

LITTLE BARRINGTON PAPER MILL

By Basil Harley & R.T.Holmes

Little Barrington Paper Mill is the subject of a Tolsey Paper* carrying full references and acknowledgments, of which this is a resume. The mill (map ref. SP216130) was one of only three on the Windrush and all were located within a few miles of each other on the Gloucestershire/Oxfordshire border. A mile or so downstream was Upton mill and, just beyond Burford, another at Widford. The latter mills had disappeared by the middle of the 19th Century and only Barrington has any substantial remains of mill buildings, notably part of the purpose-built drying loft which is still in fair condition. There is evidence that paper was being made in the Burford area on the river Windrush at the end of the 17th century. There were a number of journeymen paper makers resident in the town from the middle of the 18th century until the middle of the 19th. Peter Rich and his family ran a fulling mill and a paper mill at Upton throughout the 18th century. By 1800 it had come into the possession of George Ward, a member of a Burford family extending back to late Tudor times and whose wife Mary was a daughter of Peter Rich. By 1809 another George Ward (wife Diana), possibly his son, appears as "Paper Manufacturer in Barrington Parva". This couple buried two sons and baptised a daughter in 1809 and another daughter in 1813 so it is likely that they lived in the village.

There had been three corn mills in Little Barrington from about 1700 though one of these was probably also a fulling mill. They were then owned by a man called Hemming and the site was called the Hound Mill. Hemming conveyed it to his son-in-law William Minchin in 1710 and the Minchin family retained it until the end of the century. It was relatively easy to convert a fulling mill into a paper mill. The Hound Mill at Little Barrington had probably been changed into a paper mill at the end of the 18th century and was certainly working as such from 1809. It is shown on the first edition of the Ordnance Survey One Inch map of 1828. This also shows the paper mills at Upton and Widford though by mid-century both have disappeared. Pigot and Co's Burford Directory of 1830 lists George Ward as the paper maker at Barrington, Emberlin and Son at Upton and William Hart at Widford.

The Little Barrington Mill was a small one and is unlikely to have employed more than a couple of dozen people. From the Parish Registers we find the following paper makers living in the village who baptised their children during the early years of the century.

1809	Diana d. George and Diana Ward	"Paper Manufacturer"
1813	Mary d. George and Diana Ward	"Paper Manufacturer"
1818	Frederick s. John & Pricilla Hartley	"Journeyman Paper maker"
1830	Jane d. Richard & Elizabeth Bunting	"Paper maker"
1831	William s. William & Sarah Hartley	"Paper maker"
1832	Charlotte d. William & Sarah Hartley	"Paper maker"
1832	Anne d. William & Sarah Hartley	"Paper maker"
1832	James s. Richard & Elizabeth Bunting	"Paper maker"
1833	Elizabeth d. David & Jane Chippafield	"Paper maker"

In 1835 and 1837 and 1840 the Buntings baptised other children and in 1840 there were other

Hartley children. After 1840 none of these names appear. George Ward was listed as the maker until 1842 after which a Henry Ward (? son) was the proprietor.

It would seem that Henry Ward was unable to maintain the business profitably and the following sale notice appeared in Jackson's Oxford Journal dated February 8th 1845.

Barrington Paper Mill, near Burford, Oxon
TO BE SOLD BY AUCTION
By Thomas Streat

On Monday and Tuesday the 3rd and 4th days of March, on the premises at Barrington, - All the valuable MACHINERY appertaining to the above-named Mill; comprising two engines, seven excellent presses, chests, vats, pair of large rollers (by Barrett) nearly new, about 100 feet of lead piping, pumps, trebles and lines, drying poles &c, &c; also about 1000 reams of paper, in lots of from 3 to 20 reams; part of the neat Household Furniture, and various other effects, the property of Mr H. Ward, who is leaving in consequence of his having sold the Mill, which will be discontinued for the manufacture of paper. The lots may be viewed on the Saturday previous and mornings of sale till Twelve o'clock, at which time each day the auction will commence.

Catalogues may be had six days prior to the sale at the inns in the neighbourhood; place of sale; and of the auctioneers, Burford.

The whole of the Machinery will be sold on the first day.

The sale was conducted by Thomas Streat, who was a maltster and auctioneer then living in Sheep Street, Burford. It is not clear from the records available if the sale was concluded satisfactorily on the occasion or whether the Mill continued in operation until the end of the year. The fact that duty was paid on the paper until next year, 1846, does not necessarily mean that the mill was still in production.

