Hetton-le-Hole Herald

The Newsletter for Hetton Local History Group

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Summary

Corn mills have been in use for thousands of years. It is known that much of the mechanised technology for milling came from China, via the Arabs and the Romans. Milling using the water wheel was prevalent during the early part of the industrial revolution and followed the practices of Medieval times. There are still a number of corn mills working throughout the country.

The Corn Mills of Hetton

It is known that corn has been grown since before the eighth century B.C. As well as providing food for humans, once animals were kept for food, it was required as an animal food. In some areas of the globe it became the staple diet once it was ground into flour. The early forms of oats and wheat were indeed primitive and the yield from the early crops was low compared with modern corn crops. Nevertheless it was important and most families depended upon it. The biggest problem associated with the early crops was the time taken to grind the corn into flour which could then be baked to form a kind of bread. It was necessary to separate the corn ears from the straw then separate the seed itself from the husks by winnowing. Laboriously each seed had to be picked up, examined for disease then ground into flour using a hand mill. A family could easily spend three or four hours each day preparing flour so it wasn't long, once corn yields increased, for some form of motive power to be used to grind the corn. The first grist mills, as they were called, have been identified from the writings of Vitruvius, an engineer of the Augustan Age (31B.C.—14 AD). He described an undershot water wheel but described it as "a machine which was

rarely employed. The reason for this is that during this period the sparse application was probably due to the availability of cheap slave labour from other Roman provinces and this prevented the Romans from developing alternative sources of power, We also know that by the 2nd century B.C. the Chinese were using large water-driven rotary mills. The water wheel in China was a critical power supply since they did not rely upon slave driven and donkey-powered mills.

It wasn't until the early medieval period that social and economic conditions increased the need for replacing manual labour with powered machines. This was due to a variety of reasons namely, 1.) The rise of monasticism which had embraced all kinds of technological developments, 2). The abundance of good sites, many of which had been identified by the Romans during the period up to the end of the 4th century and 3). the increase in crop yields and the shortage of labour brought about by plagues and other natural disasters.

From the 10th century on there was progress in land reclamation. Areas in Northern and Western Europe, once Sparsely populated, came under cultivation. At this time most of the grain grown in England was ground in water mills. The Domesday Book, published in 1086 AD, lists 5,624 water mills. Considering the incomplete nature of the book this figure is likely to be low. A century earlier, fewer than 100 mills were counted. This rapid rise in numbers was no doubt in the main due to the rise in monastic power in the countryside. The Cistercian monastic order formed in 1098 moved in the direction which encouraged technological innovation and the order rode the cutting edge of both hydro power and agriculture.

Examination of most Cistercian monasteries shows them straddling a mill race. Not only did this artificial stream provide fresh water for the living quarters but it provided power for milling, wood cutting, forging and fruit crushing and for getting rid of waste water from these activities.

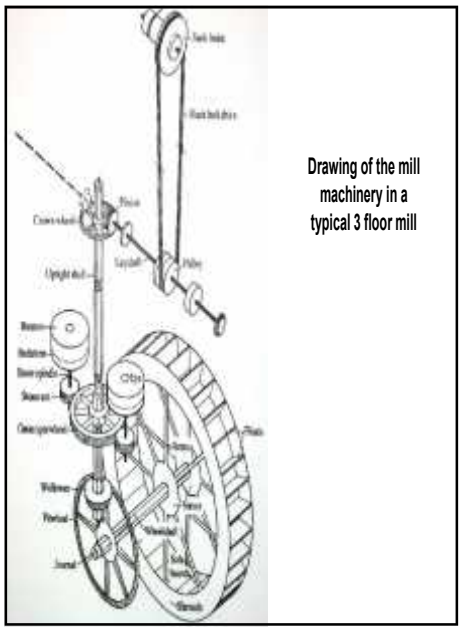
<u>Water Wheels and Hydro Power.</u>

A waterwheel is a machine for converting the energy of free flowing or falling water into useful forms

of power. The alternative to the waterwheel was the windmill and human and animal power. By the middle ages in Europe waterwheels were in use for other uses to milling flour. They were used for foundry work, machining and pounding linen in the production of paper and crushing fruit.

The main difficulties of waterwheels were twofold, firstly, their inseparability from water and secondly the variable flow speed and depth of water providing the hydro power. This meant that mills often needed to be located well away from population centres and away from natural resources. However they have been used well into the 20th century and are at present making a resurgence as they are assessed as being a clean source of power.

An Undershot waterwheel



Drawing of the mill machinery in a typical 3 floor mill

Waterwheel Structure

A waterwheel consists of a large wooden or metal wheel, with a number of blades or buckets arranged on the outside rim forming the driving surface. Most commonly the wheel is mounted vertically on a horizontal axle but the exception is the tub or Norse wheel which is mounted horizontally on a vertical shaft. It is known that this type existed in the early Arab world as well as being adopted within the Roman Empire, most notably Spain.

The advantage of the horizontal wheel is that it directly drives the load, that is the mill stones and

effectively can be operated by one person. Vertical wheels can transmit power either through the axle or via a ring gear and typically drive belts or gears.

