d per cwt. on all flours or meals or similar substance composed of or containing any cereals which are imported into this country". The duty on imported

flour pleased British millers because it checked the increasing volume of flour arriving from America. However, the duty on grain, although an encouragement to British farmers to improve their product, was more contentious as there simply was not enough grain grown in this country to meet the needs of an ever-expanding population. In the event, these duties were removed the following year but enough had been achieved to give millers the incentive to look forward again. Sheldon Kench certainly seems to have caught this new optimism as, in 1904, he started on a scheme to re-model the mill. The milling engineers chosen to carry out this work were Messrs. Briddon and Fowler. They only established their mill furnishing company in 1902 but both had many years experience with Henry Simon Ltd., probably the most influential mill furnishers of the period. George Briddon had joined Simon in 1885 and worked in the drawing office whereas R.J. Fowler joined the company in 1889 and became milling expert. Their chief claim to fame was they that they had solved a problem which had been troubling millers since the introduction of roller mills. In their quest for purer flour, millers had always worried that any flour produced at the break stage might be contaminated by dirt from the crease of the grain. Even when that problem was minimised by washing, break flour remained difficult to keep separate from bran particles or other impurities. Fowler had noted that when the rolls were positioned diagonally heavier material was projected further than the lighter break flour and other small particles. By careful positioning of vertical dividers beneath the rolls, effective separation was possible. The idea was patented as the Alphega system in 1906-7 (see Figure 5). Of course, judging by the 1885 advertisement for Lampitt and Co., it is possible that Sheldon Kench already had machines with diagonally placed rolls at Emscote Mill. Briddon and Fowler's advertisements claimed that the Alphega system could be applied to almost all makes of roller mill and this might have been seen as a way of saving considerable expenditure.

That is not to say that the re-modelling was going to be a penny-pinching affair. In 1904, entirely unrecorded on the mill calendar, a new mill building was erected adjoining the steam mill (see Figures 6 & 7). This necessitated demolishing the old office building so the dining room and pantry of the mill house were converted to serve this purpose. Sheldon Kench had moved out eight years previously to live at Parkfield in Leamington Spa. Notes on the calendar do record that "Briddon & Fowler's men began in new mill" on 7th February, 1905 and that construction of the iron water tank on the tower rising from the roof of the new mill commenced in March 1905. By the beginning of June 1905 the re-modelling was complete and the new mill was at work. As previously, there was an informative article in the *Warwick and Warwickshire Advertiser and Leamington Gazette*, this time on 3rd June, 1905.

> "Extensive alterations and additions have lately been carried out at the Emscote Flour Mills - the opening of which "in the presence of many respectable millers and mechanics" was recorded in the first issue of the *Warwick Advertiser* in January, 1806. In order to meet modern requirements, and to obtain greater comfort and convenience, Messrs. Kench and Son have erected a large additional block of buildings which

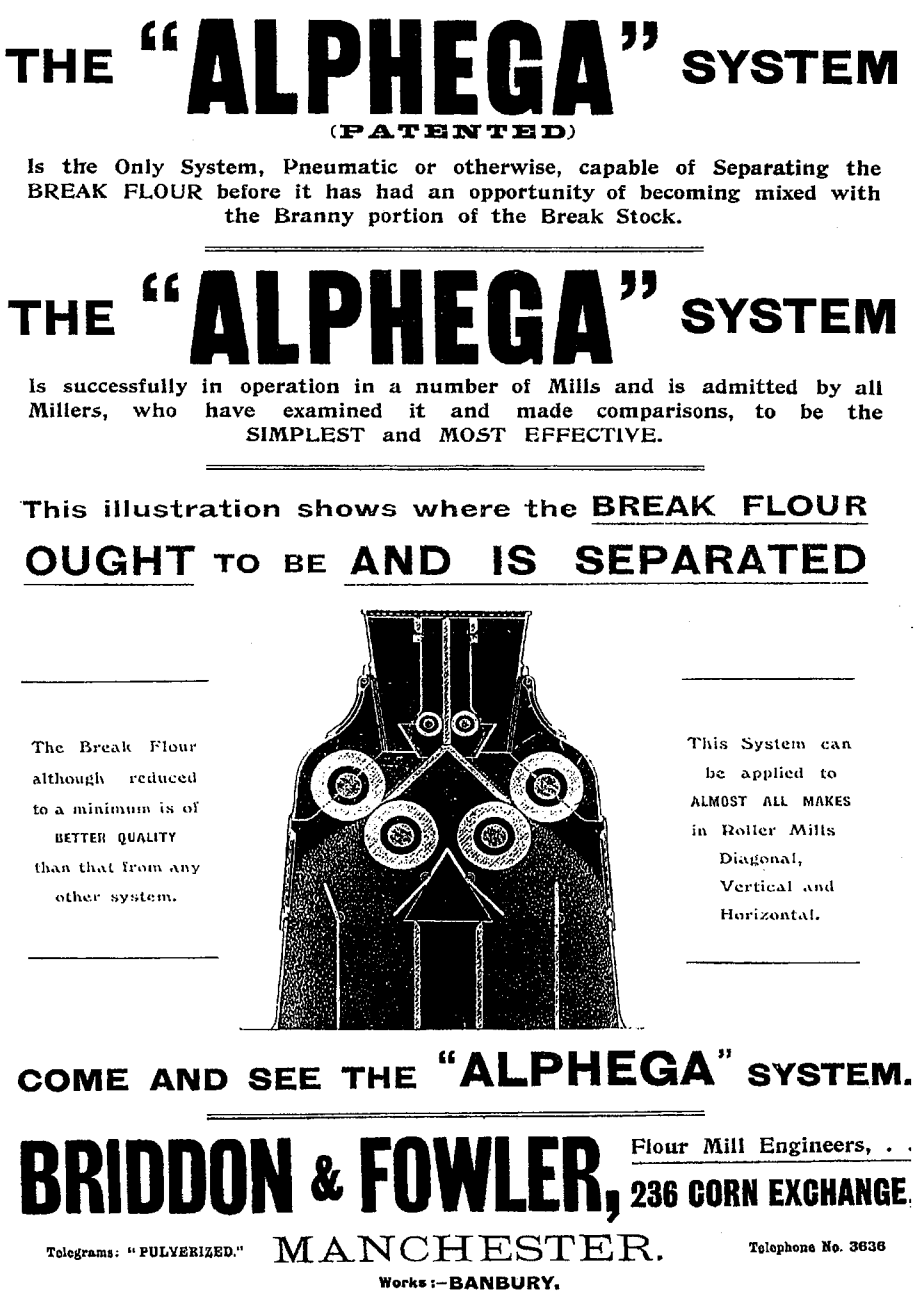

Figure 5. A Briddon & Fowler adverisement of 1907 showing their Alphega system.

enables the machinery to be separated from the sacks of corn, etc., stored in the older portion of the premises, and by letting daylight into these works should tend to considerably increase the efficiency of the "Mid-England Flour Mills". Mr. Sheldon Kench gave our representative the opportunity the other day of looking over the Mill premises, and the visit proved exceptionally interesting, showing, as it did, what great changes have taken place in the milling industry during the last 100 years. Not the least surprising fact about the Emscote mills is that notwithstanding the great alterations which were effected in 1885 and again during the past year, a few portions of the original fittings still remain in daily use. For instance, the great cast-iron water wheel, 24 feet diameter and 7 feet wide, which the writer in 1806 spoke of as being "no heavier than one constructed of wood of the same dimensions" still pursues its daily round, fed by water from the Warwick and Napton Canal, and the heavy wooden shafting which was used to hoist sacks from canal boats can still be seen performing the same operation on any day of the week. When one has said this, one has said all, so far as working of the mill is concerned, for both as to the grinding machinery and motive power used for the same there is a world of difference compared with what the "respectable millers and mechanics" witnessed in 1806. Many of the large fluted stones which were employed to crush corn are now used to pave the stable-yard, and the motive power which drives the complicated machinery is derived from a 100 h.p. steam engine. So different are the requirements of the present day that wheat which used to be dealt with by three machines now has to run the gauntlet of about thirty. The great change from stone to chilled-iron rollers was made in 1885 by Messrs. Lampitt and Son, Ltd., but, since then, wear and tear, combined with a dark and unsuitable building, made it necessary to re-arrange the plant, and by the advice of Messrs. Briddon and Fowler, milling engineers, of Manchester and Banbury, Messrs. Kench and Son decided to erect a new building with high-light floors, to part with some of the old machines, move the remainder to join some new ones, and re-arrange the whole according to the latest system. This has now been done, and though it involves the loss of a great part of the old building, it has produced such good results, in the shape of comfort and daylight, as must be an advantage in the conducting of the business. In fact, looking at the old mill now, one wonders how the work could have been carried on previously at all. A detailed account was given in 1885 of the chilled-iron roller system (which still prevails), but it may be said of the flour produced under the new process that it is thirty times purified; indeed, human ingenuity seems to have striven to the utmost to ensure that every element of impurity shall be removed from the "staff of life" consumed at the present day. On account of scarcity, only one-tenth of the wheat ground at the Mid-England Flour Mills is grown in England, and it is only fair to say that the character of the home-grown wheat would

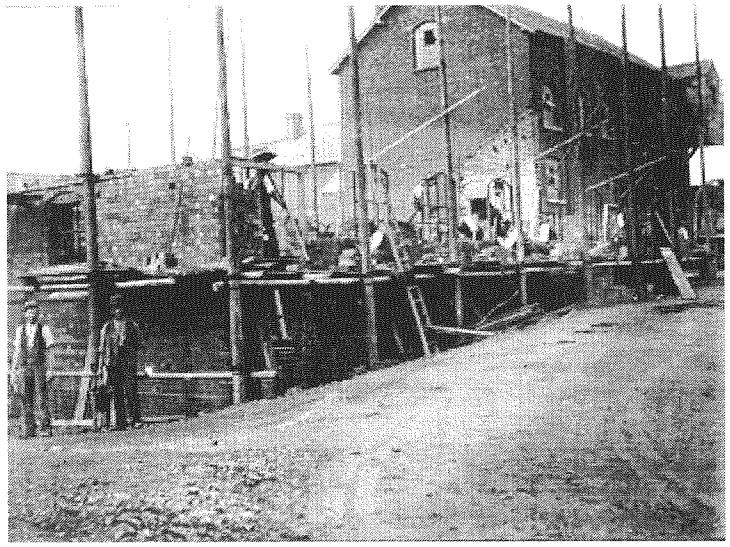

Figure 6. The new mill under construction in 1904. The steam mill of 1868 can be seen behind the scaffolding with the lucam of the waterpowered mill in the background. The scar of the demolished office building can be seen on the end wall of the steam mill.

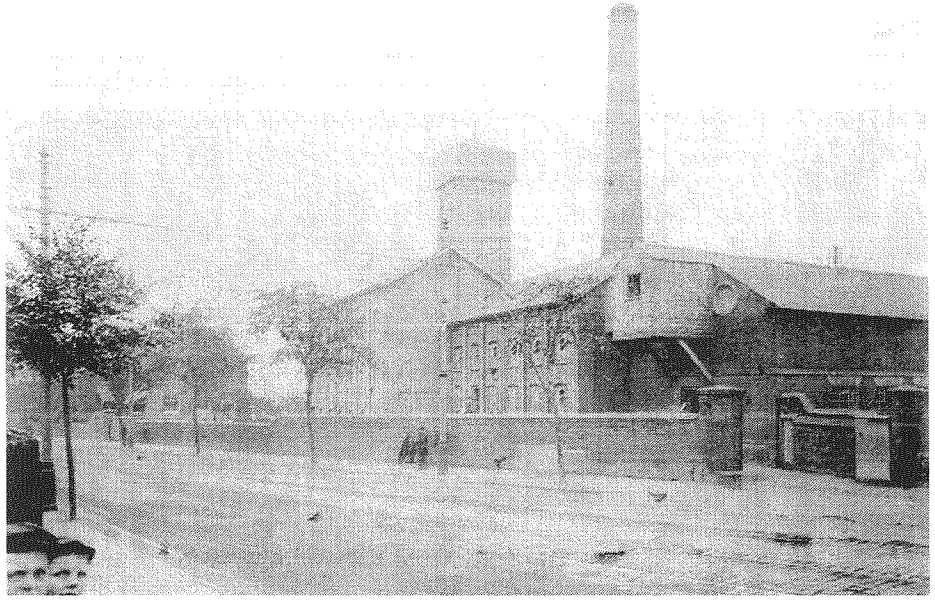

Figure 7. Emscote Mill in the summer of 1905. The waterpowered mill of 1805 is in the foreground with the 1868 steam mill adjoining. Beyond are the new mill and water tank erected in 1904/5.