The Little Barrington Mill buildings are substantially built of the local oolitic limestone in traditional Cotswold style. All except what was probably the rag store building have proper Stonesfield roofs, and that on the drying loft has recently been restored. It is not possible to be definite about when they were built since such vernacular architecture in the Cotswolds is easier to locate geographically to the nearest mile than to date to the nearest century. The remaining drying loft at the north end of the row of cottages still has some of the wooden shutters which were used to control the air flow through the building. This loft originally extended at least two bays further, and the traces of the original masonry can still be seen surrounding the later infilling in what is now a cottage. Since these lofts were specially built for paper making it is likely that they date from the eighteenth century, certainly before 1800.

According to the notice of sale the Wards had previously owned the mill and it is probable that it was bought by Charles Greenaway, who then owned the Grove. Possibly he bought it on condition that it no longer functioned as a paper mill since the advertisement specifically states that it will "be discontinued for the manufacture of paper". Some of the mill buildings, perhaps the present cottages near the road, were then living quarters since some of the Wards' furniture was also in the sale. The main building was later made into two cottages before being converted to the present building, Millstream Cottage, in 1974. The V.C.H. states that

all the other buildings were converted into cottages fairly recently but no dates for this are given.

The fall of water on the River Windrush was only sufficient to power an undershot wheel for the paper mill and the mill stream was only about one hundred yards long from the weir on the river. The original water wheel was made of wood and was about three feet six inches wide and probably some twelve feet in diameter. It is likely that it was of similar construction to the remaining parts of the similar wheel at Windrush Mill.

There is evidence of previous buildings on the site, i.e. large blocks of masonry half-buried between the tailrace and what appears to be an earlier water course, which possibly are all that remains of the other recorded 17th and 18th century corn and fulling mills. However, it seems likely that the present ones represent the extent of the paper mill in the early 19th century. As the sketch map and the reconstruction drawing shows these comprised the main mill building of some one thousand square feet floor area housing the machinery and nearby what was probably the rag store and the present row of three cottages with the remains of the drying loft. There are further indications that the third cottage had been converted from part of the loft, suggesting that the original had a floor area of some one thousand square feet, similar to the main mill.

Technology

Paper is made from cellulose. When the Barrington Mill was working the universal source of this was cotton and linen rags with rope and sailcloth being preferred for high quality paper. Although experiments were made with other materials such as straw it was not until the 1850s that esparto grass, and later wood pulp, was used successfully as a source of cellulose. The preparation of rags, partly by hand but in later stages by machine, accounted for most of the energy used in the mill. Water was, of course, vital for the processes as well as providing power via the mill wheel. There is no surviving machinery and little remains of the water supply and power control devices. In view of this recourse has been made to the particulars of the sale of 1845 and known histories of similar rural mills and particularly the hand-made paper mill at Wookey Hole in Somerset which is one of two still working in England. From the historical and present practices of this mill and the records of Postlip Mill, Winchcombe, the arrangements and techniques in the Little Barrington Mill have been deduced.

The surviving weir masonry, the floodgates and the depressions in the ground marking the filled up water courses probably represent the arrangements that were in place for running the mill from the end of the 18th century until it was closed in 1846. A survey in 1972 showed that the mill stream was four feet wide and four feet deep and indicated that the wheel was between ten and twelve feet in diameter and would have generated about five shaft horsepower.

The Windrush had been diverted into leats and drains and controlled with weirs and sluices from the 17th century to serve earlier mills on the site. There is evidence of considerable investment in manpower in the digging, excavating and re-aligning of the natural course of the river over the centuries. Early maps seem to differ slightly in their records of the course of the river but this may have been due to natural changes in the flow pattern. For example, the weir shown in the 1881 OS map is today completely dry, the river having by-passed it to the north. This weir alone was not designed to have sufficient capacity to control the level of water in the mill pond and for this reason the flood gates were built to be operated manually to maintain a suitable level for the waterwheel to work effectively.

From Rags to Paper

English rags were always in short supply and much was imported from abroad. Some papermaking countries, notably France, Holland, Belgium, Spain and Portugal prohibited the export of rags, and our main overseas suppliers were Germany and Italy. Supplies came via the ports of Bremen, Hamburg and Rostock as well as Ancona, Leghorn Messina Palermo and Trieste. For example, the New Holland, a modest sized brig trading between London and Leghorn in the 1830s regularly brought back cargoes of raw materials for paper making. Typically, in 1829 she brought 13,434 pounds of old rope and many bales of rags. Those from Sicily were by far the filthiest!

