

# KILCOTT MILL RESTORED

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The Journal for 1977-78 carried an article about the restoration of Kilcote Mill to its working condition of 150 years before. Since then a great deal has been learnt about the snags and difficulties of operation. It will help most readers to refer to the previous article and its descriptions and definitions. Inevitably there were difficulties in doing something the way it had been done 150 years before, and examples are given below.

## STRUCTURE

Rotten beams had to be replaced with first class hardwood which was water-resistant; mature oak, 18" x 18" was nearly impossible to obtain and most replacements of that size were of Greenheart. This is a very hard, water-resistant tropical timber which grows in Guyana near the Brazilian border, almost on the Equator. It is expected that these beams will still be there in 200 years; it even has the quality of tasting nasty so that work and beetle leave it alone.

Floor boards, roof timbers, stone supports and struts - a great deal had to be replaced by old timbers. The difficulty of finding old timber that is strong, wormless, unpainted and serviceable was and remains immense.

New windows and doors were necessary, all tailor-made, as it was difficult to find a window or door with a right-angle at any corner.

The author of a book, published in the mid-sixties, describing the water mills in this area, must have looked at the rusty corrugated iron roof, windowless holes in the walls, decayed door and door-posts, and easily reached the description of "derelict" put to this mill. Gloucestershire stone roof tiles were almost impossible to find in the quantity required to re-roof all the mill and its associated buildings. The cost was staggering, but it had to be done.

Fortunately, the local builder was capable of every necessary repair to the building and he made a first class job of all that was necessary.

## MILL POOL

The pool, dam, leat and weir were given their due attention. Owing to leaks in the dam appearing some years previously, and getting worse as time went on, the dam had received a 14" coat of concrete right down to the bottom of the pool.

The banks of the mill pool and stream had in places collapsed, and a bucketed tractor with a bulldozer attachment was engaged to repair, and in places rebuild, the banks. One weir gate had collapsed, and both gates (or paddles) were renewed and made to work. At a later date, due to a flood of some 18" in the mill, an overflow sluice was built, with a V notch paddle. As the level of the pool rises, so the water moves higher up the V notch, thus taking away more flood water as the level rises.

Before repairs started, the mud deposited in the mill pool was removed. Above the mud, the water level was barely 12" deep, but the stream had kept open a channel almost 3' wide and 5' below the level of the mud. Unfortunately, the year after the mud was cleared, some of it was replaced by a neighbour upstream who cleared his mud

with the paddles of his weir in the open position, and some of the silt was deposited in this mill pool, which acted as a natural settling tank for the suspended material travelling downstream.

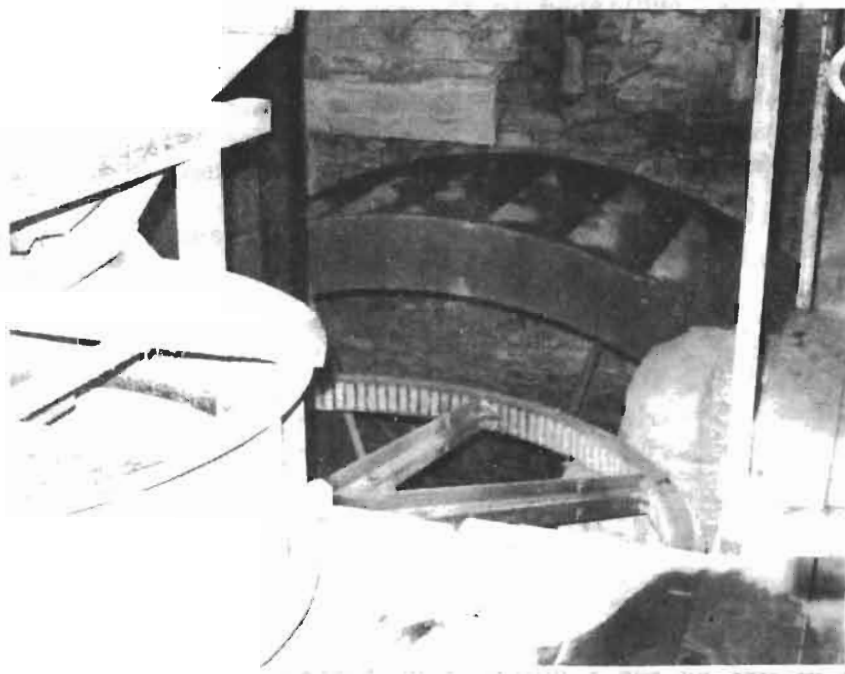
At about the time of the clearing of the mud from the pool, the discharge tunnels running under the house and garden were inspected and repaired. This is done every six months to ensure that the water is in no way impeded on its way downstream by fallen stonework or other impediment. The mill-race tunnel is very difficult to inspect and repair as the height of the tunnel is in places no more than  $2\frac{1}{2}$ ' , of which some 6" is taken up by water. The tunnel has a bend in it with the result that there is complete darkness in that length which has the least height.