scarcely require some of the precautions which have to be taken in regard to that of foreign origin. Most of the wheat milled at Emscote comes from India, Russia, Canada, South America, and Australia, and it is largely owing to the methods of harvesting adopted in those countries that the English miller has to be specially careful in winnowing the corn. A considerable amount of barley grows with the Indian wheat, and to remove this there is a specially-devised machine which removes everything of different size to the wheat. The wheat is then thoroughly washed and brushed, and after passing under a number of powerful magnets which attract certain stray bits of metal that would otherwise pass on and injure the silk through which the flour has to pass, the wheat goes on to the fluted rollers which break it down. Various processes of separation, grading, and purification follow, and to remove all the fibrous substances attaching to the grains of crushed wheat an air current is drawn through a silk sieve. After passing through the smooth rollers which grind the flour, the latter is sent on to a centrifugal dressing machine, where revolving beaters drive the flour through silk gauze. Much is said these days on the subject of "White" versus "Wholemeal" bread, but there is little doubt that the advocate of the latter would prefer not to eat much of the material that is extracted in the production of white flour if they examined it. Also a sure guide in such matters can be found in the fact that those who work hard with their muscles are not found eating bread with bran in it, though those leading sedentary lives may find it more useful than palatable, unless well buttered or otherwise assisted. It should be stated that very elaborate precautions have been taken to guard against fire in the mill premises. It seems that air charged with a certain proportion of flour dust is as explosive as gas; and the mills are therefore subjected to a higher rate of premium by the insurance companies unless very elaborate steps are taken to guard against fire. Every 10 square feet, therefore, is covered by a patent water sprinkler, the idea being that should a fire break out the heat would melt the solder and let the water fly out. Should this happen a fire-gong would be set going which would give the alarm. Mr. F. P. Trespass is the architect of the new buildings, which were built by Messrs. J. Cashmore and Sons. Messrs. Plucknett and Sons will install the electric light fittings, which will take current from the public supply to commence with."

While it would be easy to argue with the nutritional advice, this article does offer much useful information about recent modifications and the state of the milling industry at that time. Motive power for the mill was provided by a 100 h.p. steam engine thought to have been installed by King and Co. of Nailsworth, Gloucestershire, in 1896. Although the waterwheel was still in use to work the hoists in the old mill building, this situation did not last much longer. Much more attention was now paid to grain cleaning with supplies coming from such a variety of sources. It is interesting that the sole reason given for the small amount of English wheat being milled was

scarcity. While this might be taken as a diplomatic comment, it does reflect the state of agriculture in this country at that time and there was little encouragement for change with the ready availability of vast amounts of cheap imported grain. It would be many years before the balance was redressed. There is nothing in the article to indicate the capacity of the new mill but later information suggests that it was never more than a five sack plant, that is, capable of producing five 280 lb. sacks of flour per hour. While this was twice the output of some local mills, such as Great Alne Mill or Arrow Mill near Alcester, it was slightly less than Lucy's mill at Stratford-upon-Avon and very much less than Robbins and Power at City Flour Mills in Coventry which eventually reached about twenty sacks per hour. However, all these were very small fry in comparison with the massive mills being erected at the ports with outputs of up to one hundred sacks or more.

Notes on the calendar confirm that Messrs. Plucknett and Sons duly installed the electric light fittings in June 1905, power being provided by the new generating station which had been erected in 1902 close to the River Avon not far from the mill. On 4th February, 1904, a note had recorded that "Glovers repd. turbine". It is presumed that this had been installed to replace the waterwheel but there is nothing to indicate what the turbine was intended to work, or why it needed to be "repd." However, it is noticeable that the mill pond was cleaned out more regularly from this time. It is difficult to believe that the turbine was going to play a major part in powering machinery as the Warwick and Napton Canal Company had found that, apart from the mill's requirements, it had sufficient surplus water in the Leamington pound to supply cooling water to the Avon power station from 1902. One useful task the turbine could easily have performed would be pumping water up into the new tank which would have supplied the engine and the sprinkler system. Perhaps teething troubles with the turbine delayed this but, in June 1906, the waterwheel was finally taken out after a working life of just over one hundred years. In May 1906, the walls of the old mill had been raised by one storey and two cowls were added to the new roof a month later, perhaps indicative of the presence of a dust extraction plant in this part of the building. In the midst of all these alterations, Jim, the mill cat had died on 10th March, 1906, "for 11-12 years a good and faithfull servant". The arrival of new technology seems to have affected everything!

Problems with the condition of some of the imported grain must have persisted as a new wheat cleaning plant was brought into use in May 1907, though there are no details of its equipment or location. A terminal threat to the other mill livestock rolled into the yard in the same month with the delivery of Sentinel Steam Waggon V 489 by Alley and Madellan of Glasgow. From this time horses and horse drawn waggons were not replaced. New silos were erected by Briddon and Fowler in October 1907 and, at the same time, a new concrete bottom floor was put in the old mill while the last vestiges of the original water powered machinery, the upright shaft and the crown wheel, were removed.

At twenty years old, Leonard Sheldon Kench joined his father in the business in 1908, having served his apprenticeship under Percy Townshend at the Albion Flour Mills at Worcester. Improvements to the mill continued, including a new warehouse

built by Cashmore and Sons in 1910. A telephone system was fitted in the mill and offices in 1911 but proved so troublesome that it had to be replaced only three years later. A new boiler house and boiler were erected in 1913 in preparation for a replacement steam engine supplied by Robey and Co. of Lincoln early the following year. The old engine started a new life in India. At the onset of the First World War, several employees left to serve in the army and were followed by Leonard Kench in October 1914. Despite the war, supplies of imported grain were maintained initially though the milling industry increasingly came under government control to ensure local distribution of flour and keep prices in check. In March 1916, the last two horses, Captain and Dick, and the waggon built in 1860 were sold as deliveries were now all made by lorry, some of which were petrol driven.

Sadly, Leonard Kench died of wounds received in France on 29th June, 1916, leaving a wife and young son. As Sheldon Kench's only son, this also presented a major management problem at the mill. Sheldon Kench was sixty-five and had only returned to the mill to cover for his son's wartime absence so, with no other obvious family option, he invited George Rishworth to join him in the business. On 8th November, 1916, a limited company was incorporated, named "Kench & Son Limited" with Sheldon Kench and George Rishworth as shareholders. Despite the short interval between Leonard Kench's death and the establishment of this company, George Rishworth was by no means a hasty choice. He came from a milling family based in Yorkshire, latterly with substantial premises in Leeds and Hull, and had worked on mill installations for Henry Simon before starting in the milling trade at Healing's Borough Flour Mills in Tewkesbury. George Rishworth started at Emscote Mill on 1st January 1917 and had barely had time to settle in before control of all flour mills passed to the Government as supplies of imported grain diminished and there were real fears of food shortage. These would have been difficult times for someone anxious to show his worth in a new position.

At Emscote, the mill field was converted into allotment gardens in March 1917 as it was surplus to requirements with no horses to graze. The stables and waggon sheds had already been altered to suit their new motorised occupants. Sheldon Kench finally retired from any active part in the business in May 1919 and went to live at Byfleet in Surrey, though he did return to Leamington Spa for the last year or two of his life. A major change of power source for the mill was introduced early in 1921 with first the roller plant and then the wheat cleaning department being run by electricity. This almost coincided with the ending of Government control of the milling industry but this did not open up a particularly promising new era for the smaller mills. Sheldon Kench died on 21st November, 1926 and so ended the family's association with Emscote Mill which had lasted for more than a hundred years.

The Agreement which allowed the mill to use surplus water from the canal was terminated on 21st May 21, 1930 and the arches through which the water flowed into the mill pond were blocked up in August of the same year. By this time, the Warwick and Napton Canal Company no longer existed having been absorbed into the new Grand Union Canal Company at the beginning of 1929. From May 1931, the mill was driven by a 130 h.p. Allen oil engine although this proved to be

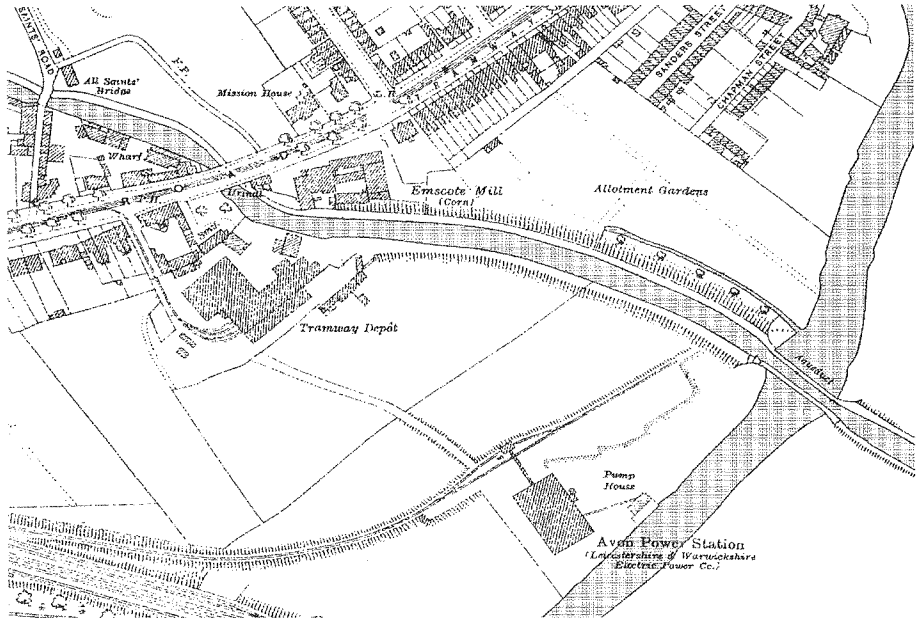

Figure 8. Emscote Mill in the 1920s from the O. S. 25 inch map of 1925. The new mill occupies the land between the old mill and the mill house. also the tail race can be seen where it joins the River Avon near the canal aqueduct.

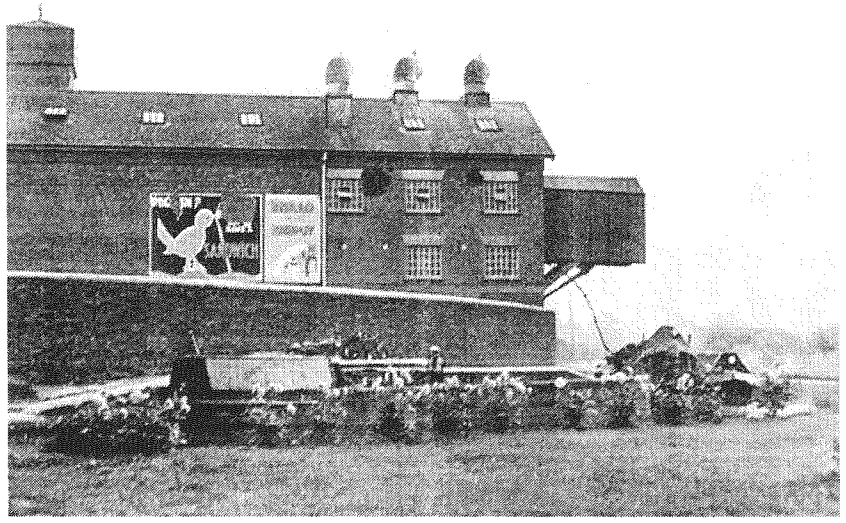

Figure 9. View of the original mill building from across the canal in 1938. The mill had an extra storey added in 1906. The raised section of the canal towpath, under which the surplus canal water used to flow, can be seen behind the nearest canal boat. (*The Miller*, 19th November, 1938)

insufficiently powerful and had to be replaced by a 173 h.p. engine by the same maker at the beginning of 1935. The last recorded addition to the machinery was a suction plant for unloading the wheat which was installed in May 1936. A short article about the mill in *Town and Country Review* emphasises the provender side of the business based at nearby Rock Mill and this had almost certainly assumed far greater importance than previously. The Second World War saw the flour mill come under government control once again and this lasted until 1953. George Rishworth had died in 1951 and the business was now managed by his two sons, Frank and Harold. Although many of the large port mills suffered bomb damage during the war, it wasn't long before they were rebuilt to even greater capacity. The milling industry was rapidly contracting into the hands of a few major companies and the only hope for the smaller firms was to maintain their long-standing trade with local bakeries. However, the development of large bakery plants in the 1950s saw the rapid disappearance of village bakeries and even this trade simply ebbed away. The "final straw" for Emscote and Rock Mills was the difficulty of recruiting and keeping staff in competition with the booming car industry around nearby Coventry, so the decision was taken to close both mills in 1961.