Over the years many loads of rags would have been brought by horse drawn waggons along the Middle Road between Barrington and Burford. Their collection and distribution was largely undertaken by small-time itinerant traders. However, some of the larger towns had rag dealers in a big enough way of business to justify inclusion in trade directories. Pigot's Directory of 1830 lists one in Buckingham, two in Banbury market place and three in Oxford. It was a well established trade which continued well into this century and the cries of the "Rags, Bottles and Bones" men are still remembered by many city dwellers. One of the weekly markets in Birmingham is still called the Rag Market.

These hesitant beginnings of re-cycling are also evident from placards which appeared in northern towns as early as 1803 addressed:-

"To The Ladies - Genteel women, who amuse their idle hours in working, frequently throw scraps of linen and cotton of various kinds into the fire. It is requested, most humbly, that every lady will reserve these trifles, and so-doing will prevent £60,000 being annually sent to foreign countries for the importation of old rags to make paper, and which in consequence, will become cheaper."

The rags varied in quality and cleanliness and there is a telling mid-Victorian quotation which says something about the pollution that resulted from their cleaning.

"The materials which have been found most advantageous in making paper for the Oxford Press are canvas sails and cotton rags in about equal proportions. The principal impurities in the former are the tarred thread with which the sails are sewn and particles of pitch from the ships decks and rigging. The bulk of the cotton rags are generally of a lower character, and contain a perceptible quantity of animal matter, the nature of which may be imagined, when it is stated that they are the cast off garments of the lowest class of society. The animal matter is very perceptible by the smell."

On arrival at Barrington Mill the rags were sorted and cut up by women and children. It is not known how many were employed but probably no more than three or four. Knives fixed vertically on a bench were used to cut the rages into pieces about four inches square which were then thrown into one of six bins dependent on the colours and quality. Being particularly unpleasant and hazardous work it was done out of doors whenever possible since infectious diseases, such as smallpox, could be transmitted by the filthy rags. It has been suggested that the disastrous outbreak of smallpox which started at Upton in 1758 and killed one eighth of the people in Burford, might have been started by rags supplied to the paper mill from Gloucester.

Cleaning was done by feeding into a "duster" - a revolving spiked drum which tossed the

pieces about to loosen the dirt. It was usual for the rags to be boiled and bleached before beating and enough chloride of lime or bleaching powder was used to cause considerable pollution of the river. This may well have contributed to the earlier closure of the Upton and Widford mills downstream.

Most of the power generated by the water wheel was used to beat the rags so that they were fibrillated and broken into very short fine fibres. The old way was to hammer or stamp the rags in mortars by heavy wooden beaters raised by cams on the waterwheel shaft. This was also the way in which the fulling stocks worked in woollen cloth making. The woven cloth was beaten in water with fuller's earth to felt it. For paper making the process was carried on longer, often with the stampers or stocks having sharp iron cutters on the bottoms, to pulverise the cloth. Hence it was not difficult to convert a fulling mill into a paper mill. The stamping was very noisy and in the middle of the century a national report on the condition of the paper industry categorised mills as having their beating engines either 'working' or 'silent'. The noise may well have been why Barrington Mill was situated about half a mile downstream of Barrington Grove. It was also downwind of the prevailing westerlies in view of the smell from the rag cleaning process.

Rotary machines for the beating had been available since the end of the seventeenth century. They were called "hollanders", having been invented in the Netherlands and were much more efficient than the hammers. The hollander consisted of a wooden drum having between twenty and twenty four iron cutter bars on its circumference which revolved in a box with fixed bars containing the rags and a plentiful supply of water.

By the beginning of the nineteenth century few mills in England were still using the modified fulling mill stampers. Unfortunately both systems were described as "engines" in the records of mill machinery and this was so in the details of the machinery listed in the 1845 notice of sale. It is not possible to be certain which were used in George Ward's mill but on balance it is likely to have been hollanders. The estimated five horsepower available would have been sufficient to drive either and would have sufficed to provide stuff for the (probably) two vats with which the mill was equipped together with smoothing rollers, pumps and stuff stirrers.

