

Notes on Water-Mills : illustrated by those on the Repton Brook.

By WILLIAM FRASER.

“ See you our little mill that clacks
So busy by the brook?
She has ground her corn and paid her tax
Ever since Domesday Book! ”

Kipling.

EVER since man became an agriculturist farinaceous foods have been one of the main constituents of his sustenance. The evolution of the methods he employed to pound or grind the grains of the various grasses he learned to cultivate into meal and flour for himself and his domestic animals, is an attractive study. It is generally accepted that the prototype of the water-driven corn mill and the later steam- or electrically-driven rolling mills was a hollow in a stone slab, or in the natural rock, in which the grain was pounded by a round boulder.

These “ bullan stones,” found in Ireland and the Hebridean Isles, were succeeded by the saddlestone, a stone shaped as its name implies, and in which the grain was ground, not pounded, by another stone with a flat underside. The oldest Egyptian saddle-stones are computed to date from c. 2300 B.C., and the type is represented in Egyptian sculpture and painting. In England examples have been unearthed in the pit-dwellings of Wiltshire, etc.

The next improvement effected was the substitution of a rotary motion for the thrusting action of the saddle-stone. The rotary handmill, or quern, appears to have come into use about 200 B.C., and quickly superseded the older and more cumbrous methods throughout the civilised Western world.

The quern consisted of two circular stones; the upper one, pierced by a narrow funnel which formed the hopper, worked on a wooden or metal pin inserted in the lower. This was the mill used by the Romans, in Britain as well as in Italy, and it was worked by a slave walking in a circle and pushing a projecting handle. Eventually a domestic animal, usually an ass, became the circumambulator, and the so-called cattle mill had arrived.

At what date mechanical power took the place of animal is not certainly known, but in Bennett and Elton's comprehensive "History of Corn Milling" it is stated that the first water mill appeared in Greece about 85 B.C. These early Greek mills were of a simple type. No gearing was necessary, because the horizontal wheel, the shaft, and the upper millstone revolved as one unit, the shaft passing through a hole in the lower stone. This form of water mill spread throughout western Europe, and was known as the Norse mill. Vestiges of them have been discovered in Norway, Ireland, Shetland, the Isle of Man, etc. It is possible they were introduced to England by the Teutonic invaders of the fifth century.

The earliest description of a Roman water mill is that by the engineer Vitruvius in the first century B.C. This mill had a vertical wheel which drove a horizontal stone by means of gearing. For a considerable time after Vitruvius' day, however, the slave-propelled rotary handmill was sufficient to provide flour for the Roman populace, and it was not until the abolition of slavery in the fourth century greatly lessened the supply of slave labour that the use of the water mill became general.

No trace of a Roman water mill has been discovered in England; if any existed they must have been destroyed in those dark days of strife and bloodshed, after the departure of the legions, which Gildas paints so pitifully. In Saxon times great numbers of water mills were erected, and it is said that one is mentioned in a charter as early as 664. In Domesday Book approximately 7500 mills are noted, all water-driven, presumably, as it is believed the windmill did not appear in Europe before the twelfth century. Derbyshire's contribution to the Domesday total was 72 mills and "sites of mills."

For many centuries the sole occupation of the water mill was the grinding of corn. In the sixteenth and seventeenth centuries there was a restricted use of water-wheels by the iron industry for working forge-hammers and furnace-blowing engines. It was in the eighteenth century, when cheap and ample power was demanded by the exigencies of the Industrial Revolution, that the water mill really came into its own. Almost every valley with a stream swift and powerful enough to turn a wheel was pressed into the service of manufacture, and it is thus in small hamlets and remote dales that the beginnings of the modern factory system are to be looked for, as many a tall derelict mill building in the Pennine valleys still bears witness.

Long before the opening of the nineteenth century water power had been replaced by steam in the great cotton and other mills that had desecrated so many fair valleys. The earlier steam engines, or fire engines, as they were called for many years, instead of being harnessed directly to the wheels, were employed to pump the water up from the stream into an elevated reservoir from whence the wheel was fed—something like going from Derby to Burton via Nottingham! The small corn-mill of the countryside continued to rely on water for its power, except in isolated instances where a steam engine was installed to remedy irregularities in water supply.

The millpond served a dual purpose. It provided an artificial waterfall to impinge on the top of an overshot wheel, and also formed a reserve of water which ensured a prolonged and continuous run of the mill machinery. As the power of the overshot wheel compared with the undershot has been computed to be as thirteen is to five, the preference for the former is explained.