Emscote Mill remained in food production being used for the manufacture of meat pies until the mid-1990s (see Figure 10). The buildings were subsequently demolished and replaced by a block of flats while the site of the mill house is now occupied by a row of modern terraced houses. Unfortunately, the developers chose

Figure 10. The pie factory. The mill house is in the foreground with the warehouse and 1904 mill and water tower beyond.

Figure 11. The nine arches beneath the raised section of the canal towpath still visible in 2003. "Fleur-de-Lys Court" stands behind the former mill pond wall.

only to commemorate the later use of the site by naming the flats "Fleur-de-Lys Court". This may be a grander and more romantic name than "Flour Mill Flats", or even "Kench's Court", but surely it would have been preferable to remember one hundred and fifty-five years of flour milling rather than thirty-five years of pie making. The only surviving reminders of the mill are the nine arches in the canal bank, one of which is partially open, and the last few yards of the tail race which still carries a little water from a modern culvert back into the River Avon. I wonder how many people passing here have the faintest idea of their original purpose.

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All documents specifically relating to the mill, unless individually referenced, are from the collection of David Rishworth.

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5. Kelly's Directory for Warwickshire, 1896.
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7. 1851 Census.
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The staff of Warwick Library for their patience in dealing with my enquiries.

THE SELF-REGULATING WINDMILL OF EDMUND LEE

by Tony Bonson

Although the windmill was essentially a medieval invention is was not until the late 18th and early 19th century that a self-regulating version that had some automatic control of its operation became generally available.[1] To achieve the goal of self-regulation two operations were necessary, namely the speed of the sails had to be controlled during the variations of wind strength, especially with respect to preventing them running away in high winds which could damage the mill, and the sails had to be automatically turned into the wind as its direction varied.

The invention of self-regulating sails has been traced to the years around the turn of the 18th century with, amongst others, Andrew Meikle, a Scottish millwright proposing spring sails in 1772, Stephen Hooper's roller reefing system patented in 1789, through to William Cubitt's patent in 1807 for what are still known as "patent sails" to this day.[2] Consequently William Cubitt is universally acknowledged today as the inventor of the self-regulating patent sail.

The device introduced for keeping a windmill turned into the wind was the fantail whose invention was ascribed in the early 19th century to Andrew Meikle.[3] In fact this belief was prevalent as late as the 1930s[4] but after the Second World War it was discovered that the fantail had been originally patented in 1745 by Edmund Lee[5] who, at the time of his patent, resided at Brock Mill, an iron forge near Wigan, in Lancashire.

It was, no doubt, due to this long misapprehension concerning the invention of the fantail that the Wind & Water Mills Section of the Society for the Protection of Ancient Buildings published a booklet by S. Buckland in 1987 to set the matter right and ensure that Edmund Lee received the credit due to his original invention.[6] However, virtually nothing was known about Edmund Lee, apart from his patent, which the booklet published in detail. However, on reading the patent it is quite clear that Edmund Lee patented a fully self-regulating windmill in 1745, not just the fantail part of such a solution. Unfortunately, his 1745 patent says very little about the detail of how this self-regulation was to be achieved but a drawing of a windmill utilising his ideas was included.[7] A year after this English patent was granted, Lee was granted a Dutch patent for his self-regulating windmill which contained rather more detail of its operation. It is worth again reproducing the part of the patent dealing with the sails in conjunction with the drawing from the English patent (see Figure 1).

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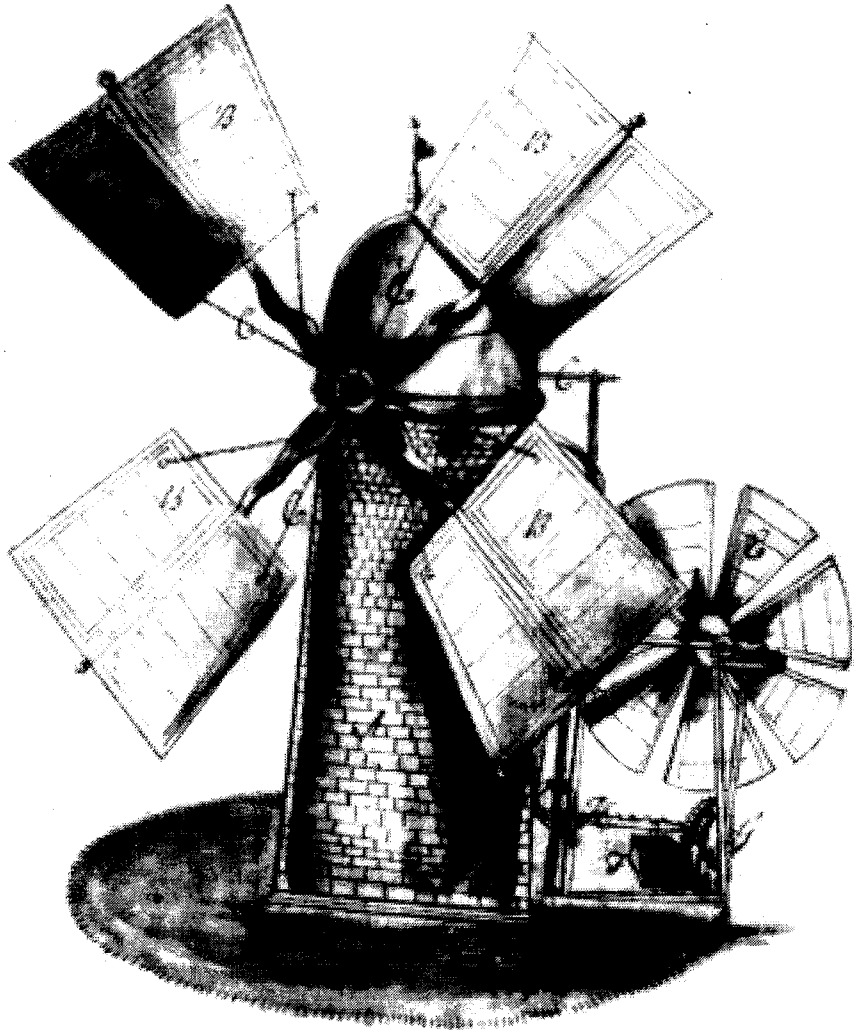

Figure 1. Edmund Lee's patent drawing of a self-regulating windmill, 1746.

A. The case of the Machine.
B. The Sails
C. The regulating barr passing thro' the Centre of the Original Axes.
D. The Chains from the Barr to the Sails.
E. The Back Sails which keep the Machine Constantly in the Wind.
F. The Weight which Regulates the Sails According to the Winds force.
G. The Travelling Wheel which moves on planks round the Machine.
H. The Regulator to which the Weight is Fixed.

> "The Sails or Wings of this Machine, which may be either four or six, are not rectangular as the Common ones of a Wind Mill, but formed Elliptical, on which the Wind will always have a much Greater Power than on Rectangular Sails: and they are so fixed to the Arms that in a superfluous Gale, the edges Will turn towards the Wind more or less in Proportion to that superfluity: These Sails are Govern'd by Ropes or Chains, one End is affixed to each Sail, the other Ends uniting in one horizontal Bar, which Passes Through the Centre of that Arbor or Axis to which the Arms of the Sails are fixed, & is there Fast'ned to the top of a crooked Lever (which the inventor Calls the Regulator) at the other End of which there hangs a Weight. This Weight is to be proportioned to the Greater or less Force Required to perform the perticular Work of Each Mill: for The Heavier it is, the Stiffer the Sails are braced, & therefore Require more Wind to turn them about; and on the Contrary, the lighter the Weight the more easily The Sails are moved: this Weight being once justly proportioned there will, Afterwards, be No Necessity for any Alteration, let the Wind blow how it will."[8]

In 1987 S. Buckland's assessment of Lee's windmill concluded that Lee had not built a full size mill at the time of his patents and probably had constructed only large working models with some six to nine feet sail span. His appreciation of the operation of the self-regulating sails was that they pivoted around the sail arm which has alternatively been described as feathering and acting as air-brakes. From this interpretation the conclusion was made that on a full size windmill the sails would be far too flexible to be controlled by a single chain under tension running from the sails' trailing edge to the central striking rod in the centre of the wind shaft (see D in Figure 1). Also the striking gear was seen to be unworkable as the vertical rod passing from the end of the striking rod to the end of the steelyard arm carrying the weight, which was nearly at ground level, would also have been impossibly flexible in full size (see H in Figure 1). As for the fantail Buckland is full of praise for what he considered was a remarkable and early example of a self-powered feed-back control mechanism.

Apart from his patents nothing else is known of Edmund Lee except that he died prior to mid-1763. When the booklet was published in 1987 it was not known if any full size windmill had ever been constructed using Lee's patents but the author concluded that the fantail must have been used on at least one mill before the patent's expiry. In tracing the history of propagation of the fantail, the publication by Adam Walker, an itinerant lecturer in science and mechanics, in 1771 is noted[9] because he describes an equable moving windmill and later ascribed its design to a "Dick Melling" of Wigan.[10] But who this person was and what his connection to Lee might be was not known.

Are these conclusions a fair reflection on the merits of Edmund Lee's invention and did he ever use his patents to construct a full size, operational, self-regulating windmill?

The dismissal of Lee's sails is dependent on the interpretation that they were meant to rotate about the sail arm. Is this a justified interpretation of the phrase that the sails "require more wind to turn them about" in Lee's patent? The sails shown on the patent drawing have a number of sections lying across the sail arms which, in fact, could be a representation of shutters arranged as in Cubitt's patent sail. It is noticeable that the chains are shown connected to the first of these sections and not to the rigid framework of the sails. The phrase describing their operation could equally by applied to such shutters if Lee was using the word "sail" rather than "shutter". Also it is difficult to understand how a striking rod, which can only move horizontally, could operate chains, that themselves could only exert a force in a direction roughly parallel to the sail arm, such that they cause the sails to rotate around the sail arm. Could it be possible that Lee did in fact invent the patent sail some sixty years before Cubitt?

As with any source document the reason for its production must be considered along with a recognition of terminology in use at the time. When Lee wrote his patent, a self-regulating windmill had never previously been described and so some words used do not necessarily have the same specialised, precise meaning as they do in this context today. Also Lee's description was intended to be as clear as necessary to have his patent granted without being so explicit that a competitor could gain an advantage. So how is it possible to tell exactly what Lee designed and how it worked? If Lee ever built a real windmill it has not survived and even archaeological evidence, if ever found, would probably never answer such a question.

Fortunately, after the passage of over 250 years, an eyewitness has come forward to testify that Lee's self-regulating windmill design was definitely built and to describe how it actually worked. His name is R. R. Angerstein, a native of Sweden, who was paid by the Swedish Steel Producer's Association to visit England in 1753 to report on the state of the English iron industry and its possible effect on Swedish iron exports to England. In short, he was one of the many 18th century industrial spies. During the eighteen months or so that he was in England he produced eight volumes of notes, not just on the iron industry, but on many of the developments that were taking place in this country at the very beginning of the "industrial revolution". In doing so he travelled widely throughout the country. His eyewitness accounts are made even more valuable by the many sketches and drawings that he included in his notebooks. These notes were of course written in Swedish and have only recently become available in an English translation.[11]

During the latter part of 1754 Angerstein travelled through Northern England including the region around Wigan. With his interest in ironworks it was inevitable that Angerstein would visit Brock Mill Forge. At the forge he was very keen to see a screw cutting machine but this was kept secret, locked in a cellar. Although he tried to gain entrance by bribery he eventually was told that

> "the works formerly had been the property of an expert mechanic who had made himself poor through experimenting, and now lived a few miles away in a little town called 'Holland' [Up-Holland, about six