The pulp was stored in a stuff chest before being transferred to the vat as needed. It consisted of between 1% and 5% of fibres in water, depending on the thickness of the paper to be made, and was kept stirred to prevent them settling. The stirring would have been done by some form of paddles operated by a power take off from the waterwheel shaft. The paper making process involves two people, the vatman and the coucher. Two wire mesh frames are used and the vatman applies a deckle (which is basically a frame to define the paper edges) to a mesh covered frame and holds it in contact whilst dipping it into the vat. He then lifts it out, throwing off the surplus stuff, and ensures that the fibres lie evenly in the frame. The frame, less the deckle, is slid across the vat to the coucher who inverts it onto a woollen felt sheet to transfer the layer of fibre (which is to become a sheet of paper). He then passes the frame back to the vatman and places a new felt over the layer of fibre to form a stack. When one frame is passed back to the vatman the other is ready for the coucher and so the process continues until a suitable stack of fibres and felts is completed. The stack is then put into a press and the surplus water squeezed out by reducing to about half its original height.

In George Ward's time the press would have been screw operated by at least four men. The paper sheets were removed and at this stage are delicate and contain about 60% water by

weight. The sheets were pressed and often smoothed between polished rollers before being taken and hung up on lines called Trebles in the drying loft. Each piece of paper was hung individually on horse or cow hair ropes strung across the lofts. These ropes were used since hemp ropes would have marked the paper. It is probable that these were made in Burford where a flourishing trade was carried out by James Wall who had added rope making to his hemp dressing and sack weaving business. Incidentally, any discarded hemp would have been useful for paper making. The business continued within living memory and Raymond Moody records *"It was one of the sights of Burford at one time to see the boy emerging from the passage beside the works and walk backwards across the High Street, the rope twisting as he went."*

It was usual to rely upon natural air movement to dry the paper and shutters were fitted to the openings in the drying loft to control the airflow. In the summer the sheets would often have been laid on the hedges or the grass. Artificial heat was used as infrequently as possible owing to the cost, though in Barrington Mill there are fireplaces and chimneys extant which look to be original both on the surviving drying loft as well as the present cottages.

Customers

It is difficult to estimate the output from the mill since the only recorded customer is the Bible Press run jointly with the Oxford University Press. The accounts of the Press only list the names of the paper suppliers and not their mills. At the time George Ward was supplying paper he may still have had links with Upton Mill. The accounts between 1780 and 1845 of "A General Statement of the Bible Press Concern" were consulted and the only transactions recorded of supplies by any of the Windrush paper makers were-

Date	Supplier	Cost
1812	Ward & Co	£4-16-6 for brown paper
1812	Ward	£215-0-0 for paper unspecified
1813	Emberlin	£596-15-0 ditto
1814	Ward	£303-0-0 ditto
1815	Ward	£1059-11-0 ditto

In 1812 the total annual cost of paper for the Bible Press was £33,740 and this was only marginally less until 1815. In this year the Battle of Waterloo ended a twenty year war which was followed by great unemployment and distress throughout the country. The amount of paper used by the Press was reduced to £15,181 in 1816, £12,600 in 1817 and continued to decline. The main paper makers, Swann, Venables and Dickinson, maintained supplies without the assistance of the smaller makers.

In 1800 the Bible Press was paying approximately £1 per ream for its paper, the following being typical prices.

