

# Notes on windmills in Greater London

by G. C. Arthur

*It is possible to find more than thirty streets in London named 'Windmill', including the one which contains the theatre, and London can still show examples of all three main types of windmill once common in England. This article not only describes the features of mills, but also provides a gazetteer of surviving windmill remains in Greater London.*

Although the water-mill may have a history dating back to the Roman occupation, the first specific references to windmills do not occur until the twelfth century. One of the first of these early records is a reference to a windmill built for the Priory of Clerkenwell at its foundation.

The growth of inner London, with its narrow streets and ever-taller buildings, combined with a liberal number of water-mills on every river, meant that the windmill was literally fighting for air. Windmill owners had to take advantage of any high ground available; during the seventeenth century a group of six windmills stood on a mound in Finsbury Fields, said to have been created in 1549 by dumping a thousand cartloads of human bones from St. Paul's charnel house which was later consolidated with city rubbish.

Cornelius Visscher's Panorama of London, drawn about 1616 shows a post mill on the top of a tall tower between St. Paul's and Queenhithe, referred to as the water house. A few mills mounted on the top of waterworks for pumping water seems to have been the only type able to penetrate central London although Millwall, on the Isle of Dogs, displayed an impressive collection of windmills. By coincidence the most central of today's surviving mills is the pumping mill at Rosebery Avenue.

The windmills on the fringe of London, in common with their counterparts elsewhere in the country, prospered until the early part of the 19th century. The introduction of cheap grain from abroad and the growth of steam-powered, riverside mills which were ideally situated to take advantage of this ship-borne produce, brought about the demise of most inner London windmills, prophesied by the owners as early as 1784 at the opening of the Albion mills at Blackfriars.

As will be seen from the descriptions of the windmills in this survey, a number of mills were built during this period, and bearing in mind the considerable capital outlay, these windmills had a short working life, although the mills at Brixton and Upminster managed to continue working into the 20th century by taking advantage of alternative power sources.

## Windmill types

### The post mill

The earliest type of windmill in England was the post mill; the machinery is housed in a wooden body, built to revolve around a massive central post; the post is supported by diagonal timbers mortised into horizontal timbers laid at right angles to each other, their outer ends being supported on brick piers. The mill is

turned into the wind by means of a tailpole projecting through the steps at the rear of the mill, which are raised during the turning operation (Fig. 1).

The earliest post mills housed only one pair of stones driven directly from the brakewheel; later mills had a second pair of stones in the rear, driven by a tailwheel mounted on the windshaft and similar in construction to the brakewheel. In its final form the drive to the stones in a post mill was the same as in tower and smock mills.

### The tower mill

Although documentary evidence exists for tower mills as early as the thirteenth century, the type became established in the seventeenth century. The tower mill consists of a brick or stone structure, housing the main machinery. At the top of the tower is a revolving cap carrying the windshaft and sails, and only the cap need be turned to enable the sails to face into the wind. In early tower mills this was achieved by a tailpole reaching down to ground level. Although the tailpole persisted in use in continental mills, it was superseded in England by the use of cogs set in the curb at the top of the tower, meshing with a worm on a spindle built into the cap framing. At the end of the spindle was a wheel over which was hung an endless chain reaching to the ground; pulling on the chain revolved the worm and drew the cap round. The design of the tower mill meant that it was not limited in height as the post mill was. This was an advantage when nearby buildings obstructed the wind.

In their final form, some tower mills had reached 100 feet in height, and contained up to five pairs of stones, plus a full complement of auxiliary machinery.

### The smock mill

The smock mill is in effect a tower mill built of wood. The type was popular in Holland and may have been introduced into this country by Dutch engineers brought over to drain the Fens during the reign of James I.

The body consists of a wooden framework, in most cases octagonal, covered with horizontal weatherboarding. The timbers are built up on a brick base that can vary from a few courses up to several storeys in height. The shape of the caps on smock and tower mills exhibit regional differences:— those built in Kent often having the appearance of small post mill bodies. Mills in the East Midlands have ogee-shaped caps, while those in the Norfolk area have a distinct inverted boat shape.