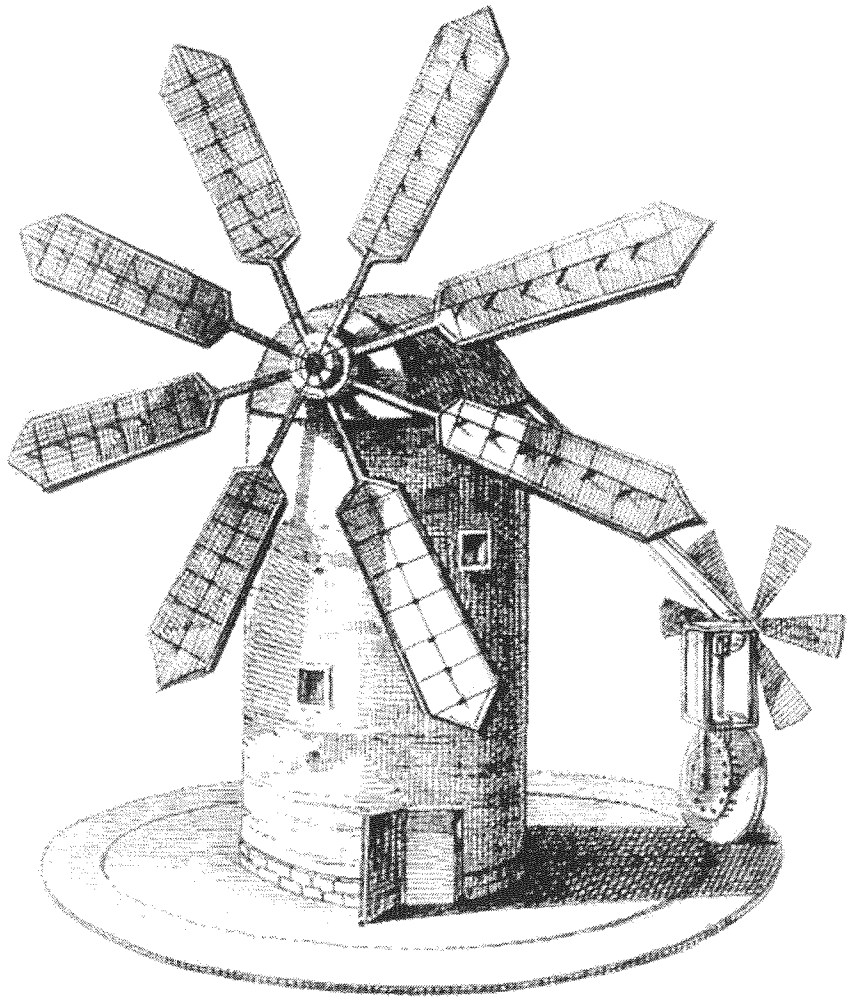

Figure 2. Angerstein's drawing of the self-regulating windmill erected by "Mr. Melin", 1754. (Science Museum and P. Berg)

> miles west of Wigan]. I was also told that he there had built a very peculiar windmill to his own designs and ideas."

Angerstein duly visited Up-Holland and learned about the screw cutting machine and "in addition to this invention, the above mentioned man, whose name is Melin, had at Brockmill made a contrivance to drive five pairs of bellows from one waterwheel". Finally, Angerstein turned his attention to the windmill which he drew and described in detail, as follows,

> "The windmill, invented by the above-mentioned Mr. Melin, is no

longer kept secret either in England or in Holland, because he has obtained exclusive rights for fourteen years in both places. He has already sold the rights to build his design of mill to two people living in the neighbourhood. One of them is Sir Rodger Brock, who already has used such a mill for several years pumping water from one of his coal mines. The other person uses the design for a flourmill located some miles from here. Each of them paid the inventor 20 guineas. The main part of the invention consists of a regulator, which not only causes the mill to turn into the wind, but keeps the speed uniform both in strong and moderate winds.

The mill has eight sails (see Figure 2). Each sail is provided with at least eight panels made from thin boards, which can be closed by iron bars with weights hanging from them, but opened by stronger wind.

All the rods reach to the windshaft where they are attached to a rod, by means of chains running over pulleys, which can move lengthways inside the hollow windshaft. The opposite end of the latter rod is connected to a chain by means of a swivel, the other end of which is wound around a horizontal drum mounted on gudgeon pins. A quadrant fitted to the drum carries another chain with the weight on the end. (see Figure 3)

The governor, which controls the position of the sails in relation to the direction of the wind, is a set of smaller sails that rotate on a shaft

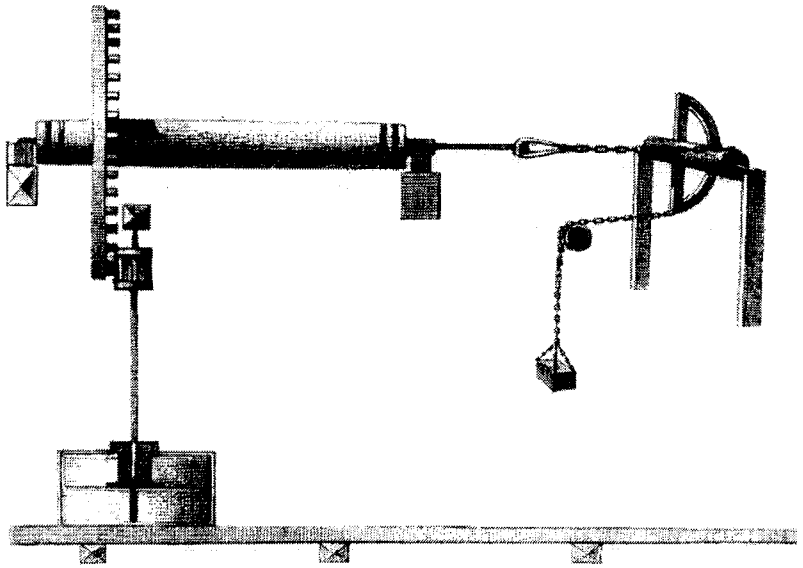

Figure 3. Angerstein's drawing of the striking gear in the flour mill constructed by "Mr. Melin", 1754. (Science Museum and P. Berg)

at right angles to the windshaft proper. The fantail, or wheel with small sails, can move in either direction and its movement is by means of gears that transfer the movement to a track wheel, which can operate backwards or forwards and is fitted to the poles that move the cap.

As long as there is a good wind for the sails, the fantail stands behind the mill in the lee of the tower but, as the wind turns, it starts rotating and winds the sails back into the wind.

The mill built by the coal mine only had four sails. As the crank for the flat rods prevented the striking rod from passing out through a hollow gudgeon pin at the end of the windshaft, holes had been made in the shaft, through which bars fixed to the rod projected. These bars supported an iron ring pressing against a hinged frame of iron, which supported the weight (see Figure 4). This arrangement could be simplified by placing the crank on a separate shaft geared to the windshaft. The driving gear on the windshaft as well as the gudgeon would have to be provided with holes at the centre to let the striking bar through. Another way to simplify the design would be to use springs mounted inside the hollow windshaft instead of a weight."

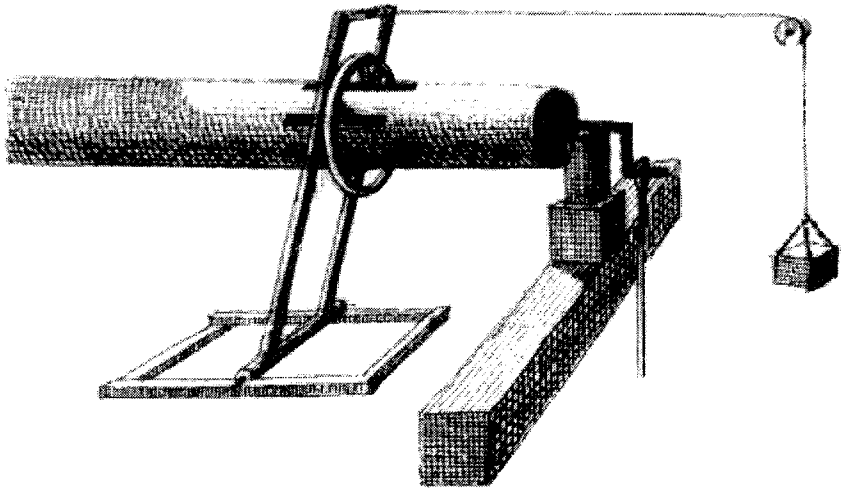

Figure 4. Angerstein's drawing of the striking gear in the mine pumping windmill of Sir Rodger Brock. (Science Museum and P. Berg)

The details given in this account of "Mr. Melin" are similar to those details known about Edmund Lee. It is almost certain that Edmund Lee and Mr. Melin were one and the same person and that Mr. Melin (or the millman) was a nomme de guerre (for the benefit of nosy foreigners?) and could well be the source of the "Dick Melling" in Walker's account of the development of the self-acting windmill.

The confirmation of the building of these two windmills bears out the conclusion

made in 1987 that the fantail must have been executed on at least one mill shortly after Lee's patent was granted. The sails, however, do not rotate about the sail arm as was suggested in the interpretation of the patent but the drawing (especially the three sails at the top right, see Figure 2) and Angerstein's account shows that the sails had shutters linked by a central bar that was itself linked to the striking rod, operating in a very similar way to Cubitt's patent sails. It is highly likely that this was the basic operation intended to be described in Lee's patents.

As for the regulator shown in the patents, the conclusion reached in 1987 that the long vertical rod was impractical on a full size windmill is vindicated by the changes shown in the Angerstein's drawings (see Figures 3 and 4) of how the weight was attached to the striking rod in the life-size windmills compared with that shown in the original patents.

In conclusion it is probably necessary to re-appraise the work of Edmund Lee. His contribution to the development of the self-regulating windmill was massive, not being restricted just to the invention of the fantail, but also including the invention of regulating "patent"-like sails. Consequently the work of Cubitt, some fifty years later, can now be seen as improvements and modifications to an existing idea rather than the introduction of a ground-breaking innovation. That honour must surely be attributed to Edmund Lee.

Finally, the moral of this story is that it always pays to publish regardless of the completeness of the information available. By publishing what little was known of Edmund Lee and his patents (which was quite minimal) in 1987 it has been possible to appreciate the significance of the evidence of a Swedish industrial spy, that has been languishing in Sweden for 250 years, to give a more complete picture of the introduction of the self-regulating windmill in the middle of the 18th century.

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GREAT HAYWOOD MILL, STAFFORDSHIRE

by Barry Job

Location

Great Haywood Mill lies on the River Trent, some five miles east of Stafford at grid reference SJ 994230 (see Figure 1). Although the Trent rises on the northern edge of the county, after passing through the towns of "The Potteries" it has become a substantial river by the time it reaches Great Haywood. The mill lies upstream of the Trent's confluence with the River Sow, an important tributary which flows through Stafford. Just downstream of this confluence is the famous Essex Bridge, the longest packhorse bridge in Britain. The mill is close to the junction of the Trent & Mersey Canal (running to the east of the mill) and the Staffordshire & Worcestershire Canal (running to to the south of the mill). The village of Great Haywood is to the south-east of the mill. Another water mill, Hoo Mill, lies about half a mile upstream on the River Trent (see Figure 2).

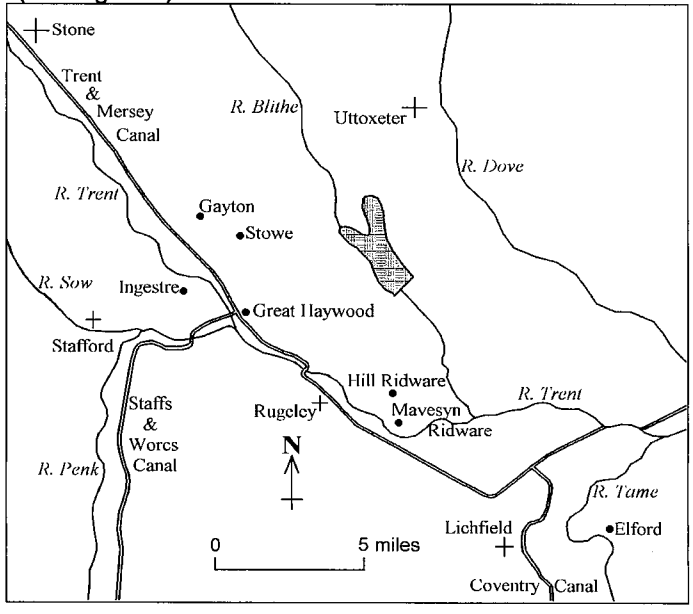


Figure 1. Map of the area around Stone, Stafford and Lichfield in Staffordshire showing the location of Great Haywood.