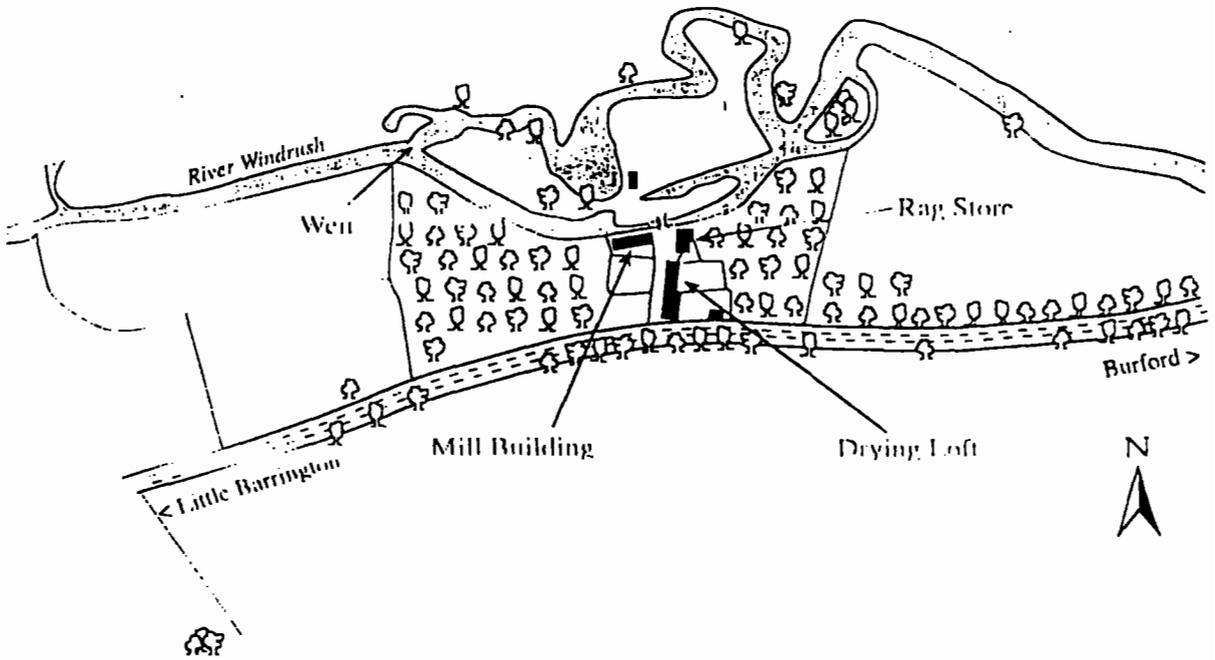
Per Ream (about 480 sheets)	Demy sheets were 17½" by 22½"
Demy Bible	22/-
Demy Pica	28/-
Demy Inferior Bible	16/6
Demy Quarto Prayer	30/-
Demy Psalters	21/-

Prices varied little during the next few years and taking a median price of £1 per ream Ward's output in 1815 was something of the order of one thousand reams, representing about a year's work which suggest that he employed some four paper makers, ie vat men, which tallies with the names recorded as living in Little Barrington. Nevertheless some paper was probably either imported from abroad (which was quite common) or Upton and/or Widford also helped. The question then arises, who were his main customers in the other years?

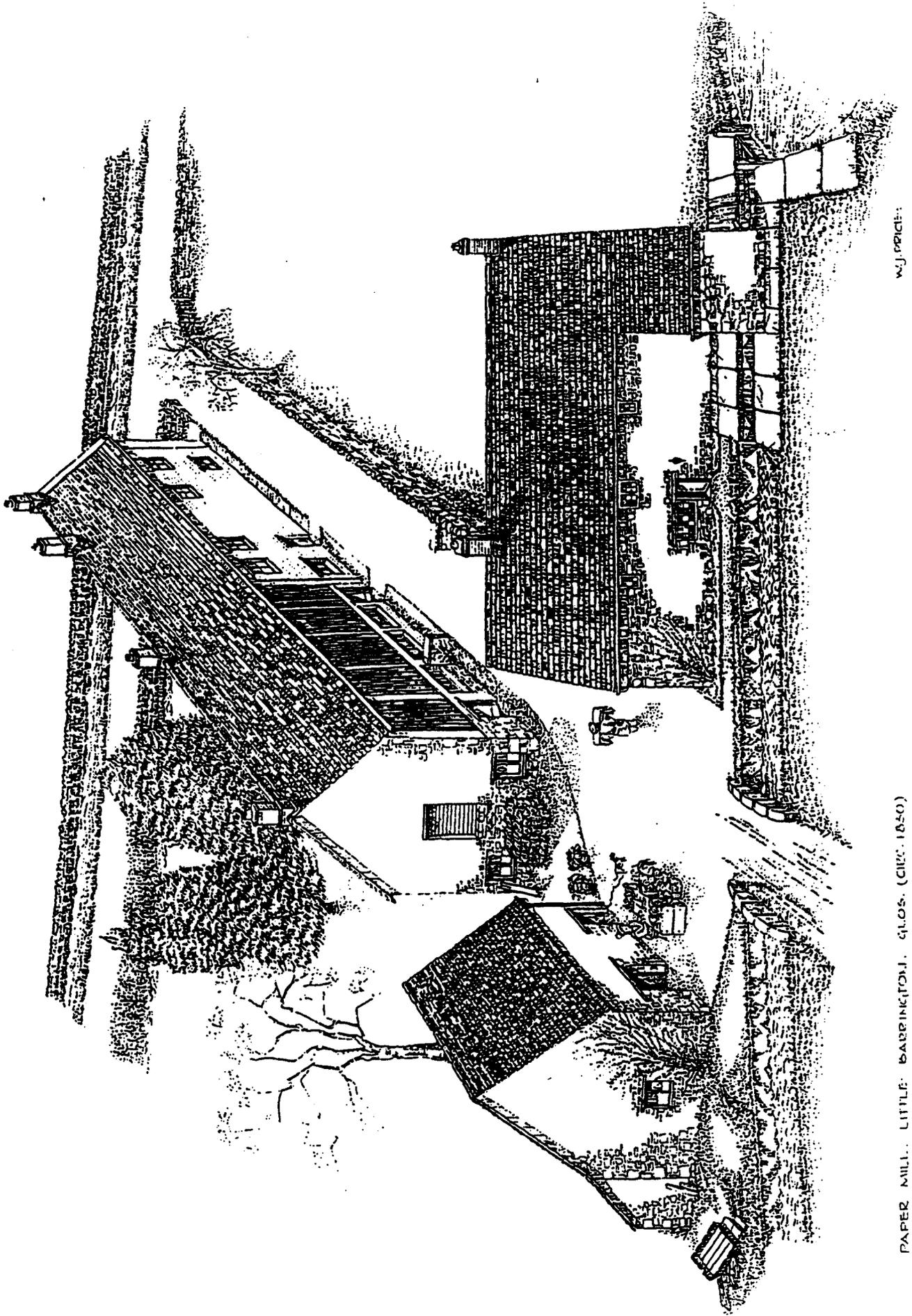
It is often possible to identify paper makers from watermarks, names, trade marks or other devices, made from thin brass wires sewn onto the wires of the moulds which leave an impression in the paper making it thinner at that point. Being more translucent the designs can be seen by holding the sheets up to the light. So far no watermarks of the Little Barrington mill or of George Ward's products have been found in books or locally printed pamphlets which might indicate that they were the sources of supply. However, there were many paper users in the 1830s within a thirty mile radius which suggests that there were many outlets for the smaller mills among the booksellers, stationers, letterpress and lithographic printers.