The services of a civil engineer competent in the science of land drainage had been sought, and he gave valuable advice on how to remove mud, on its disposal, and on the machinery necessary for this task. The work was completed in about five days of concentrated labour, and the machinery - consisting of an excavator, bulldozers and tipper lorries - departed.

One piece of advice given by the engineer proved of the utmost help. He advised that leaks and seepages that had been in existence for a long time needed careful treatment; that it was probably useless to try to stop up the leaks and the best policy was to pipe away the seepages and to channel away the leaks. This advice was faithfully followed, and the general wetness and dampness reduced nearly to nothing.

#### MACHINERY

Machinery repairs were in some respects the most difficult, and in other respects, the simplest. This last statement is made because a local engineer whose father had also worked on the maintenance of this mill, was enthusiastic and energetic in the restoration. He was assisted by an elderly former millwright, whose services were invaluable.

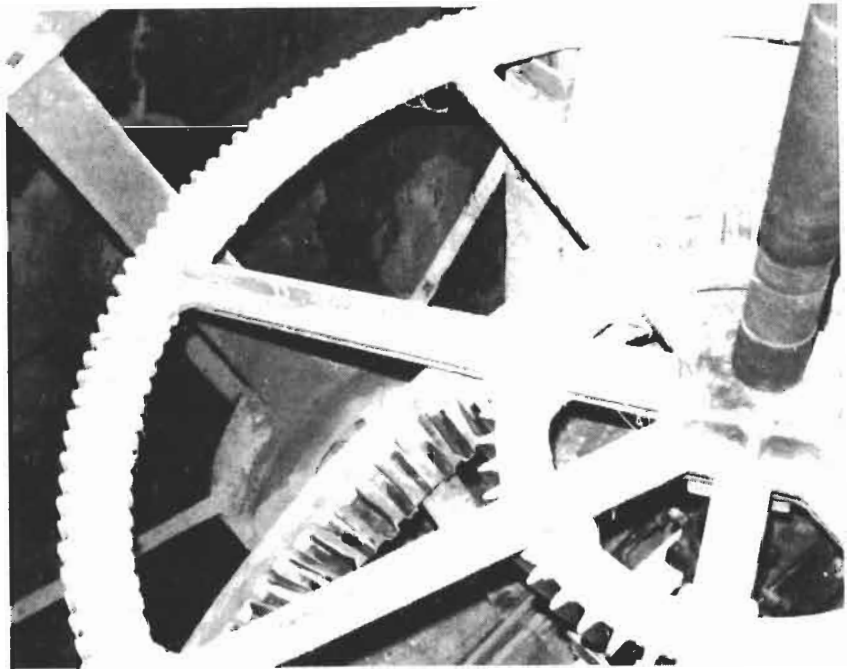


General view of the water-wheel driving the horizontal spur wheel which turns the upper grinding stone

The first step to be taken was to read all about it. This took a year or two, and the material was widespread, some of it in the British Library, some of it in the libraries of Mechanical Engineers' Institutes, some of it in private hands, and some purchased. There were visits to water mills to see what was there or what was left - one of them in France; visits to commercial roller mills to see what they did to wheat to make it into flour, and to learn about wheat and flour and how to manage them.