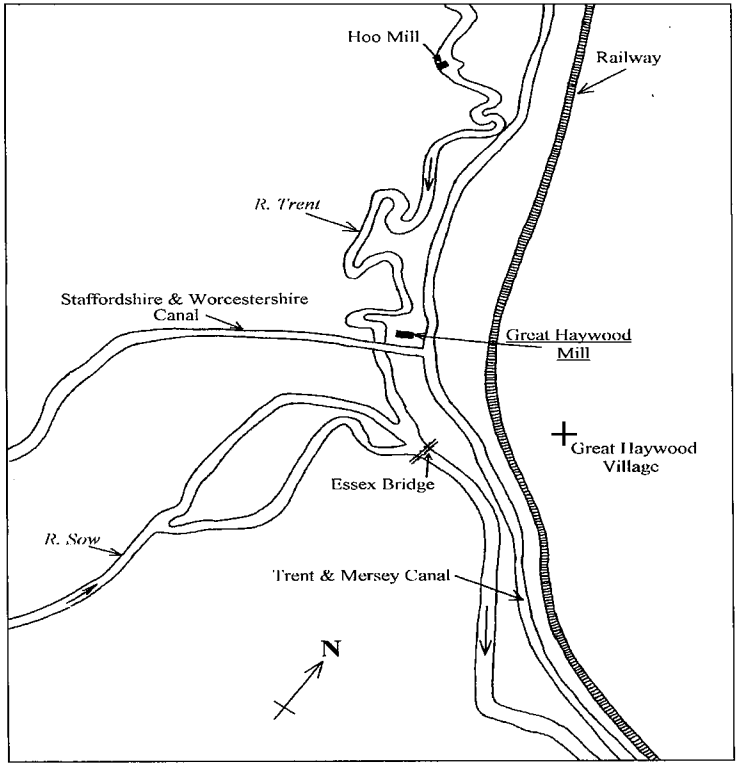


Figure 2. Sketch map showing the river confluence and the canal junction at Great Haywood.

History

The corn mill site is undoubtedly an ancient one as a mill at Great Haywood is mentioned in the Domesday Book where its value of five shillings is one of the highest in the county. A mill is also included in 15th century deeds,[1] but the present mill dates from just after 1770 as the Staffs & Worcs Canal, cut in 1771 and opened the following year, caused the river to be diverted, this diversion then being used for the new mill leat.[2] This is illustrated by comparing the map in Figure 3 showing the original course of the river with the map in Figure 4 showing the changes caused by the canal. Just over ten years after the mill was built an advertisement[3] authorised by Mr. Adams, the miller and owner, suggested that the mill was suitable for paper making as there was "*a very powerful stream*," but it is not thought that this trade was introduced until a few years later. After Mr. Adams' death his widow, Margaret, sold the mill for £980 in May 1784 to William Webb, a miller from Mavesyn Ridware.[4] The mill house was described as "*newly erected*", but was, in fact, not finished and a warehouse, adjoining the house, had only just been completed. Paper making was being undertaken by 1792 according to a Sun Fire Insurance Policy taken out in that year.[5] In April 1798 William Webb let the mill for £50 half-yearly rent to his

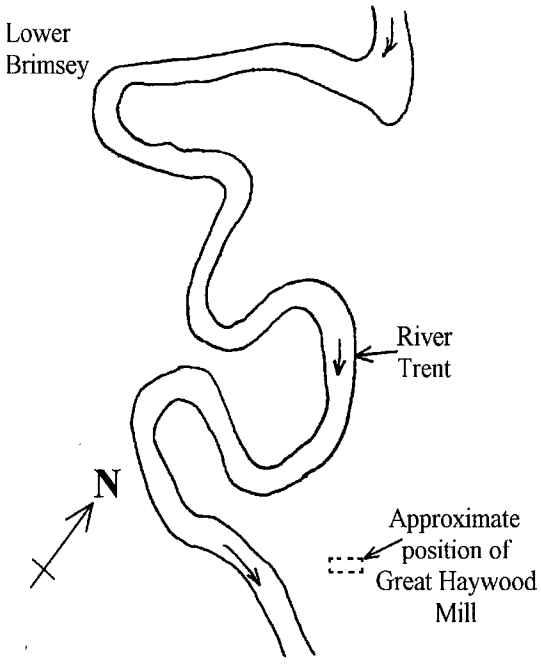
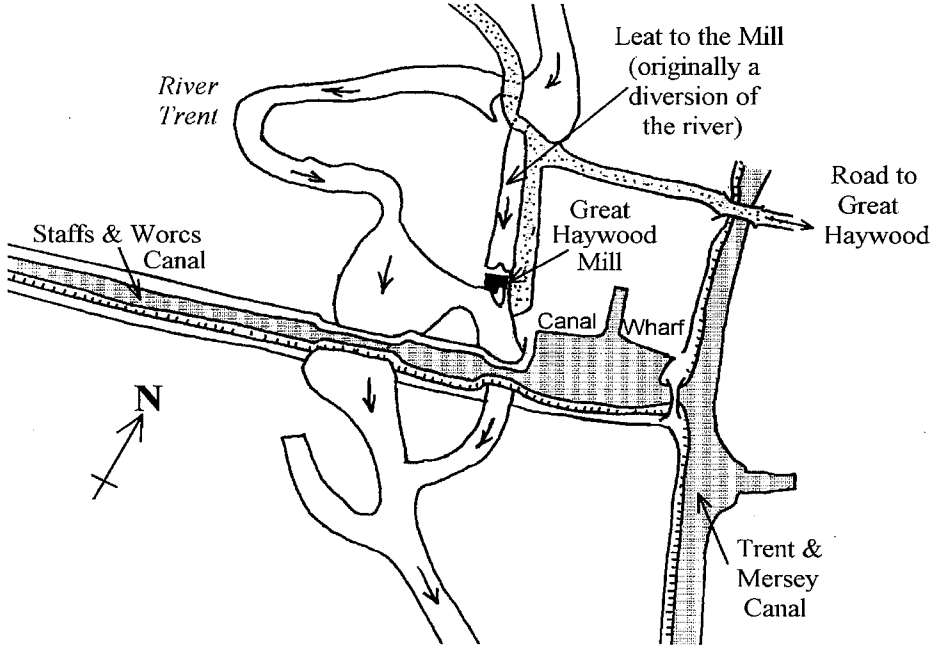


Figure 3 (*left*). A sketch map showing the original course of the River Trent at Great Haywood.

Figure 4 (*below*). A sketch map showing the changes to the water flow subsequent to the construction of the Staffs & Worcs Canal, taken from S.R.O. D3186/8/1/1/1 (undated but believed to be from c.1770.)



sons George and James Webb, both described as millers of Hill Ridware.[6] William Webb died in November 1812, leaving the mill to George and James, but with substantial financial bequests to his other children and grandchildren, with the exception of one grandchild, William Neville Kent, who was specifically excluded.[7] The partnership between George and James effectively finished in 1814, with James in debt to George for the sum of £860. Their partnership for milling and paper making officially ceased on 31st March 1814, and that for the trade of colour grinding on 31st December 1816.[8] The partnership was officially dissolved in July 1819 with James selling his interest in the business to George for a nominal five shillings, but George also paid him £100, plus £1000 payable on the estate and the debt of £860 was discharged.[9] Up to this point William Bailey had been the actual miller at Great Haywood,[10] but then Richard Webb, another member of the owner's family took over this position. By 1819 Great Haywood Mill was a substantial property, consisting of three dwelling houses, the corn mill, paper mill, twelve gardens, two barns, three stables, ten acres of meadow and ten acres of pasture.[11] Richard Webb, John Brereton and George West occupied the three dwelling houses, with George West's house being the converted warehouse. Throughout this period George Webb appears to have continued to live in Mavesyn Ridware, where he was recorded as the miller,[12] although he was earlier recorded as a paper maker at the nearby Elford Mill (another Domesday site).[13]

Richard Webb was born in 1791 in the parish of Stowe[14] but his relationship to the other Webbs is unclear. Also with Richard was his wife Hannah, daughters Frances and Mary and sons George, Bartlam and Robert. The 1841 census shows that Bartlam, at the age of 16, was assisting with paper manufacture,[15] but by 1851 both George and Robert had left the mill.[16] Richard Webb died on 7th July 1858[17] and by 1861 Robert, now aged 29, was back helping his mother Hannah run the mill. At this time his sisters, living at the mill, were described as "*Railway Shareholders*".[18] George Webb Senior died on 27th December 1847 aged 93 years.[19] He had two children, Sarah and Ann. Sarah married Thomas Jackson of Wade Lane House, Mavesyn Ridware, but she died in October 1848 without issue[20] and hence ownership of the mill passed to George's other daughter Ann. She had married Robert Thacker, of Castle Donington, Leicestershire, on 8th March 1808 and had four children, but two of these, Emma and George, had died before their grandfather.[21] Another son, Arthur died in 1857 and Ann herself died on 13th December 1859. Thus the mill passed to the Ann's remaining child, Charles William Thacker, described as a farmer of Elford Low, but who is also recorded as being at the Elford corn and paper mill.[22] At this time the mill was producing £75 per year rent. Charles William Thacker married Louisa Bourne of Comberford Lodge, and when he died on 26th May 1867 he left equal shares in the Great Haywood mill to his two daughters Emily Louisa and Mary Florence Thacker, aged 21 and 19 years respectively.[23] Mary Florence married Robert Moore Gillson, a Royal Navy commander, when she was twenty and went to live in East Cowes on the Isle of Wight. When Emily Louisa married a William Briggs the rent from the mill had risen to £80 per year, although paper making had ceased before 1871.[24]

Figure 5. The gravestones of George Webb (d. 1847), his wife Sarah (d. 1819) and his daughter Sarah (d. 1848) at St Nicholas's Church, Mavesyn Ridware.

In 1871 Robert Webb was still at Great Haywood, but was now described as "*lately corn miller*".[25] By the following year the miller was William Tomlinson, aged 50, from Coppenhall in Cheshire.[26] He was there at least until 1890, as testified to by the following advertisement.

> "To be let from 25th March next, Great Haywood Mill, Stafford, now in full work, with four pairs of stones, roller mill etc. and good supply of water. Apply to W. Tomlinson on the premises." [27]

Presumably this was successful as by 1891 Joseph Tabbernor, aged 47, from nearby Gayton Mill was listed as the miller at Great Haywood.[28] He was there about ten years, but in 1901 a change was recorded as Edmund John Howell, aged 45, miller and baker from Ipswich in Suffolk moved to the mill.[29] He was there at least until 1908, and probably much later, but after this date the mill ceased to be listed in the Trade Directories. Bill Howell, who also ran the Town Mill, Stafford, was the miller by 1918 and through the 1920s and 30s,[30] after which H. W. Hunt & Sons took over the mill. They carried out considerable extensions, removing the water power and millstones and installing a set of rollers on the ground floor for producing animal feed, although the original jockey pulley sack hoist was retained. This and other machinery were originally driven via lineshafting from a single cylinder engine installed in the wheelhouse. In more recent years this system was replaced by electric motor drives within the mill and the wheelhouse was demolished.[31] This machinery

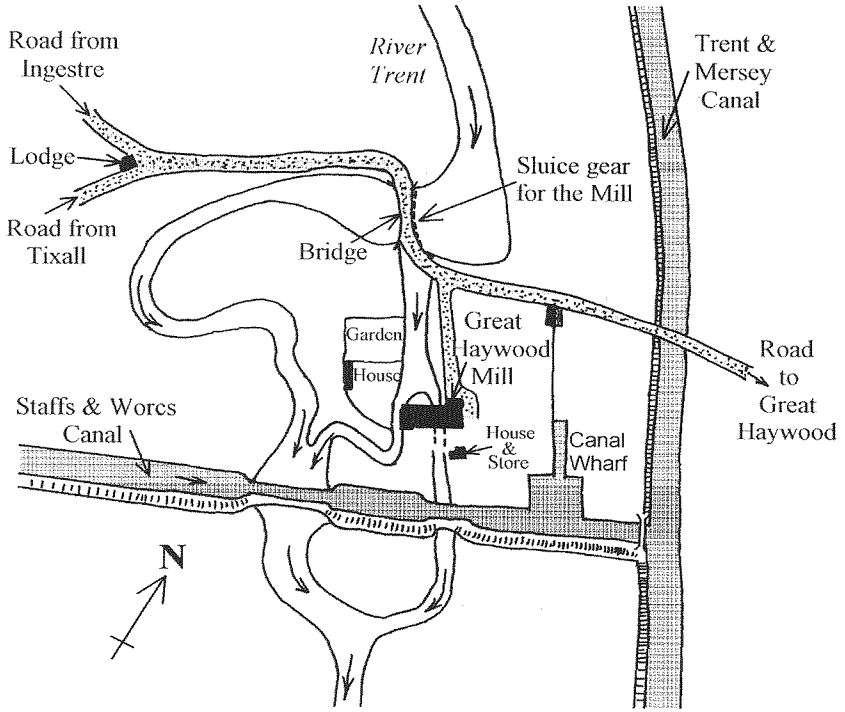


Figure 6. Sketch map to indicate the water flow to the mill, taken mainly from S.R.O. 1434/6/7 (dated 1871) and S.R.O. D240/E/C/1/7/1 (dated 1802/4).

was still in use when the mill was visited by the Staffordshire Industrial Archaeology Society in 1983, but more recently all of the machinery has been removed, the mill building very much reduced in size, and the site given over to modern warehousing.