## Gazetteer of surviving mill remains

### Arkley Windmill, Barnet Road, Barnet TQ 217953

Arkley, a black tower mill with a white domed cap and restored sails and fantail, was built about 1830, the first recorded owner being a James Whitehead. The mill continued to work using sails after the installation of auxiliary steam power in 1881.



Fig. 1. Map showing location of surviving mill remains

After ceasing work in 1916 the mill became derelict before being bought by Colonel William Booth in 1929. Restoration work was carried out by Hunt Brothers of Soham, Cambridgeshire at a cost of over £300. The surrounding site (now a large garden in which the mill is almost hidden) was cleared, and Col. Booth had Windmill House built. In its current state the mill has a combination of two common and two patent sail frames.

#### **Brixton Windmill, Blenheim Gardens, Brixton, SW2 TQ 305744**

Built in 1816, the brick tower mill with a weatherboarded, boat-shaped cap, was worked throughout its productive life by members of the Ashby family. In 1864, by which time the surrounding housing had reduced the available wind, the two common and two patent sails were removed, and the mill tower was used as a store. Milling began again in 1900, first with steam, and then gas engine power to drive two pairs of stones. In 1912 the Ashby family obtained the freehold of the site after nearly 100 years of leaseholding. Milling finally ceased in 1934 and the following year Joshua Ashby, the grandson of the original miller, died aged 77.

The site became derelict and was in danger of demolition for housing development in the 1950s. However the decision was taken to restore the mill, and work began in 1964 by Thomsons,

the millwrights of Alford, Lincolnshire. Much of the present internal machinery is from a derelict mill at Burgh-Le-Marsh in Lincolnshire. Of the two pairs of stones on the second floor, the pair with steel stone vat and hopper are the original gas engine driven stones. The sails have been restored to represent the original common and patent combination. The mill is in the care of the London Borough of Lambeth and is open to the public during normal park opening hours. The best view of the mill is, however, from inside H.M. Prison!

#### **Erith Windmill, St. Pauls Road, Erith TQ 502772**

A two storey circular brick roundhouse is all that remains of the early 19th century post mill. In its working days the large black body of the mill was a landmark for river craft. It was last worked about 1880, and collapsed in a gale on January 1st. 1892; it then received its conical slate roof and was used as a corn and seed merchant's store until the 1930s.

#### **Islington Windmill, Amwell Street, N1 TQ 313828**

At the headquarters of the Thames Water Authority, Rosebery Avenue, a truncated tower mill base may be seen just beyond the entrance gate in Amwell Street. The mill is depicted in a number of 18th century prints, always without sails, although it is believed to have been used for pumping water in 1767 when it stood in for the incapacitated Newcomen engine.



Plate 1. Keston Windmill (Photo Martin Salzer)

A view dated 1730 described the mill as being horse driven, suggesting that the base may have been used as a horse gin.

**Keston Windmill, Heathfield Road, Keston, Bromley TQ 415640**

On the west side of Heathfield Road, Keston Common, stands a weatherboarded post mill with a brick roundhouse, the survivor of a pair of windmills which once stood on this part of the common (Plate 1). Originally fitted with patent sweeps, only the middlings and striking gear remain. The tailpole protruding through the steps was used to turn the mill into the wind. The mill is dated 1716 if the carving on the main post is correct.

The body has three floors with most of the machinery intact. On the second floor are two pairs of stones, a sack hoist and a flour dresser. The mill was last worked in 1878 and was repaired in 1914 with local support and help from the Society for the Protection of Ancient Buildings.

**Mitcham Windmill, Windmill Road, Mitcham Common, Mitcham TQ 291679**

A single storey brick roundhouse with a conical thatched roof is

all that remains of this hollow post mill built in 1806. During its working life it would have had the appearance of a conventional post mill. Inside, however, the drive from the sails would have been taken via a shaft down through the hollow main post, to drive the stones beneath the supporting trestle in the roundhouse itself. Room beneath the stones to collect the meal was achieved by having the floor level in the roundhouse below ground level. The mill ceased work in 1860 and was struck by lightning in 1878; the superstructure was dismantled in 1906.