At the time of restoration, the pitwheel packing on the axle had decayed and the pitwheel was leaning drunkenly against a not too stable crumbling stone wall. Undismayed, the engineer and millwright hung the wheel from a roof truss at the top of the mill and with eight small jacks specially constructed for the purpose, at some considerable trouble and expense repacked the centre of the pitwheel with wood and adjusted it to perfect engagement with the wallower wheel.

Downward view of the wallower wheel which drives the vertical power shaft to which spur wheels on each floor are attached. The view also shows the water-wheel in the background.



To find mature wood for the various cogs was no mean task. Eventually enough mature oak was found to make a complete set - 144 - of pitwheel cogs. Cogs come from a saw mill in rough size and shape, and have to be tailor-

made for each slot of the wheel. Learning how to shape the cogs was the next problem: the Bristol Industrial Archaeological Society had a member who was a qualified journeyman joiner, and he enthusiastically showed how the cogs were shaped and fitted. From that generous gesture, many pitwheel cogs were replaced, and the millwright was able to replace many more.

Spur wheel cogs - 192 - were also rough shaped by a saw mill, and with the experience gained from the pitwheel cogs many of the spur wheel cogs were replaced, and continue to be replaced today as it becomes necessary. Opinions differ as to the best material for wooden cogs: some say apple or pear for the pit wheel, some say oak; some say hornbeam for the spur wheel - but pragmatically one has to use the wood available at the time and lay down for the future the appropriate immature woods. Due to the kindness of the mill engineer, there is a quantity of hornbeam maturing in the mill for the next replacement of the (192) spur wheel cogs.

The stones had to be taken apart and redressed, that is to say the cutting and grinding edges of the furrows and lands of the stones had to be sharpened and deepened. Through the kindness and patience of a retired stone-dresser, the method of stone dressing was learnt and applied. A description of design of cut, depth, angle, method and application would be lengthy, and in a descriptive article such as this out of place. Suffice it to say that after many days of mistakes and their correction, application of advice and weary rejuvenation of muscles unused to the inevitably heavy cutting chisels, resharping of misused chisels (and other frustrations) the redressing was completed.

Next it was necessary to get some advice on the practical side of milling. Once again, fortune smiled by introducing a former operator of a local water mill whose mill had been repossessed by a landlord who ripped out the irreplaceable machinery and transformed the mill into a "desirable residence overlooking a quiet mill pool" - an irreplaceable loss of a working water mill. The operator, by then a farmer, was patient and kind, freely giving all his knowledge and experience to a fellow miller trying to restore a mill.

#### THE MILL RESTORED -

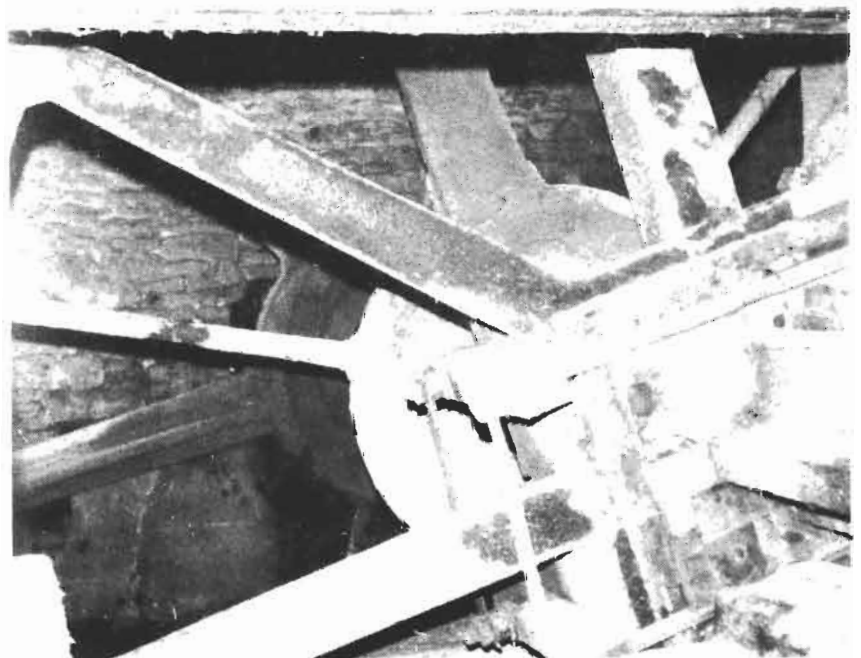
Then on 10th August 1977 a few bags of barley, which is easier to grind than wheat, passed through the mill without a hitch. \*\*\*\*\*

#### - AND PROBLEMS STILL OCCUR

There was, of course, much mutual congratulation but had it not been for the various professionals with their knowledge, experience and enthusiasm, it is doubtful if the mill stones would ever have turned again. To their lasting credit, all of them without exception freely and patiently gave the benefit of their knowledge and experience to the concept of a working mill as it was 150 years ago.