Description

As built, the brick and tile mill was a substantial building of three floors, plus roof storage space. The site is flat lying and it was powered by two undershot water wheels, latterly one internal to the east and the other external in a wheel house to the west. However, the Staffordshire and Worcestershire Canal map (see Figure 4), undated but "*believed to be from about 1770*" (but probably slightly later), suggests that at that time both wheels were external. Thus the east wheel became internal when the mill was extended at an unknown date (compare with Figure 6), this extension being completed before 1871. The western wheel pit indicated a wheel of about 20 feet in diameter and 6 feet wide.[32] This external wheel drove a cross-shaft to four pairs of stones on the axis of the mill.[33] Presumably the internal wheel was of a similar size, originally driving four pairs of stones, although by 1890 these had been replaced by rollers. Sluice gates fitted to the arches of the road bridge over the Trent diverted the water into the mill's leat. This ran alongside the track

Figure 7. Great Haywood Mill, 2002, seen from the entrance to the mill yard

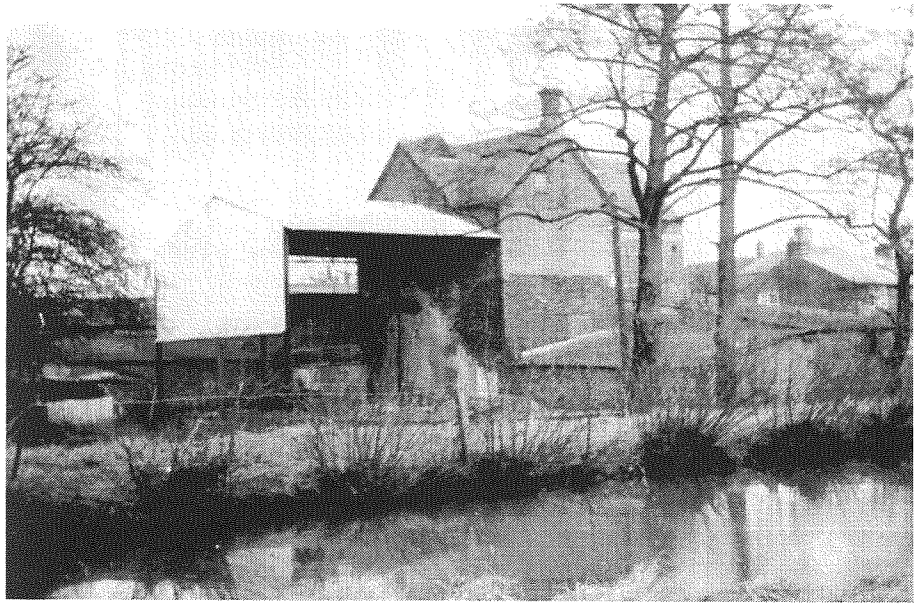


Figure 8. The rear of Great Haywood mill, 1966, viewed across the Staffs & Worcs Canal. The outline of the old wheelhouse can be seen under the new extension. (Photograph courtesy of John Bedington.)

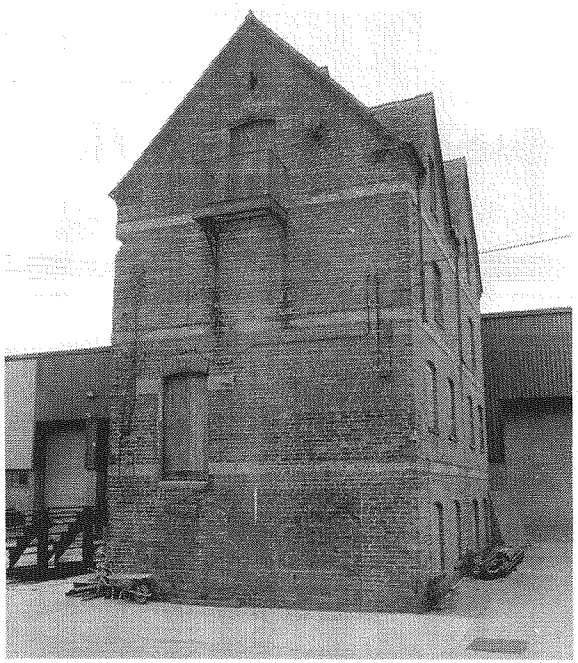


Figure 9. The side view of the three storeyed, brick, mill with roof storage space as seen in 2002 with modern warehousing in the background.

which ran from the road to the mill yard. The leat ran from the north and split to the wheels, the external wheel's tail race ran directly to the river, the other ran in a culvert under the Staffordshire and Worcestershire Canal before entering the river (see Figure 6).

Ancient Water Marks

Where mills are closely spaced along a river it must have been common for the working of one mill to interfere with another. However, descriptions of these problems are unusual and the following account of a dispute is a rare survivor. Problems arose with the mill at Great Haywood impounding the water to the detriment of Lord Talbot's Hoo Mill upstream and of Mr. Clifford's meadows between the two mills. Complaints seem to have arisen as early as 1787; "*Flood gates used to be four gates but Webb when he came to the mill sawed off the heads of two of the gates...*" preventing them from being operated, "*...from the want of passage of water in floods... injured the new road over the Brimsey as they could only draw two gates instead of the four.*"

The agreed height of the water impounded at Great Haywood Mill had been established by an "*Old Stone with a + upon it*" acting as "*The Ancient Water Mark*". The water level impounded at Haywood was not supposed to rise above this mark

because as the water backed up the river Hoo Mill became backwatered and the meadows were prone to flooding. A witness "*swore to standing upon that stone to angle*" but the stone was said to have been submerged for many years. Proposals to install a stone weir instead of the floodgates came to nothing as its level could not be agreed upon.

The problems continued and about 1794 a new "*mark was made upon a stone in the wall... and when the water rose to the mark the flood gates were to be drawn and Lord Talbot promised the miller of Haywood Mills a Christmas box if he attended properly to the gates and kept the water down.*"

Presumably the miller never received his Christmas box for Haywood Mill continued to hold back the water to ever higher levels to improve the efficiency of their two wheels but events began to come to a head in 1802. Lord Talbot had been wary of attempting to force a legal settlement and his solicitor advised that "*the case is by no means a clear one.*" However, in 1803 he "*lost a witness by death*", a "*Mr. Clegg of Heywood Inn*", and he realised that time was not on his side. Eventually all parties agreed to arbitration. The water level was dropped and the arbitration jury searched for the Ancient Water Marks. The stone marked in the wall could not be found but "*the stone with a + upon it was found*". The arbitration jury found in Lord Talbot's favour, deciding that the water level had been held above the agreed level, but their view of the case was perhaps indicated by them awarding only one shilling damages. Mr. Webb agreed to install new flood gates at the proper height and Lord Talbot promised him "*a Christmas box if the work was properly attended to*".[34]

Conclusion

Although the modern mill was built by Mr. Adams, his death resulted in it being sold soon after to the Webbs for a substantial sum of money. They were expanding their interests which already included mills and farms in the area between Rugeley and Lichfield. They were undoubtedly successful, as suggested by the fact that they later lived at Elford Park. Great Haywood Mill continued to flourish throughout the period of the Webb's ownership, with paper making being added to corn milling. However, it may not have been a particularly pleasant place to live as the River Trent was becoming notoriously polluted with raw sewage and industrial effluent particularly from "The Potteries." The slow decline with increasing competition from elsewhere is suggested by the mill's disappearance from the Trade Directories, culminating in the replacement of waterpower with an internal combustion engine and the change over from milling with stones for domestic consumption to roller milling for animal feeds. This was completed by the installation of electric drives and the mill continued to function in this form until recently when all of the machinery was removed and the building reduced in size. The dominant feature is now the modern industrial warehousing which covers much of the site. There have been major changes to the course of the river and the roads in the area, and it is doubtful if any of the Webbs would recognise the site today.

References

1. Staffordshire Record Office (S.R.O.),Stafford, deeds D(W)1734/3/2/1-3, and personal communication, Robin Clarke, see "Great Haywode" paper mill and water mill in *Guide and History of Haywood*, Birmingham, 1924, page 125.
2. S.R.O., D3186/8/1/1/1,map, personal communications,Tony Bonson and also Anne Andrews.
3. *Birmingham Gazette*, 14th July, 1783.
4. S.R.O., deeds D240/B/1/8.
5. Sun Fire Insurance Policy No.597333 for 2nd March, 1792, and Policy No.613381 for 4th April, 1793. Robert Bage of Elford and George Webb of Ridware insured their stock and utensils in their house, water and paper mills, brick and tiled, for £1000, their drying house, thatched, nearby for £50 and their warehouse, brick and tiled, nearby for £50. Also Policy No.724905 for George and James Webb, farmers, millers and paper makers of Ridware, 14th November, 1801, recorded in the notes of Herbert E. S. Simmons, held at the Science Museum, South Kensington. Also Alfred H. Shorter, *Paper Mills and Paper Makers In England 1495-1800,* The Paper Publications Society, Holland, 1957, page 235, where it is called Haywood Wharf Mill, Shugborough.
6. S.R.O., deeds, *op. cit. 4.*
7. *Ibid,* deeds.
8. *London Gazette*, 21st January, 1817.
9. *Ibid,* deeds.
10. White's *General and Commercial Directory* for 1818.
11. S.R.O., deeds, *op. cit. 4.*
12. Recorded in 1835 according to Simmons's notes, *op. cit. 5,* and in Pigot's *London and Provincial New Commercial Directory*, 1841.
13. George Webb was given the excise No. 187 for Elford Mill and No. 186 for Dunford Mill (also written as Danford, but more correctly Darnford) in 1816, according to Simmons's notes, *op. cit.5* and personal communication, Robin Clarke.
14. 1841 census returns S.R.O., HO107/0994/11, and personal communication, Robin Clarke, who gives Richard, son of Richard and Ellenor (but also Eleanor) Webb, christened 25th January 1791 at Colwich.
15. *Ibid,* census returns.
16. 1851 census returns S.R.O., HO107/1999/13.
17. Personal communication, Robin Clarke, gravestone, St. Michael's and All Angels', Colwich, gives Richard Webb, born 24th January, 1791, died 7th July, 1858 and his wife Hannah, born 10th March, 1791, died 17th July, 1863.
18. 1861 census returns S.R.O., RG9/1909, and personal communication, Robin Clarke, states that Mrs. Webb of Haywood Mill died 17th July, 1863 aged 73 years; see *Staffordshire Advertiser*, 1st August, 1863.
19. S.R.O., deeds D240/B/1/8, and gravestone St. Nicholas's Church, Mavesyn Ridware, records George Webb, *"Who for nearly a century was a resident in this parish during which period he discharged the duties of life with integrity and punctuality. He died December 27th 1847 aged 93 years."* Also the gravestone of

his first wife, Sarah *"Died August 14th 1819 aged 73 years"* and *"Also in the same vault are deposited the remains of Sarah wife of Thomas Jackson of Wade Lane House in the parish and daughter of the above named George and Sarah Webb died October 21st 1848."* Personal communication, Robin Clarke, states that George Webb's second wife Mary died 29th September 1859 in her 84th year, see *Staffordshire Advertiser*, 8th October 1859.
20. *Ibid,* deeds and gravestone St. Nicholas's Church, Mavesyn Ridware.
21. *Ibid,* deeds.
22. *Ibid* deeds and Simmons's notes, *op. cit.5,* gives *London Gazette,* 11th July, 1856, *"Charles William Thacker, of Elford Park, in the County of Stafford, miller, one of the trustees of a Tamworth grocer and provision merchant. Indenture dated 1st July, 1856."*
23. S.R.O., deeds D240/B/1/8.
24. *Ibid* and S.R.O., indenture 1434/6/7, although personal communication, Robin Clarke, suggests paper making had ceased as early as 1849 as it is given as *"left off"* in the excise records of 14th March, 1849. Its appearance in the *Paper Mills Directory* in 1860 being merely a repetition of earlier entries.
25. 1871 census returns, S.R.O., RG10/2820.
26. Simmons's notes, *op. cit.5,* and 1881 census returns, S.R.O., RG11/2671.
27. *The Miller*, 6th January, 1890.
28. Halden's *Stafford Almanac and Directory* records Joseph Tavernor in 1891 and 1892, but alters this to Joseph Tabbernor in 1893 through to 1901; 1891 census returns S.R.O., RG12/2141, and personal communication, Robin Clarke, Electoral Register, Staffordshire Western Division, 1900.
29. Halden's *Stafford Almanac and Directory* and 1901 census returns S.R.O., RG13/2573, and personal communication, Robin Clarke, Electoral Register, Staffordshire Western Division, 1902, also 1905 and 1908, with William Howell, lodger, two rooms, first and second floor, furnished.
30. Personal communication, Robin Clarke, Electoral Register, Stafford Parliamentary Division, 1918, gives William Howell and Rosetta Amelia Howell, similarly 1922, but with the addition of John Bush, although the 1930 Register lists 14 voters for "Haywood Mll", none of these three are included. Also personal communication, John Bedington.
31. Personal communication, John Bedington; Staffordshire Industrial Archaeology Society visit June 1983.
32. *Ibid.*
33. *Ibid.*
34. S.R.O., alterations to mill D240/E/C/1/7.