The configuration of the normal valley is distinguished by steepness and narrowness in its upper parts, the lower end tending to broaden out and become much more level. Consequently in the higher reaches the construction of a dam wall across the valley presented little difficulty. It was otherwise at the bottom end, however, where the building of a dam high enough to direct a fall of water on to the top of an overshot wheel would have necessitated a structure of unwieldy length, apart from other disadvantages. The difficulty was usually overcome by constructing the millpond at the nearest practicable spot above the mill, and running the water from it to the mill-wheel along a narrow artificial channel or leat.

The great majority of mills were driven by either overshot or undershot wheels. The distinctive principle of the former was the production of power from gravity, or the weight of water falling into the buckets at the top of the wheel. The latter derived its power from the impulse or velocity of water confined to a narrow channel striking the lower part of the circumference, thus anticipating to some extent the principle of the water-turbine.

Let us now illustrate and perhaps amplify these notes by reference to a south Derbyshire brook and the old mills which once "clacked" so busily upon it. Few who know it will disagree with the description of the Repton Brook, which rises on the flanks of Pistern Hill just beyond Hartshorn and joins the Old Trent Water at Repton, as the most picturesque watercourse in the

southern part of the county. It has, or rather had, other adjuncts beyond those of mere pictorial charm, however, and one of them was its usefulness in supplying the water that drove six great mill-wheels.

The source of the stream coincides almost exactly with the 500 feet contour line, and in its journey of just over six miles it drops to 140 feet at its junction with the Old Trent Water, an average fall of 60 feet per mile. The actual decreases in altitude from the source downwards, however, work out as follows:—Half a mile for the first 100 feet; one and a quarter miles for the second 100; two and a half miles for the third 100; the last 60 feet of drop occupies the remaining two miles. It will be seen that the valley adheres perfectly to the rule of configuration adumbrated above.

The first mill, known locally as the Screw Mill, is situated in the village of Hartshorn about a mile and a half below the source of the brook. This is the only "active" mill left, the proprietor still doing a little corn-grinding and timber-sawing. I learned from him that the two ponds which existed higher up the stream (they appear on the one-inch ordnance map) broke down some five or six years ago under the impact of a severe flood, but the pond adjacent to the mill supplies the overshot wheel with enough water for its present restricted operations.

Although the mill must have spent most of its life in the corn trade, it was fashioning pointless iron screws at the end of the eighteenth century—hence its local name. Stebbing Shaw, in his "History of Staffordshire" (1798) describes it as a "curious manufactory" for the making of "screws to drive into wood." He tells us also that it employed 59 pairs of hands, and had an average output of 1200 gross per week, by means of 36 lathes turned by one water-wheel. Fifty years later (1846) Bagshaw's "History of Derbyshire," referring to Hartshorn, states: "An extensive screw manufactory, which gave employment to a number of hands, has been discontinued."

According to the present proprietor the cause of its failure as a screw mill was its inability to stand up to the competition of "those Chamberlains and Nettlefolds of Birmingham." It appears that in 1834 John Sutton Nettlefold, founder of the firm of Guest, Keen & Nettlefold, Ltd., opened a factory in Birmingham for the making of patent screws. At the Great Exhibition of 1851 the Nettlefolds bought the patent of an American machine for making gimlet-pointed screws. One of the effects of the appearance on the market of this more effective article seems to have been the extinction of small businesses like the one at Hartshorn. It may be noted in passing that Joseph Chamberlain, the famous statesman, joined the Birmingham firm as partner in 1854.

A long mile below the Screw Mill, but still in Hartshorn parish, stand the exiguous remains of what is usually known as Glovers Mill, at Nether Hall. On the Burdett map of Derbyshire (1762-7) the place is called Mill Green. A dozen years ago most of the mill building and the gear were intact, although the wheel itself had been removed about the time of the 1914-18 War. The one wall now standing will probably soon go the way of the others.

This mill has the most picturesque environment of any on the brook. The walls of the ground floor were of stone, the storeys above being of brick. Fortunately one of the lower window-openings survives, and shews what appears to be good typical work of the second half of the seventeenth century. While the building was fairly complete I took a note of some of the names and dates cut in the stonework by the old millers, and here append a selection: WILLIAM WEST 1736: W. COOK WHAS MILER 1790: JOSEPH JACKSON WHAS MILLER 1800: JOHN GLOVER WHAS MILLER 1808: and so on down to JOHN WILLIAMSON 1854.