Mr. Farries and Mr. Mason during an examination of the remaining trestle in 1955, were able to establish that the iron shaft was still in place inside the main post, and was three inches in diameter.

**Plumstead Windmill, Old Mill Road, Plumstead Common, SE18 TQ447779**

At the rear of the Old Mill Public House stands the brick tower of a mill built about 1820. At one time it had a hemispherical cap and common sails. In 1827, at a mock battle staged by the local garrison, a number of people climbed onto the stage in spite of the warnings of the miller, Mr Longmore. The weight proved too

much for the stage and it gave way causing several injuries. After the mill fell into disrepair about 1848, the owner took to selling beer; on being granted a full licence the public house was built onto the lower floors. The wood panelling behind the bar has a pronounced curve and batter, where the wall of the mill projects into the later building.

**Shirley Windmill, John Ruskin School, Upper Shirley Road, Croydon TQ355651**

The tall brick tower mill has a post mill cap with a fantail and sails restored to represent the patent sails it once possessed. This mill was built in the late 1850s possibly using parts of an older

mill. During restoration work in 1927, the date 1740 was found carved on one of the beams. The mill ceased work about 1900 but successive owners continued to carry out restoration work. In 1952 the site was compulsorily purchased for the building of the John Ruskin School. The windmill was incorporated in the school layout and has continued to receive remedial work.

Inside the mill are four floors, and most of the machinery is intact, including the brake wheel, wallower and upright shaft. The two pairs of stones, one a 53" Derbyshire Peak the other a 55" French burr, are underdriven from a cast iron spur wheel with wooden teeth and cast iron stone nuts.



Plate 2. Upminster Windmill (Photo Martin Salzer, 1963)



**Upminster Windmill, St. Mary's Lane, nr Cranbourne Gardens, Upminster TQ 557868**

An impressive smock mill, with boat-shaped cap, complete with patent sails and a fantail (Plate 2). The mill stands on an octagonal brick base, the brickwork extending up to the loading stage on the first floor. The mill was built in 1803 and originally had a bakery alongside. A steam engine was installed in 1811 to supplement wind power driving two pairs of stones. The mill was badly damaged by a storm in 1927, ending its working life.

In 1960 Essex County Council purchased the surrounding land and demolished the mill house and outbuildings, creating a park. Major repairs, costing £2,000 were carried out in 1962 and in 1965 the mill passed into the hands of the London Borough of Havering. The mill was made safe for visitors and opened to the public in September 1967. The interior of the mill consists of four floors, the top floor, the dust floor, gives a view of the cast iron windshaft and the wood-rimmed brake wheel with cast iron spokes. The third floor, the bin floor, contains the sack hoist which is driven by a secondary shaft from the upright shaft. The