Acknowledgements

I would like to express my thanks to the following for assistance with this article; Anne Andrews, John Bedington, Tony Bonson and particularly Robin Clarke.

A FATAL AND DISTRESSING MOTOR-CAR ACCIDENT AT GREAT HAYWOOD MILL

by Barry Job

Introduction

This fatal accident, which occurred by Great Haywood Mill, near Stafford, in March, 1905, was so unusual that it would be fully reported today when fatal vehicle accidents are relatively commonplace. In 1905, when motor cars were still something of a novelty, the accident and the protracted efforts to recover the body, which indirectly resulted in another fatality, were covered at length in the local paper, *The Staffordshire Advertiser*.[1] This was a weekly publication which unfortunately did not extend to illustrations nor to photographs, but the text is wonderfully descriptive and typical of the period. What follows is a much shortened version of the published account which attempts to retain something of the original flavour by using the phraseology and tense of the original without necessarily quoting from it verbatim. Any contradictions which occurred, for example between the weekly accounts and the inquest, have been removed.

Location

Great Haywood Mill is situated some five miles east of Stafford on the River Trent (see the previous article in this Journal). The road from Little Ingestre, lying to the north-west, to Great Haywood village, lying to the south-east, crossed the River Trent by a bridge adjacent to the mill (see Figure 1);[2] this is where the accident occurred. The bridge contained the sluice gates for the mill so that the river was unusually deep by the bridge and produced complex currents. This was an important factor in the incident.

Narrative

The Staffordshire Advertiser, Saturday, 11th March, 1905[3]

A very regrettable motor-car accident, unfortunately attended by loss of life, occurred by Great Haywood Mill last Thursday afternoon, 9th March, about half past two in the afternoon. It appears that a Gladiator car (see Figure 2), belonging to Mr. Arthur Challinor, the town clerk of Hanley, who resides in Little Ingestre, was being driven in the direction of Great Haywood when the accident happened. The car was in the charge of an experienced chauffeur named James Roper, and the other occupants were Mrs. Challinor and her niece, Miss Dorothy Grace Notley,

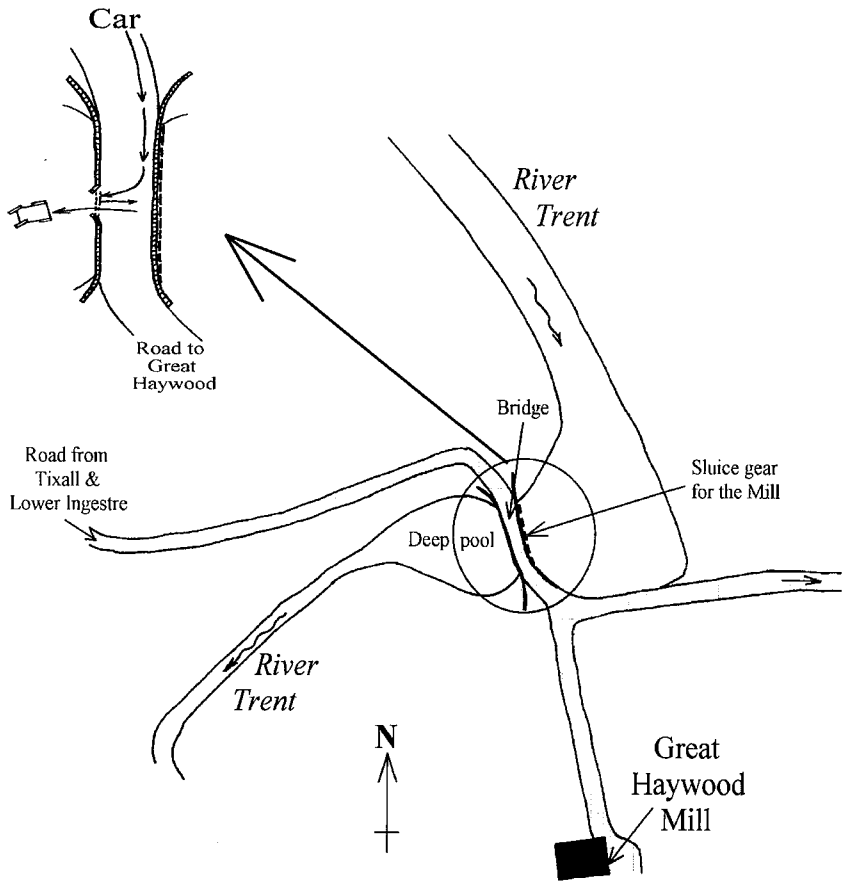


Figure 1. Sketch of the Accident site, 9th March, 1905. (Not to scale)

aged nearly 21. All went well until the car was on the bridge by the mill when the steering gear, according to the chauffeur, broke, causing the car to swing round and strike the bridge parapet almost in the centre on the right hand side (see Figure 1). The force of the impact was sufficient to carry away a portion of the brickwork, the car rebounded, then sped forward through the gap, turned a complete somersault, plunging into the river. When the car rebounded, the chauffeur jumped onto the road and clutched at Miss Notley, but was unable to hold her, and she was drowned. Mrs. Challinor was also thrown into the river, which was partially in flood, and the swiftly-flowing current carried her 90 yards down stream, to a shallow ford where she was able to grasp the branches of a tree. The chauffeur shouted for help and ran to the mill. Some men heard him shouting, and ran out of the mill to assist. One of the men and the chauffeur were able to give Mrs. Challinor a helping hand and assist her to get out of the water. If the chauffeur had been thrown into the

water there is little doubt that all three occupants of the car would have been drowned. At the spot where the accident occurred there are some very sharp and dangerous turns in the road, which almost forms the letter S. The spot is a familiar one to cyclists, many of whom have doubtless experienced some difficulty, when riding at a good rate, in negotiating the abrupt turn over the river bridge. The scene of the accident was visited by a large number of people yesterday, and apart from anything which may have happened to the car, little surprise was expressed at the fact that an accident should have happened at such a place, which is quite unsuited to fast traffic of any kind. Deep sympathy has been expressed on the terrible fate which has overtaken Miss Notley. The escape of Mrs. Challinor was little short of a miracle, as the current was so swift. Fortunately, she received no injuries by the fall, but she was almost insensible when taken from the water, and it can readily be imagined how prostrated with grief she would be on learning of the shocking fate which had befallen her companion. The deepest sympathy is felt for her and her husband in the sad trouble which has so suddenly come upon them, coupled with the wish that Mrs. Challinor may speedily recover from the terrible shock she has received. On the police being informed of the occurrence, efforts were at once made to recover the body of the unfortunate young lady. Several constables commenced dragging operations which were continued until dusk without success. The work was resumed at an early hour yesterday (Friday). Near to where the car fell the water is some 20 feet deep, with a dirty and muddy bottom and the work has been carried on with some difficulty owing to the constables being unable to get a firm foothold. In the meantime steps have been taken to lower the water in the river by running it off on to the adjoining meadows. A net has been slung across the river so that should the body rise to the surface it will not be carried down stream, although the current is so strong it is quite possible this has already happened, this would explain the non-success which has attended the efforts of the police.

The Staffordshire Advertiser, Saturday, 18th March, 1905[4]

The search for the body of Miss Dorothy Grace Notley, who met with such a tragic death as a result of a motor-car accident at Great Haywood Mill, has, up to the present, been a fruitless one. Every effort has been made to recover the remains of the unfortunate young lady and no expense has been spared in securing the best possible help for this purpose. The father and brothers have been constant witnesses of the melancholy operations which have been in progress and several thousands of interested spectators have been attracted to the scene. The police have been instructed by the Chief Constable of the County, to do everything in their power to assist the exertions of those engaged in the endeavours to recover the body. A number of officers have attended each day and they have been untiring in their efforts. Two divers from the Manchester Ship Canal, with their assistants, began a search of the river bed in the vicinity of the bridge on Sunday last and continued operations until Wednesday when they were recalled by their employers. Commencing at an early hour in the morning the divers worked continuously throughout the day and when they had completed their unpleasant task they had

completed a thorough investigation of over 200 yards of river bed. Any obstacle with which the body might have been entangled was examined with particular care, but the divers were greatly handicapped in their work owing to the muddy state of the river and the whole search having to be done by the sense of touch. In addition the current was so strong that they had much difficulty in standing up against it. On Sunday a purse which belonged to the deceased lady was recovered, and on the day following a glove, which presumably was hers, and a cushion belonging to the motor-car were found, the cushion being recovered some distance down the river wedged in the roots of the trees which hereabouts line the river bank. The heavy rains have caused the river to be in greater flood than at the time of the accident. If it had been at its normal height it would have been impossible for the body to have passed the Essex Bridge, where there is a ford, but at the present time the water at this point is four or five feet deep. The work of the divers and police has been supplemented by a number of villagers and friends in the neighbourhood, and equipment for the use of those engaged in dragging operations has been lent by the Earl of Lichfield and Lord Shrewsbury's agent.

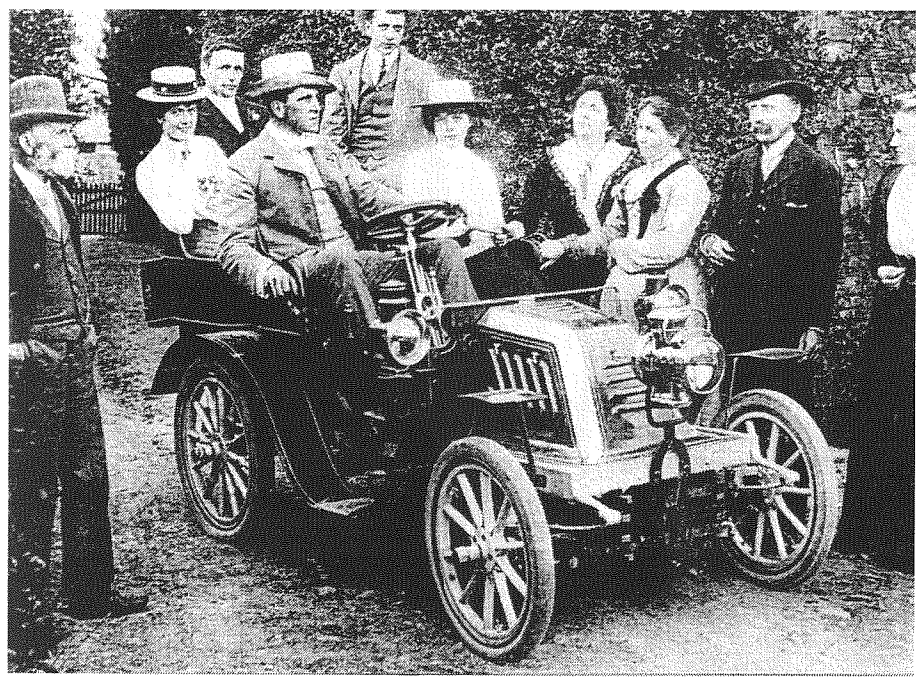


Figure 2. A Gladiator car similar to the one involved in the accident at Great Haywood. (Image kindly supplied by the Museum of British Road Transport, Coventry, from *The Complete Encyclopedia of Motor Cars, 1885 to the Present*, by G. N. Georgono, Ebury Press, 1982.)