Thereafter the troubles have mostly been ones of repair and maintenance. New floorboards, gutter clearing, repairs to ladders, hurstings, meal spouts and such like. The biggest repair was to the pit wheel: originally it had been constructed in two halves then bolted together onto the driving axle connecting the pitwheel with the water wheel. Sometime in the past it had suffered damage and was no longer fully true. This caused it to move along the connecting axle which in turn moved it out of comfortable engagement with the wallower. As a result the central packing box was strained, causing the corners to open and so put the whole pitwheel out of true.

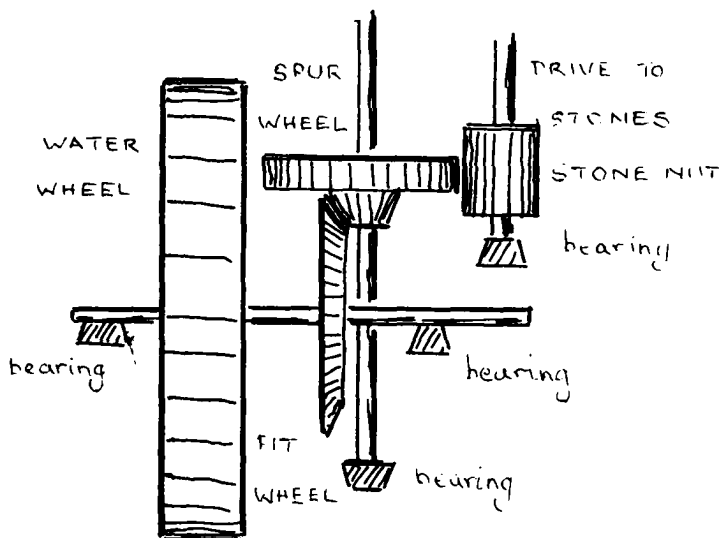
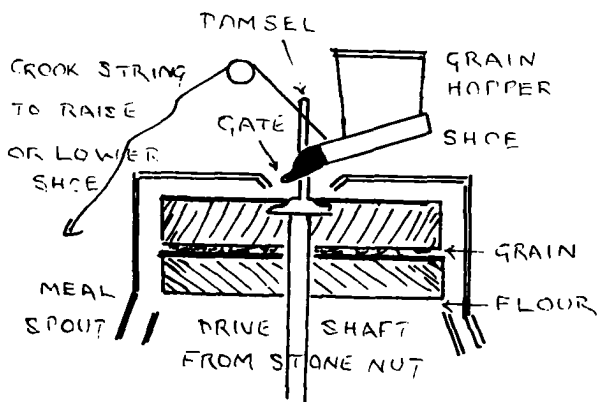
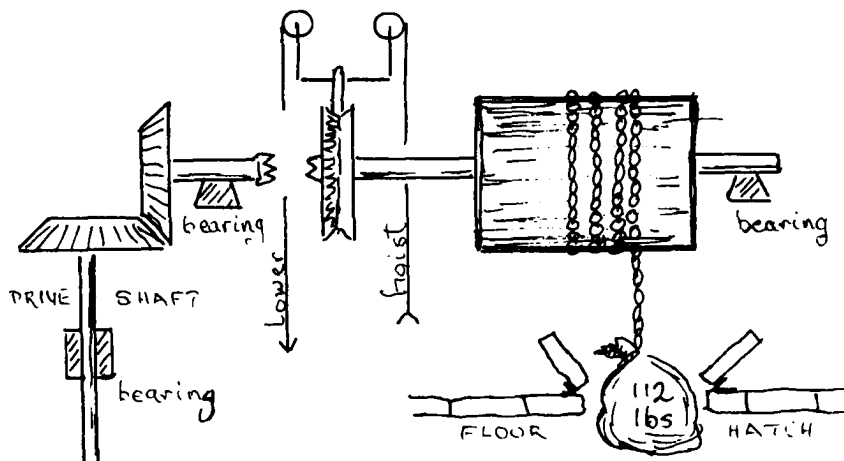
The central box of the pitwheel strained at the corners, now strapped together. Also shown is the renewed wood packing round the axle.