The mill appears to have ceased work round about fifty years ago. The wheel was of the usual overshot type, and

of considerable size, as is evidenced by the circular markings on the wall of the wheel-house. Adjacent to the wheel is the millpond, its limits now barely traceable because of the dense growth of nettles and other coarse vegetation which enshrouds it.

Four of the six mills originally on the brook still have their buildings more or less intact. All traces of the other two have completely disappeared. One of them occupied the next site we reach. A short distance below the mysteriously-named Hoofies Farm is Bugley Hole, where what is still referred to as the Leather Mill is known to have been situated. Although the exact site is a question, it is possible that a shallow basin-like formation immediately below Hoofies Farm indicates the whereabouts of the millpond. In that case the dam-wall may have been at the spot now occupied by the bridge over the brook.

The former existence of this vanished mill is sufficiently authenticated by the fact that the cottages in Bugley Hole are still known as the Leather Mill Cottages, and on the Burdett map previously referred to the site is marked by the characteristic mill symbol employed by the cartographer. Still later proof is furnished in Vol. V of Lysons' "Magna Britannia" (1817), which contains the entry: "At Hartshorn is a mill for oiled and chamois leather."

The three mills noted so far are all in Hartshorn parish. Before reaching the fourth we pass into the parish of Bretby, near the point where the stony lane comes hurtling down from Greysich. Half a mile further on stands Bretby Mill. The present dwellinghouse is dated 1814, but the mill-building is probably a century earlier. Here also, as at Glovers Mill, the wheel and other gear were taken out during the first Great War. This mill appears to be the only one on the brook that during its working life called on the auxiliary of steam when water was scarce. The base of the chimney stack is still in situ, and

local information has it that Miller Bradbury installed a steam engine about 1850. It proved unequal to the work required of it, and was replaced by a 12 h.p. engine in 1855, which apparently gave satisfaction.

An older Bretby Mill (about which I have something to say later on) was situated lower down the valley, and was approached from Bretby by the now disused track along what is locally termed The Slades. When the present mill was built a shorter way (Watery Lane) was constructed from the village to it. As Watery Lane is shewn on Burdett's map it can be taken for granted that the present mill-building was standing when Burdett made his survey.

Like the mills above it, Bretby Mill was driven by an overshot wheel, and, as with the others, the millpond adjoins the wheel-house.

The fifth mill, at Repton, is over two miles lower down the brook. Towards Repton the valley opens out, becoming wider and flatter, and the convenient arrangement by which the pond is constructed adjacent to the wheel is here no longer possible. Such a water "lay-out" at Repton would have necessitated the building of a dam-wall of inordinate length to obtain the height needed to raise the water level above the top of the wheel. What they did was to place the pond at the nearest convenient point above the mill (half a mile), and then cut a narrow lode or leat to bring the water to the wheel.

Owing to various circumstances Repton Mill ceased to function five or six years ago, and the lower part of the lode now exists as a straight grassy depression fast yielding itself to the ubiquitous nettle.

Recently I discovered the two following inscriptions cut in some stonework at this mill: THOMAS EVANES 1652 and ROBERT SH . . . 1687. I congratulated myself on having run to earth two of the old Repton millers; and thought to find further reference to them in the church

registers, as the miller was invariably a man of substance in the village community. The Rev. A. W. Fletcher (vicar of Repton) very kindly searched the seventeenth century portions of the registers for me, but came across nothing that could be "married up" with the inscriptions. It may be that the names denote two outside builders, or repairers, of the stonework.

At the time of writing the mill-wheel is still in situ. The dwelling-house is a low thatched ochre-washed cottage, and combines with the red-brick mill buildings to form a picture of considerable rural charm.

The sixth, and last mill on the brook was that belonging to the Priory founded at Repton, c. 1170 and dissolved in 1538. It is commemorated by a stone let into the Priory (now Repton School) wall, but the extensive laying-out of playing-fields for the School over many years has destroyed any possibility of tracing its exact position.

In an indenture dated 1539 between Henry VIII and Thomas Thacker of Repton, specifying the details of property purchased by the latter when the Priory was suppressed, occurs the following: ". . . a water-mill adjoining the monastery." (D.A.J. Vol. 53, p. 78).