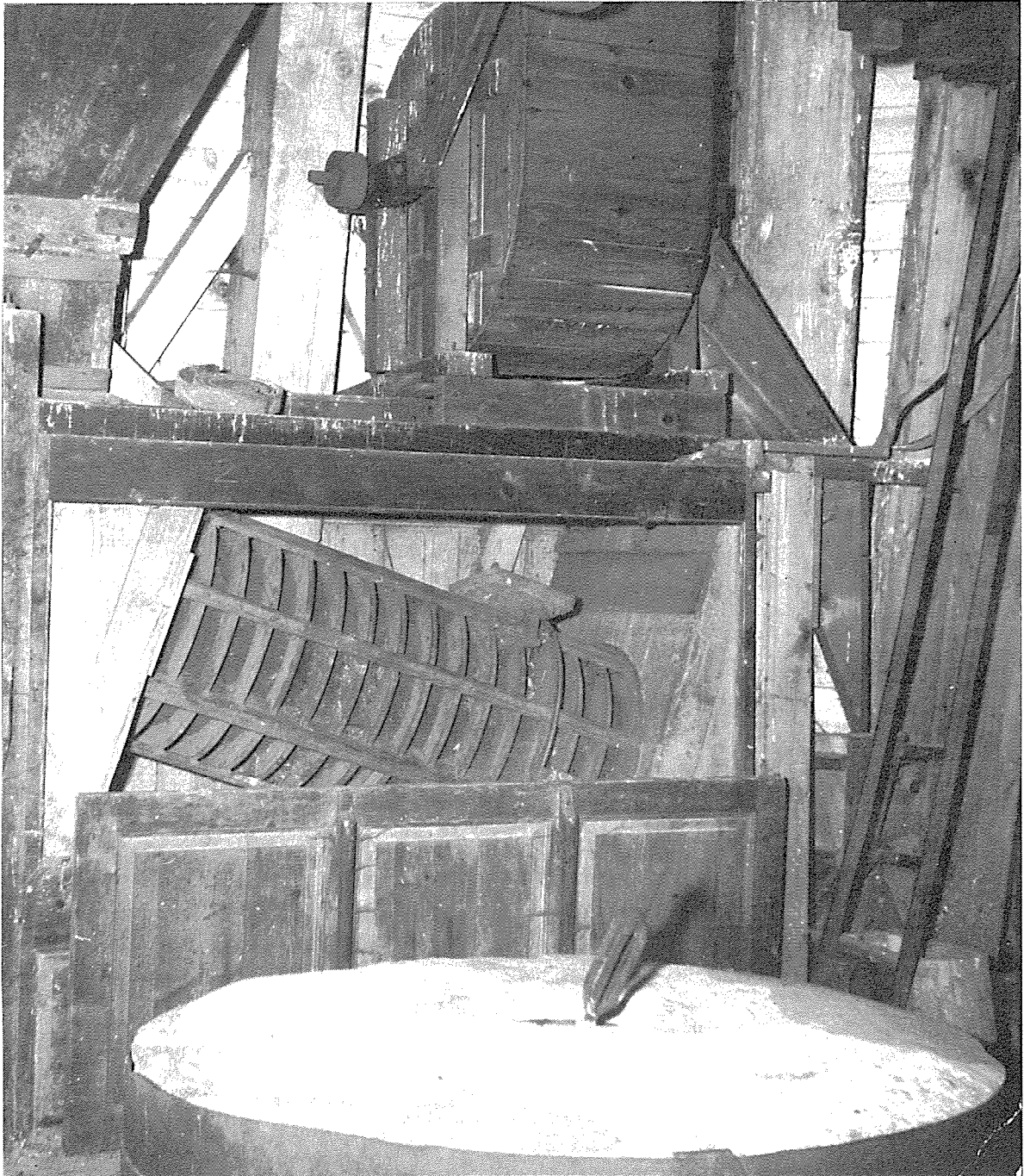


Plate 3. Interior of a mill (Upminster) showing a pair of stones with the vat removed, and a wire dresser in the background (Photo Martin Salzer, 1967)

It was then acquired by Essex County Council in 1937 with the intention of demolishing the mill to provide a development site. The public outcry which arose led to a fund for the preservation of the mill being started. Renovation was delayed by the Second World War and various groups during the 1950s attempted restoration but failed to arrest the continuing decay.

storage bins, from which this floor takes its name, are replacements.

The stone floor contains four pairs of underdriven French burrs and a wire dressing machine (Plate 3). Below on the meal floor can be seen the spur wheel mounted on the upright shaft; the

four gears known as stone nuts which are connected directly to the stones above can be disengaged from the spur wheel by means of jack rings. Each pair of stones has its own centrifugal governor. This floor gives access to the stage enabling the bagged meal to be loaded directly onto carts.

The mill is now in the care of the local authority and is opened to the public by the local history society on occasional weekends during the summer.

#### **Wandsworth Windmill, Windmill Road, Wandsworth, SW18 TQ 268745**

This small hexagonal smock mill was built in 1837, as a pumping mill to provide water for an ornamental lake built on the Common by the founder of Price's candle works, Mr Wilson, and to drain the cutting of the London & Southampton Railway. The mill stopped work when the cutting was widened and the lake drained and filled in. During its working life the mill was fitted with double shuttered patent sails and fantail.