***Paper Making in Little Barrington.**

Tolsey Paper No 7. The Tolsey Museum High Street Burford Oxfordshire OX18 4QU
Price £2.50 post free.

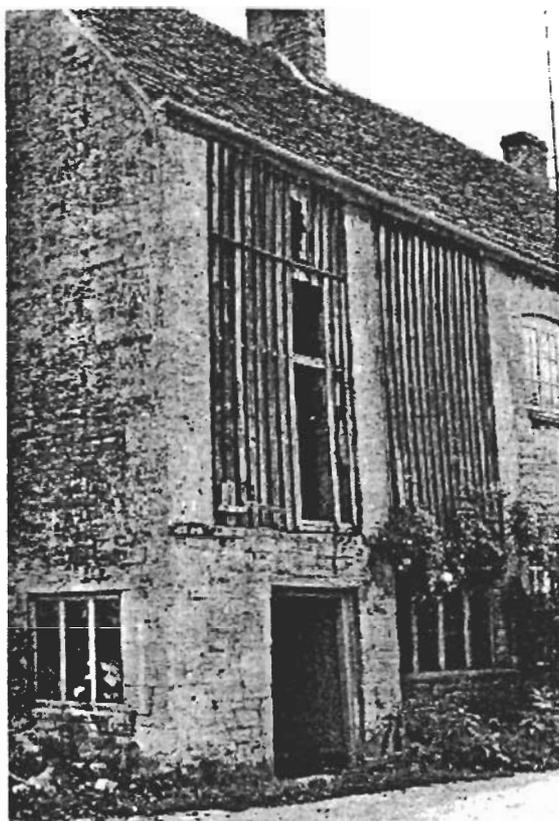
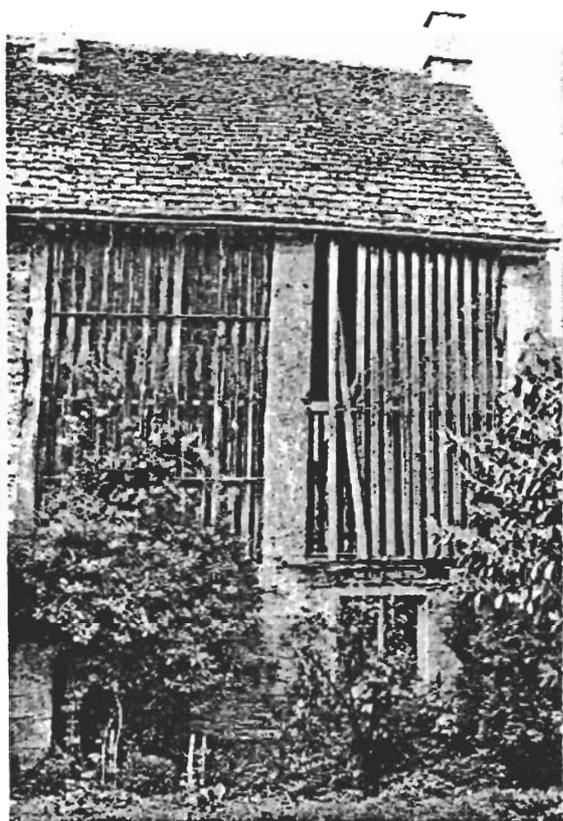