The Domesday entry relating to Repton contains the statement: "There are two mills." One of these would doubtless be that once belonging to the Saxon Abbey, which was founded in the seventh century and destroyed by the Danes in the ninth. It is unlikely that the destructive fury of the invaders, ruthless in the case of religious edifices, would be extended to a secular building like a mill. The other Domesday mill would be a predecessor of the village mill now standing, and in all likelihood occupying the same site.

Water mills have, it would appear certain, stood in some of the six places indicated above since Saxon times. Flour and meal were always staple foods, and no institution was more necessary to the continued existence

of the community than the mill upon the local stream. In feudal days and later the lord of the manor owned the mill, farming it out to the miller, and insisting on all his tenants bringing their corn to be ground there.¹ "This jurisdiction arose by purely manorial local custom, and not by statute This manorial privilege of the milling soke was in many instances allowed to lapse by the owners, and in other the rights were purchased by the community." (Hone: "The Manor and Manorial Records.")

The soke mills proved unequal to supplying the greater demand for flour caused by the increase of population consequent on the Industrial Revolution. To buy freedom from this manorial restriction cost the ratepayers of Leeds and Wakefield £13,000 and £18,000 respectively.

Complexities of water-rights affected all streams with mills on them. Every miller was entitled to two things—a good "head of water" with which to drive his wheel, and an adequate "get-away" for his water behind his mill. An overshot wheel is driven by the water falling on top of it, and the greater distance the water falls the greater the power developed and the larger the wheel that can be turned. The miller might therefore be tempted to increase the height of his dam-wall, but in thus raising the level of his pond he must be careful not to inconvenience the next mill higher up the stream by making it difficult for the water to run away freely from its wheel—in other words, compromise his neighbour's "get-away." It often happened that when a miller raised his dam-wall the miller higher up would be compelled to diminish his fall

¹ That tenants were actually fined for not having their corn ground at the lord's mill is illustrated by the following extract from the Darley Abbey Cartulary:—"Memorandum that on the 27th December 1270, the abbot of Darley in full court exhibited his charter of enfeoffment concerning the men of Horsley to his mill Wherefore Thomas de Castro was amerced because he had his corn ground at another mill. Thomas, son of Emma amerced at the same time and for same offence." Editor.

of water by raising his wheel, or to insist on his neighbour below lowering his dam again.

It can thus be seen that on a stream occupied by mills at frequent intervals many pretty problems of adjustment in water lay-outs had to be solved.

Before bringing these notes to a conclusion I should like to say something about a little problem that has baffled me for years. It relates to the site of the old Bretby mill previously referred to, the predecessor of the mill now standing. In the sloping field that borders the brook just below the present mill, an ancient grassed-over leat starts from near the Watery Lane corner and runs parallel with the stream at a height of perhaps twenty feet above it. At the end of this old channel the site of the previous mill is still plainly discernible.

Apart from the evidence on the ground, a proof of the existence of this former mill is contained in a Repton deed, dated 1569, which states that: "William Wakley, of *Bretby Mill*, sets to farm to William Rawston, of Repton, weaver, a cottage house and tenement in Repton . . ." (D.A.J., Vol. 36, p. 117). This Wakley, or Waklin, family seems to have been well represented in south Derbyshire. There is a monument in Repton Church to George Waklin, of Bretby, who died in 1617, and we hear of them at Rosliston and Hilton.

There can be little doubt that this sixteenth century (or earlier) mill stood on the site just described. Although it was situated in the Repton valley, its height above the main brook precludes the possibility of its having derived its water supply from that source. We are, therefore, driven to look elsewhere for a solution.

A few hundred yards up the side-valley which contains Watery Lane there exist the remains of a large dam-wall, which, before the construction of the lane as a means of access to the present mill, must have stretched right across the narrow valley. The small stream which

tumbles hastily along at one time supplied the water that filled this pond, from which the long lode or leat before mentioned was fed. The little brook is now culverted under road and field into the main valley stream.

The enigma I should like to resolve is: Why was the earlier Bretby Mill not built lower down on the large brook, as were the other mills? Why construct a millpond across a small side-valley, and depend for the water supply on an insignificant tributary which in dry weather must have been much more likely to fail than the main valley stream?

An old miller who was at Bretby Mill for forty years, and who died during the preparation of these notes, told me he himself had often pondered over this question.

A recent writer on the Repton valley, after remarking on the unusual position of the earlier mill, proceeds to shew that he has apparently missed the significance of the broken dam-wall, the dry leat, and the diverted brook, by wondering naively how exactly the water reached such a high level.