#### **Wimbledon Windmill, Windmill Road, Wimbledon, SW19 TQ230724**

The hollow post mill is mounted on the roof of a two storey octagonal brick building and was built in 1817 by Charles March, a carpenter from Roehampton. One of the millers, a Mr Dann, also held the office of constable, and in September 1840 arrested the Earl of Cardigan and Captain Harvey Tuckett for duelling near the mill. The mill worked until the 1860s and became so derelict over the years that in 1893 the Conservators of the Common launched an appeal to restore it. During this (one of the first attempts to preserve a windmill) the mill was modified considerably leaving a structure of similar appearance. Currently the mill only contains the windshaft and brake wheel while the external features show frames for single-shutter patent sails with leading boards and a fantail driven winding gear.

The mill now contains an excellent small museum of milling and is open to the public at weekends.

### **Glossary**

**Brake wheel:** A large diameter wheel mounted on the windshaft. Teeth on the back face of the wheel mesh with the wallower to transfer the drive from the sails to the machinery of the mill. Around the periphery of this wheel is a sectional contracting brake to enable the miller to bring the mill to rest.

**Common sail:** The earliest form of sail, consisting of a lattice frame upon which is spread canvas sailcloth fitted with pointing lines to enable the sails to be reefed, thus presenting a variable area to the vagaries of the wind. The object of this is to maintain a constant speed at the millstones. A major drawback to common sails is that the mill must be braked for each sail to be brought down in turn to adjust the sailcloth.

**Dust floor:** The floor directly under the cap of a tower or smock mill. The purpose of this floor, as its name implies, is to prevent wind-blown debris that penetrates through the gap between the cap and curb of the mill, from contaminating the grain stored in the bins on the bin floor beneath. In some smaller mills where space is limited, the dust floor is dispensed with.

**Fantail:** A small wooden sail at the rear of the mill, set at 90 degrees to the main sails, and which is connected by gearing to a toothed rack set in the body of the mill. Should the wind

change direction, the fan will revolve and bring the main sails back into the eye of the wind. The fantail was invented by Edmund Lee in 1745.

**Flour dresser:** A machine containing a sloping cylinder covered with either cloth or wire mesh (Plate 3). The meal is passed through and is separated into various grades, the bran being discharged at the far end.

**Governor:** A centrifugal device to enable the gap between the stones to remain constant. Contrary to common belief, the governor was not invented by James Watt in 1788, but had been in use in windmills for many years. It should be noted that the governor does not control the speed of the mill, as in the steam engine. It is connected through a lever system to the runner stone in the pair and controls the size of the meal. An increase in wind speed causes the stone to ride up on the grain, increasing the gap between the stones and coarsening the meal. With this increase in speed the bob weights on the governor fly out and lower the runner stone.

**Great spur wheel:** At the lower end of the upright shaft is the great spur wheel. Power is transferred from this wheel to the stone via the stone nuts. In an underdrift mill the spur wheel is below the stone floor and the drive to the runner stone is up through the bed stone. In an overdrift mill, the spur wheel is at ceiling height above the stones and drives down via the stone nuts, which are mounted on square section spindles known as quants. The quants are forked at their lower ends and sit over the bar set across the eye of the runner stone.

**Jack ring:** A metal ring in contact with the underside of the stone nut. It is fitted with a threaded rod and handle. Turning the handle causes the ring to rise, pushing the stone nut out of mesh with the great spur wheel. The stone nut is mounted on a square section spindle, to which the drive can be transferred from the spur wheel and to the runner stone. The stone nut is disengaged only when the mill is at rest. The jack ring is used on under-driven mills.

**Leading boards:** Narrow boards fixed to the leading edge of sails, to direct the airflow onto the sails. The leading boards are often set up a few degrees with wedges under the leading edge to create a wind-gathering effect.

**Middlings:** A Southern term for stocks, large section timbers that pass through the poll end of the windshaft, at 90 degrees to each other and carry the sails.

