

Education

Teacher's Kit

Watermills

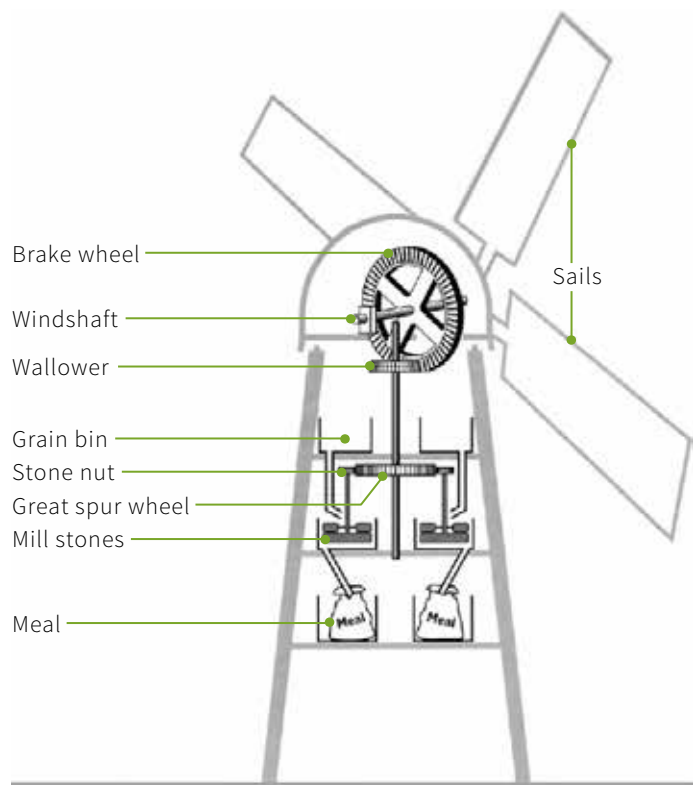
Watermills can be divided into two basic types, one powered by a vertical-waterwheel via a gearing mechanism, and the other equipped by a horizontal-waterwheel without such a mechanism. The former type can be further divided, depending on where the water hits the wheel paddles, into undershot, breastshot, pitchback or overshot waterwheel mills. The earliest mill consisted of a horizontal water wheel set in a watercourse so that the forces of the stream pushed the paddles round, the axle passing up through the floor of the mill to drive millstones which crushed the grain. It was probably the Romans who devised the necessary gearing to enable vertical water wheels to be used. By the time of the Domesday Book in England, every settlement with access to running water had its own mill.

Windmills

By the end of the twelfth century England had some 56 known windmills, the earliest built before 1137, compared with only three or four known in the rest of western Europe. These early mills were post mills. In post mills the buck, or main body of the mill, contained all the machinery: sails, gearing and grindstones. Since the mill only worked effectively if the sails faced directly into the wind, the buck was supported on a post and could be pushed round by a tail pole to face the wind. In the thirteenth century the tower mill was developed. This had a fixed tower containing the machinery, with the sails mounted on a cap which could be turned into the wind. Mills with wooden towers were called smock mills.



Saxtead Green Post Mill, Suffolk
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Tower Windmill

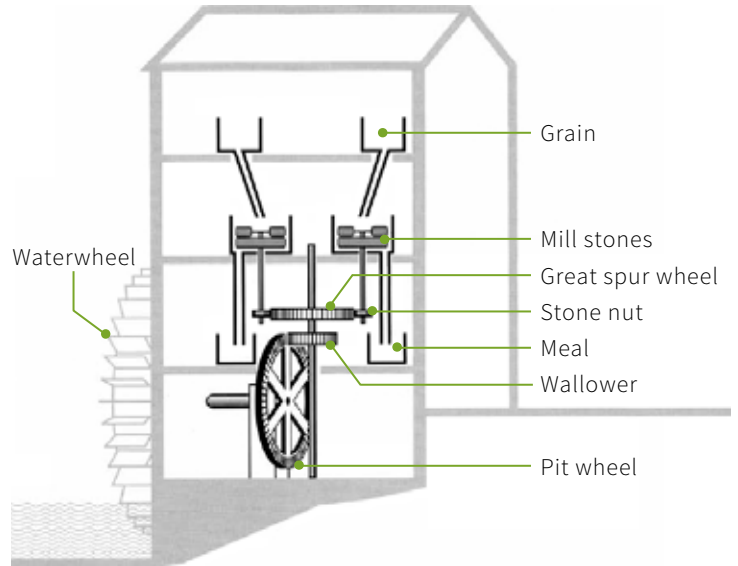
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Mills



Mortimers Cross Watermill, Herefordshire
© Historic England Ref: J920893



Watermill



Berney Arms Windmill, Norfolk
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Milling improvements

Until 1754 all gearing in both wind and water mills was made of wood, but then Thomas Smeaton introduced the first cast-iron gears. The invention of the 'governor' in 1787 automatically adjusted the distance between the stones. As the top runner stone turned faster it tended to lift from the lower, stationary bedstone, and the flour was not ground so finely. The 'governor' used levers to close the gap fractionally. James Watt adapted the idea to control the speed of steam engines.

Other ingenious but un-datable inventions included the 'sack-hoist', which used available natural power to lift sacks of grain to the top of the mill, the 'damse'l' which agitated the chute feeding grain into the stones and kept the grain running smoothly, and the 'bell alarm' which warned the miller when the grain was running low.

Wind or water provided the power for a variety of tasks including crushing ores, sawing wood, and pumping water, (the latter often to drain marshy areas, but also for domestic purposes). Water power was commonly used to pump out mineral mines, especially in areas remote from good communications where importing coal for steam engines was difficult. The buildings housing these activities all became known as mills. In the nineteenth century waterwheels were built into barns to drive the new farm machinery.