Site of Little Barrington Paper Mill. From OS 25" to mile map of 1881. Map reference SP2J6130

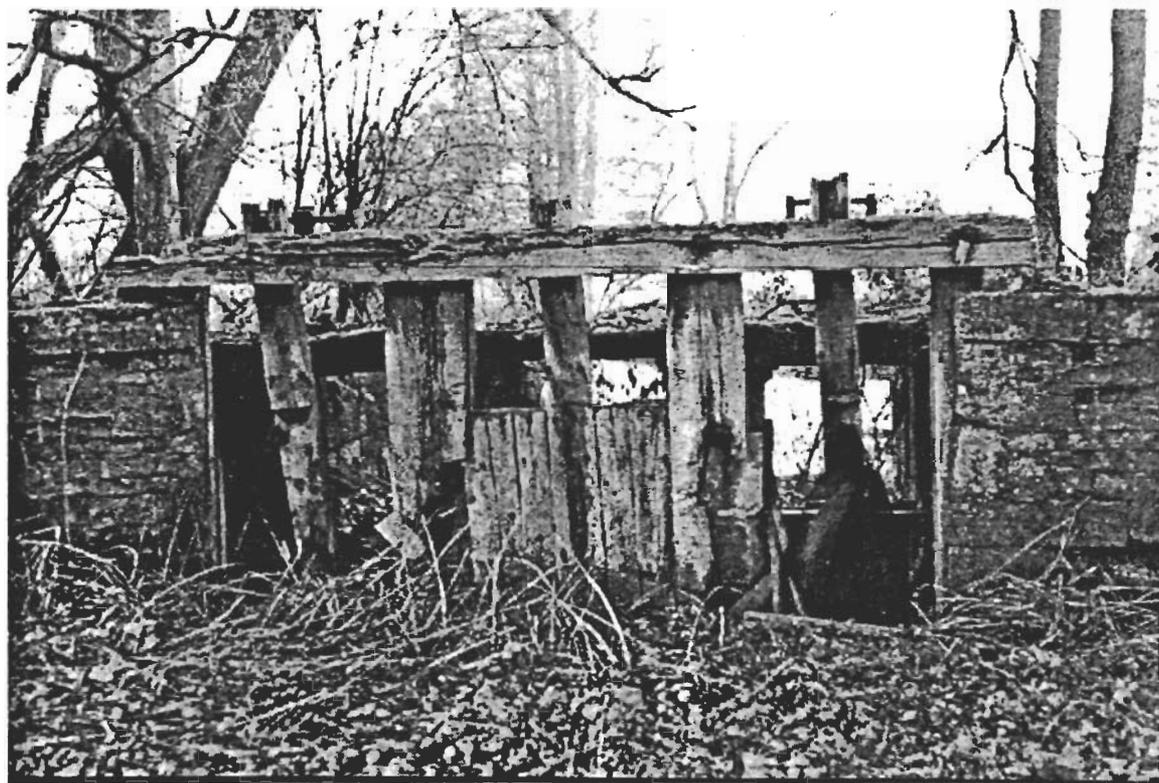


PAPER MILL. LITTLE BARRINGTON, GLOS. (CIR. 1850)

W.J. PACE:



The Surviving Drying Loft - From the West (left) - From the East (right)



The Mill Pond Floodgates - Looking Towards the River