Immediately the mill engineer and millwright designed a bracing bracket which in the event proved not strong enough to retain the strain. This defect was quickly observed and further bracing bars and rods were designed. After templates, first of wood then of mild steel, had been tested, proper braces and bars were cast and installed, and the trouble overcome.

Grain gave trouble too. The hope had been that, as in 1830, a Gloucestershire farmer would grow Gloucestershire wheat on Gloucestershire farmland, send it to a Gloucestershire mill to be ground by a Gloucestershire miller, and sold in Gloucestershire village shops for Gloucestershire housewives to bake good wholemeal bread for their husbands and children. But this hope failed. When the steam roller mills were invented over 100 years ago, their capacity was such that it was necessary to establish them at major ports so that huge quantities of grain could be imported from American and Canadian prairies and processed at the ports. This policy put many local grist mills out of business, and the farmers ceased to grow the hard wheat necessary for bread-making.

Again generous help was forthcoming: a friendly commercial miller in Gloucester helped by designing a mix of various grains whereby the stones would work efficiently. To his credit, and satisfaction all round, he has been clever enough to design a mix which contains nearly half English-grown wheat, but maintains the quality of wholesome wholemeal flour. He also lends his chemists and laboratories so that the quality of the flour can be monitored.



## NOW - AND THE FUTURE ?

Since its restoration it is estimated that the mill has been seen by about 1000 visitors, from all walks of life, and of all ages and sizes. School, university students, industrial archaeological societies - one from as far away as London - historical societies, elderly motor-car enthusiasts, church groups ... the list is endless.

The mill runs only for demonstration purposes: it is not, and is not meant to be, a commercially working mill. What little wholemeal wheatflour is produced is disposed of to family and friends and the local Women's Institute, which insists on taking a modest weekly share. The mill is there, and operating, so as to give a glimpse into the past; it is a kind of private museum shown free of charge to interested parties of up to 30 people who are properly organised.

The mill pond and its banks have been replanted with carefully selected eutrophic plants, and nature has returned. Moorhens and water voles are today busy about their business, mallards regularly raise families, dabchicks dive and reappear. Water shrimps and water snails were purchased and introduced, and the mayfly and other ephemeroptera\* encouraged. Dragonflies, dippers and kingfishers live on or near the pond, and some brown trout have been introduced in order to fortify the strain already present in the millstream. As long as abstraction, extraction and pollution are kept in check, the natural beauty of the stream and pool, and their use to the mill, will remain.

What then is the end of the story? The mill must remain a mill of 1830 into the foreseeable future. The owner who restored the mill is now only a part-owner, and many consents - and some will not be easy to get - will be required before the mill and its associated pools, weirs, property etc., can be disposed of or altered. Beyond this, help and support and indeed sympathy, are required from industrial archaeological societies to keep a constant watchful eye on the mill, from local environmental and conservation societies to safeguard the wild life and flora of the valley and pool, the water authority to fight all and sundry for the maintenance of water flow in the stream - and most of all to oppose upstream abstraction and possible charges of water use, the local health authorities to see that no pollution endangers flora, fauna or indeed human beings on the banks of the brook, the local authorities to be modest in their valuations and demands for rates by acknowledging the value of the venture to the community and those who visit the mill ... and the host of other possible areas of interference.

In the Millers' Technical Magazine (which reviewed the mill), it was described as "elderly, snug, compact, warm and wise."

The mill is there for posterity - may it  
step into the future in peace.

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\* eutrophic - pertaining to healthy nutrition.  
ephemeroptera - insects of the mayfly order:  
i.e. with a life of one day.

Well - I had to look them up! Ed.)