**Patent sails:** Introduced by William Cubitt in 1807, the sails consist of a frame containing a number of pivoting shutters. Each shutter is fitted with a crank that connects it to a shutter bar, running the length of the sail. The shutter bars are connected at their inner ends to a metal cross by bellcranks and rods. The metal cross, known as the spider, is mounted on a rod running through the hollow windshaft. At the rear of the mill the rod is fitted with a rack that engages with a pinion on a shaft. On the end of the shaft is a wheel over which is hung an endless chain reaching down to the ground. Pulling on either side of the chain causes the shutters to open or close.

Weights are hung on the chain to hold the shutters closed. Should a gust of wind strike the sails, the shutters will open against the resistance of the weights. The shutters will be pulled back to their closed position when the gust subsides. The patent sail, being self-regulating, had a distinct advantage over the

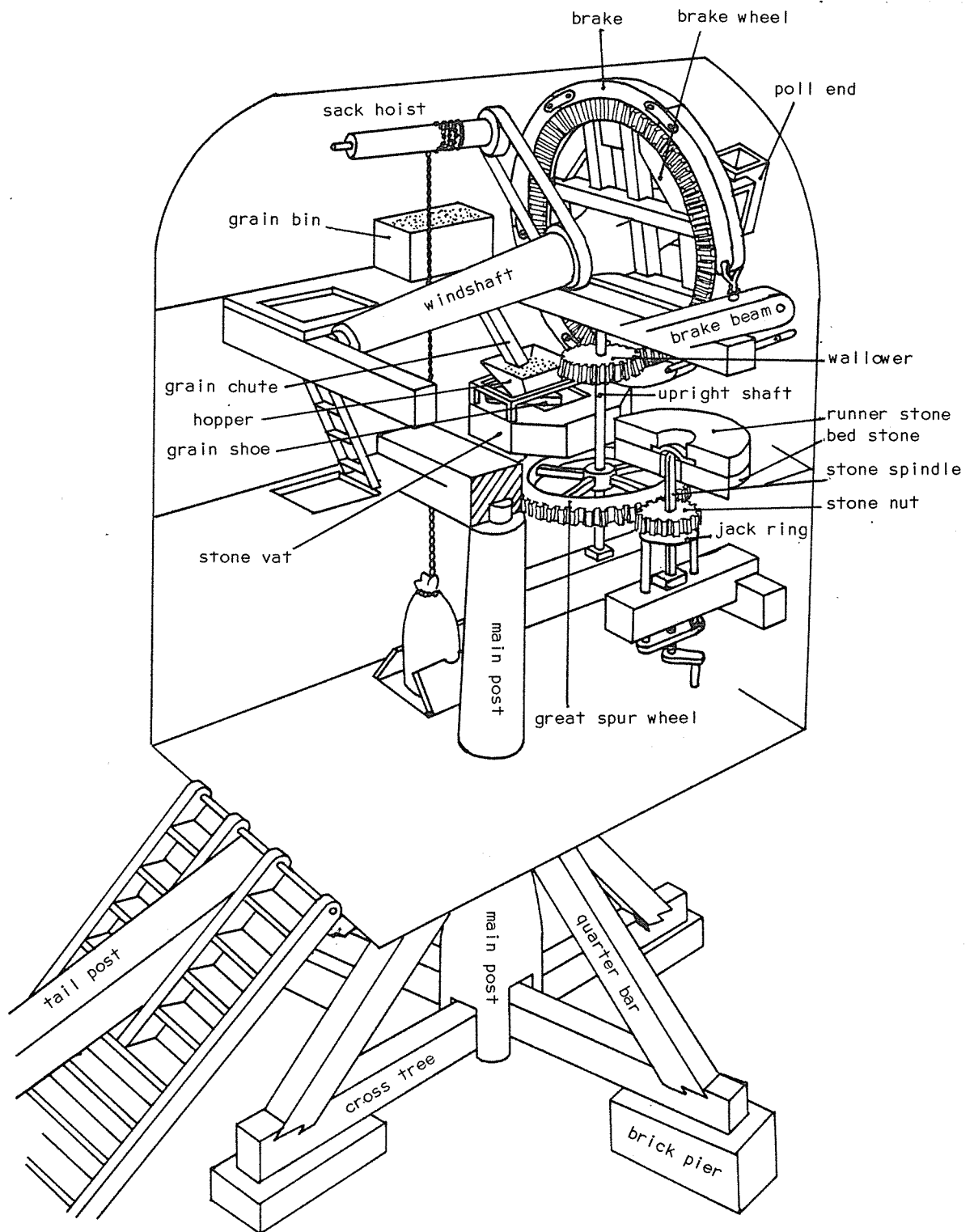


Fig. 2. Working parts of a typical post mill

inconvenience of the common sail. However, a disadvantage of the patent sail was that, being constructed of a number of parts, it was not as aerodynamically efficient as the common sail, thus many millers worked with a combination of two common and two patent sails.

**Poll end:** Also known as the canister; a double box on the outer end of a cast iron windshaft to retain the stocks. Originally when windshafts were constructed completely of wood, the stocks were mortised through a massive square section on the end of the windshaft.

**Roundhouse:** A brick or stone structure built round the trestle of a post mill, introduced in the 18th century. The roundhouse protected the trestle from the elements and provided additional storage space. Above the roundhouse is a sloping roof terminating close under the body of the mill. As a general rule the roundhouse does not bear any of the mill's weight.

**Sack hoist:** The device that enables grain to be brought to the top of the mill. Most types consist of a chain that passes down through a series of trapdoors to the ground floor. The chain is fed round a horizontal wooden drum at the end of which is a

wooden disc; the disc can be brought into contact with some revolving part of the mill, usually the underside of the wallower. The friction drive is controlled by the miller pulling on a rope which passes down through the mill; thus the miller can work the hoist from any floor in the mill. The process is made easier if the miller has an assistant to loop the chain round the neck of the sacks on the ground floor. The miller can then work from the bin floor and tip the grain into storage bins. The trapdoors open upwards and fall shut after the sack has passed through. The chain will unwind by gravity when the drive is disengaged, the end of the chain passing through a hole in the centre of the doors.