Closeup of the gearing arrangement between water wheel and millstones

Vertical Wheel, horizontal axle and gears

In order to provide a constant flow of water, even during periods of drought, the stream providing the power is dammed by building a weir or a mill pond is constructed some distance up river. A channel is then constructed to lead this water to the wheel. This is called the mill race or leat. The race can be divided into sections; the race bringing water to the wheel is the head race and the one carrying it away from the wheel is called the tailrace. The

A mill race

wheel is turned by water dropping on to the blades from a height (overshot) or half way up the wheel (breast shot). If the water runs under the wheel forcing it to turn, the wheel is said to be (undershot). The speed of the water striking the blades varies the speed of rotation, thus the water flow must be regulated by operating sluices which allow differing volumes of water to flow along the race.

Regulating sluice with valve wheel

There have been many uses for water wheels over the centuries including the following:- 1. Corn Mills, 2. Worstead Mills, 3. Paper Mills, 4. Cotton & Woollen Mills, 5. Saw Mills, 6. Metal Mills, 7, Agricultural Mills, 8. Stamping Mills (Hammering). Water wheels have also been used to drive pumps and most recently there has been a resurgence in order to create electricity generation. Corn mills are by far the most common type of mill and at one time most village in England and Wales had at least one mill. These mills are used to produce flour from grain and rely upon the grain being crushed between two stones.

A millstone showing the rhynd and channels

The two stones are the bed stone (underneath) which doesn't move and the runner stone which moves in a circular manner on top. Millstones are made from hard sandstone called millstone grit, a rock common in the Pennines. Granite is also a favourite mill stone because of its hard abrasive qualities. Additionally there are composite stones made of small flakes of granite which are held together in a Paris matrix (a type of hard cement) then held together with iron bands. The centre of the stone is square or round cut and allows the grain to be dropped through. A metal arch or rhynd supports the weight of the stone and allows it to be lowered on to the bed stone to create the degree of coarseness for the flour. The flour, once made works its way out to the circumference via a series of channels and it drops into a channel to be collected.

The Mills at Hetton.

Most people who live in Hetton have heard of the Bogs but are unsure where they are. At the north end of Hetton Park there is an overgrown swampy area which is subject to periodic flooding during periods of heavy rain. This wetland area has been pro-

duced by man due to his attempts to control water flow downstream to assist with milling. There have been two corn mills associated with the village, one which was built close to Hetton House Wood and the second built at Rainton Bridge in association with a brewery. Both have been removed from the landscape, most recently during the 1950s and 60s.

There is evidence today in the landscape of the numerous mill races and millponds which served the mills during their productive era. They may even go as far back as the 17th century although there is little evidence to verify this. The mills relied heavily upon the Hetton Beck which drained water from the high ground both to the east towards Murton and to the south around Hetton on the Hill. Additionally further flows from the magnesian limestone escarpment in the vicinity of Hetton Downs and the famous Seven Sisters

Hetton Bogs with the stream that originates at Hetton on the Hill

area helped to maintain a continuous flow of water.

Water was led from the stream in the area of the present bogs via a mill race or leat which runs alongside the present path. It was led into a mill pond which is still in existence today

Hetton Beck, Bogs and the Mill leat

This mill pond was held back by an earth dam fitted with sluices which released the water to continue flowing in a westerly direction towards Rainton Bridge. Some of this water may also have been used to work the first mill built close to the earth dam.

Mill pond with the dam at the far (west) end

The photo above shows the mill, known as Scotts Mill close to Hetton House Wood. The arch-like structure over the beck is part of the mill structure and not a footbridge. At the extreme left of the photo is a gravel road leading to a footbridge over the beck.

The old Hetton Mill building stood a short distance to the left of the tree.

The photo above shows the site of the mill house in the photo above. Note the tree in both pictures. The earlier photo was taken in the 1950s before demolition of the house. Evidence of the house still exists today as numerous bricks lie beneath the grass. Further evidence can be seen

Stones which once formed part of the millpond wall now form stream banks

in the form of stones lining the beck side.

The relief leat leading from the dam to another millpond

Water from the pond was then led away from the earth dam via another race and this flowed close to another millpond which was served by the beck as it was released from the mill workings. The mill pond was held within an earth bank and probably formed a secondary water supply for the mill at Rainton Bridge.

The leat continued flowing west until it met the road at Rainton Bridge at which point it flowed within a contained stone lined leat into a mill pond.

The earth wall formed the perimeter of the second millpond

Above, the earth bank forming part of a mill pond as a secondary source of water at Hetton House Wood.

The leat emptied into this stream bed which was regulated by sluices at Rainton Bridge

Above and below, the mill race at Rainton Bridge just before it ran into the mill pond at that location.

Retaining wall of the mill leat beneath footbridge at Rainton Bridge

A lasting reminder of what used to be more than a century ago

Corn Mill, Drive, a lasting reminder of the original location of the corn mill at Rainton Bridge.