The Staffordshire Advertiser, Saturday, 25th March, 1905[5]

The long and wearisome search for the body of Miss Dorothy Grace Notley, who was drowned in the River Trent near Great Haywood Mill a fortnight ago, led to a second tragedy last Thursday morning. All the efforts which had hitherto been made to recover the body of the unfortunate young lady had proved fruitless, it was decided to pump the water from the deep pool by the bridge into which the motor-car had plunged, and for this purpose five fire-engines were brought to the scene of the accident. These interesting operations had attracted a large crowd of spectators, who lined the road several deep in the vicinity of the accident. The work of pumping had proceeded several hours without incident when a loaded furniture van, drawn by a powerful young horse, approached from the direction of Stafford. The horse, being led by Thomas Ecclestone, came alongside the steam engines, which were in the bed of the river, it was evidently startled by the noise they were making, Ecclestone kept it fairly well under control, when it was again frightened by a motor-car coming towards it. The horse then reared lifting him off his feet. There were some 500 people about the bridge at the time and they began to scream which frightened the horse further, and it dashed forward at an alarming speed. Ecclestone clung pluckily to the horse's head, but was unable to check its career, and a panic ensued amongst the spectators, some rushing to one side and some to the other side of the road. Amongst the crowd was Mrs. Payne, 40 years of age and wife of Henry Payne of the Haywood Brewery, who had been a frequent spectator of the operations which have been carried on. The affrighted horse, with Ecclestone still clinging to its head, had barely passed the fatal bridge, when Mrs. Payne dashed across the road apparently with the intention of saving her bicycle which was leaning against the railing. In her hurry and fright, she stumbled and fell down a few yards in front of the horse, she rose to her knees, but in an instant the horse was upon her, and the wheels of the heavy vehicle passed over her body. Several people rushed to the unhappy lady's assistance, but it was pretty evident that she had been killed on the spot, and her body was carried to the Mill House. Dr. H. A. Bull arrived on his motor-car, and he at once pronounced life to be extinct. Mrs. Payne's inquest was held yesterday morning (Friday), at the Clifford Arms Hotel, Great Haywood, the Jury returned a verdict that the deceased was accidentally killed, and they expressed the opinion that great praise was due to the driver for the able and plucky manner in which he held on to his horse and got it through the crowd.

At the spot where the accident happened, the river Trent forms a large deep pool, and the current is at all times strong as the river forces its way over the paddles or sluice gate under the narrow arch of the bridge, and is further strengthened by the overflow waters from the stream that feeds the Great Haywood Mill, and here it was believed the body would be found. However, neither the professional divers who were employed last week nor those who have dragged the pool in every direction could find any trace of the body. A strong opinion, based on long experience, entertained by Mr. Byfield, the captain of a Runcorn grappling and life-saving corps, was that the body would be found at the bottom of the deep pool, and an attempt was made on Tuesday to draw the water out of the pool. The Earl of Shrewsbury

kindly lent his steam fire-engine from Ingestre, and the Earl of Lichfield sent his quaint old wooden manual which is over 100 years old and bears the date 1801. The river was shut off at the Hoo Mill about a mile away, and a quantity of water was run off on to the meadows by means of sluices. After some three hours the waters broke in over the paddles and over the weir. This was a great disappointment to all concerned, but it did not deter them from making a fresh attempt. Mr. George Smith, builder of Great Haywood, undertook to keep back the waters of the Trent for 12 hours, making his preparations on the Wednesday, for the work on the morrow when an early start was to be made. The operations on Thursday naturally excited great interest, and a large crowd was once more gathered on the river side. The river was once again dammed at the Hoo Mill and the surrounding meadows were soon inundated. The paddles under the bridge were closed and a small dam was constructed on the weir to prevent the overflow from the stream which feeds the Haywood Mill and another dam was carried across the ford to prevent any back pounding of the water in the river. Five fire-engines were employed to pump the water out of the pool. These were the Hanley steamer, the Stone steamer, the North Staffordshire Railway manual, plus the two already mentioned. It was estimated that the pool contained some two million gallons of water, so that the engines had a pretty formidable task before them. The three steam engines were taken down to the bed of the river, on the ford below the pool, the two manuals were stationed on the meadow below the road. Pumping began at 9:15 am, the manuals getting to work first, and all the engines soon being in full swing. The Stone engine was the most powerful, and was soon pumping 450 gallons of water per minute. The Ingestre engine was next with 320 gallons, and the Hanley engine, which did not get up steam so speedily, pumped at the rate of about 300 gallons per minute. The North Staffordshire manual got up to 200 gallons per minute, and the little Shugborough manual, which, like its companions, was well manned, did splendid work in pumping about 80 gallons per minute. The discharged water was turned on to the meadow and conducted in sluices back to the Trent below the ford. For some time little Impression seemed to be made on the considerable expanse of water, and it was only by watching a landmark that one could detect the gradual lowering of the water level. The engines were worked continuously until noon, by which time the water had been so much lowered that it was necessary to take the steamers closer to the water's edge so as to keep the suction tubes well under water. The two manuals also joined the steamers in the river bed, and after a brief interval they were soon in full swing again. As the surface of the water became less, the level was lowered much more rapidly, and great boulders and tree stumps began to show above the water. Everyone present at the melancholy proceedings must have been moved to the hope that after so much expense and trouble, the relatives of the young lady would at last be relieved from further anxiety by the finding of the body, and as the water level got lower and lower the interest of the spectators deepened. Close to where the car fell a cushion, two brass lamps, a cushion brush, a spanner, a hammer, and other small articles belonging to the car were found on he river bed. At four o'clock the steamers were stopped, which, with the one break, had been working

continuously for seven hours. The manuals were kept at work about a quarter of an hour longer, practically all the water then being pumped out, and the fact was revealed that Miss Notley's body was not to be found in the pool, but must have been carried further down the river - how far possibly time alone will tell. That the result of the search was a disappointment to all goes without saying, and the sympathy of the public will be intensified for the relatives of the loved one who has been lost in such a tragic manner. We are glad to learn that Mrs. Challinor has recovered from the terrible shock she received by reason of her own peril and the loss of her friend and relative.

The Staffordshire Advertiser, Saturday, 1st April, 1905[6]

The long and anxious search for the body of Miss Dorothy Grace Notley, who was drowned in the River Trent at Great Haywood Mill, three weeks ago, has at last resulted in the recovery of the body. Up to yesterday (Friday) all efforts to recover her body had proved unsuccessful, notwithstanding the fact that the police and professional divers had made a most careful investigation of the bed of the river in the vicinity of the accident, and dragged the river even as far down as Rugeley, beyond which it was held the body could not proceed on account of the weir which crosses the river here. Near to the spot where the car entered the water there is a deep hole, and local opinion inclined to the belief that here the body would be found- in other words, that it had been held down at this spot by some obstacle. In order to clear up the matter, the relatives of the deceased lady, who have spared no expense to recover the body, decided to have the water drawn out of the pool. The river was dammed and five fire-engines were employed, the result of the operations proved that at any rate the body was not in that part of the river. The police, who have worked most zealously, have never relaxed in their efforts to recover the body, on Saturday night lowered the paddles at the Hoo, Great Haywood and Rugeley Mills, so as to lower as far as possible the level of the river between Great Haywood and Rugeley, and at 5.30 am on Sunday they put up the paddles at the Hoo and Great Haywood Mills, and commenced a further search of the river bed as far as Rugeley, the water level being then very low. The search was unavailing, but the police continued their quest daily. On Thursday they armed themselves with some specially made iron skewers, 14 feet long, with barbed points, with which they were able to probe the muddy reaches of the river. Whilst engaged in these operations near the aqueduct which carries the Staffordshire and Worcestershire canal over the river, they recovered from the mud the last of the cushions belonging to the motor-car, and also struck another object believed to be the body of the deceased young lady. The object was apparently stranded on a mud bank in front of the fourth arch on the right of the aqueduct from the Great Haywood Mill side. An attempt was made to secure the object which had been disturbed, but it had evidently got into the current again and eluded the grasp of the searchers. The police were convinced that they had at last disturbed the long-lost body, and that it would soon rise to the surface of the water, and at six o'clock yesterday morning a constable was sent to watch the river, but no trace could be found of the body. About half past nine, however, a man

named Reginald Gibbs, of Great Haywood, was walking by the river side in Mr. Rawes' meadow towards the mill, when he discovered the body wedged between two trees on the left bank of the river, some 200 yards from the Essex Bridge and about 600 yards from the spot where the accident happened, and only a few yards from the point where the River Sow joins the Trent. Gibbs at once informed the police and they went to the spot and recovered the body. The police stretcher was sent for, the body placed in it, and quietly conveyed to Mr. Challinor's residence at Little Ingestre, where it was received and identified by Miss Notley's grandmother. At the time the body was recovered the body had undergone very little change and her clothing was in perfect order. It is a rather singular coincidence that on the very morning the body was discovered the police issued a notice offering a £5 reward to the finder of the body.

The inquest was opened yesterday (Friday) evening at Little Ingestre, at the residence of Mr. Arthur Challinor. The foreman of the jury said that there was one common feeling to all present, and that was a feeling of sympathy and sorrow, not only to Mr. and Mrs. Notley and their family, but also for Mr. and Mrs. Challinor, and he was sure that sympathy was all the more felt by reason of the additional suffering which they had all undergone, through the inability to find the body of Miss Notley, which happily in one sense for them had been found that day. The body was then formally identified and the inquest adjourned as Mrs. Challinor was away from home.

The Staffordshire Advertiser, Saturday, 8th April, 1905[7]

The body of Miss Dorothy Grace Notley was conveyed to the home of her parents at Diptford, South Brent, Devonshire on Saturday last for burial. After the recovery of the body on 31st ult. it was conveyed to the residence of Mr. Arthur Challinor at Little Ingestre. About nine o'clock on Saturday morning the body was conveyed to Stafford station in a glass-sided hearse, and there entrained for Devonshire. Mr. and Mrs. Challinor, who had been at Diptford during the week, arrived at Little Ingestre on the 31st ult., having commenced their travel homewards as soon as possible on receipt of the news that the body had been found. They were, therefore, amongst the friends who saw the body depart on the long journey to its last earthly resting place. The body was carried through a side entrance on to the platform and placed in a central compartment of a special carriage employed for these occasions. At the station a few handsome floral tributes were placed on the coffin.

The inquest was held at the Clifford Arms, Great Haywood, on Monday afternoon. It revealed that James Roper, the chauffeur, was licensed on July 29th 1904, and that the Gladiator car was new in June 1904. Roper repeated that he believed the steering gear to have broken, this was confirmed when the car was recovered, the Gladiator representative could not account for the breakage, other than to say that there was a flaw in the metal. The inquest verdict was that the deceased was accidentally drowned, the police officers deserved commendation for their efforts and no blame was attached to the driver of the car.

Conclusion

Although it was typical of the period, the Gladiator car would be regarded as primitive today. It was unfortunate that the steering became deranged on the bridge, anywhere else and the consequences would probably not have proved fatal. Because it was an open vehicle, at least the ladies were thrown clear and not trapped inside when it overturned and sank. Surprisingly, there is no record of the vehicle's recovery, although subsequent examination did confirm that the steering gear had broken. It is perhaps curious that the inquest revealed that after the breakage the left hand wheels had mounted the grass verge on the left of the road on the bridge, it might be expected that the car would then swerve to the left rather than to the right as it evidently did. It is also surprising that Roper,the chauffeur, was reported to have clutched at Miss Notley to save her, rather than Mrs. Challinor. It might be assumed that Roper jumped out of the offside of the car, Miss Notley was sitting on the nearside, whereas it was Mrs. Challinor who was sitting directly behind Roper. The other factor in this incident was of course the Great Haywood Mill, the control it exercised over the river resulted in the deep pool and complex currents which caused the fatality and the difficulty in recovering the body. The crowds of spectators and the police attempts to lower the river level, no doubt severely disrupted milling operations, but the presence of the weirs and sluices enabled the police to eventually locate the deceased young lady. They expended considerable effort and resources in their operations which took nearly 22 days to be brought to a successful conclusion, and it is doubtful whether the body would have been recovered any quicker today. The bridge, course of the river, roads and environs of the mill are so much altered now that it is difficult to picture the scene here in 1905.

References

1. The accident was also mentioned in the *Staffordshire Sentinel*, 11th March, 1905, page 7, although the coverage was much less.
2. Sketch based on document D240/E/C/1/7 alterations to the mill, in the County Record Office, Stafford.
3. *The Staffordshire Advertiser*, 11th March, 1905, page 5.
4. *The Staffordshire Advertiser*, 18th March, 1905, page 4.
5. *The Staffordshire Advertiser*, 25th March, 1905, page 7.
6. *The Staffordshire Advertiser,* 1st April, 1905, page 5.
7. *The Staffordshire Advertiser,* 8th April, 1905, page 6.