**Shutters:** Rectangular panels fitted in the frame of a patent sail (See patent sails).

**Stocks:** See middlings.

**Stones:** The stones in a mill are in pairs, four feet in diameter on average. The lower of the pair, known as the bed stone, is set in the floor of the mill; this floor being called the stone floor. The underside of the bed stone is visible from the meal floor below. Over the bed stone is the runner stone, this being the driven stone (Plate 3). The runner stone does not make contact with the bed stone but is supported on the stone spindle that passes down through a dust-tight bearing in the bed stone. The gap at the outer edge of a pair of stones is approximately  $\frac{2}{1,000}$ ths of an inch. Two of the most popular types of stone used in milling are the French burr and the Derbyshire Peak. The French burr is a freshwater quartz quarried in the Paris basin. The pieces are not large enough to make a complete stone, so are cemented together in sections and bound with metal rings. This is the hardest form of stone and is preferred for milling flour. The Peaks are quarried at Hathersage from millstone grit and are made in one piece. Being softer than French burrs they are used for grinding animal feed.

**Stone nuts:** Gears that transfer drive from the great spur wheel to the stones. Provision is made to disengage the stone nuts from the spur wheel, should a pair of stones not be required.

**Stone vat:** A wooden cover over the stones also known as a 'tun'.

**Striking gear:** The mechanism for opening and closing the shutters on patent sails. (See patent sails).

**Sweeps:** A Kentish term for sails.

**Wallower:** The gear wheel mounted at the top of the upright shaft. It is driven by the brake wheel. The brake wheel and wallower are set at approximately 85 degrees to each other, transferring the drive from horizontal at the windshaft to vertical at the upright shaft; they are therefore bevel gears.

**Windshaft:** Set at approximately 5 degrees to the horizontal, the windshaft carries the sails and the brake wheel. With the introduction of cast iron into mills by John Smeaton in 1754, the wooden shafts had cast iron poll ends spliced on when the outer ends became rotten. Most windmills now have complete iron windshafts.

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Several of the books mentioned above have been out of print for some time and may only be obtained through a library or by good fortune in a second hand bookshop.