

# Spinning wheel

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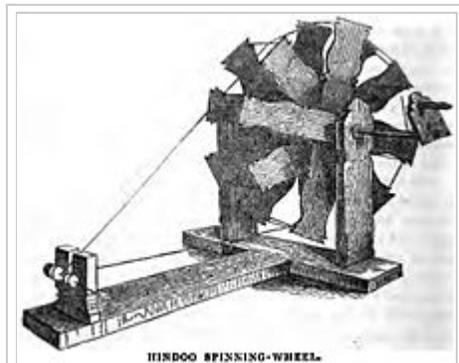
A **spinning wheel** is a device for spinning thread or yarn from natural or synthetic fibres. Spinning wheels were first used in India, between 500 and 1000 C.E.<sup>[2]</sup> Spinning machinery, such as the spinning jenny and spinning frame, displaced the spinning wheel during the Industrial Revolution.

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Irish spinning wheel - around 1900  
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Hindoo Spinning-Wheel (1852)<sup>[1]</sup>

## History

The spinning wheel was invented in India, between 500 and 1000 C.E.<sup>[4]</sup> The earliest clear illustrations of the spinning wheel come from Baghdad (drawn in 1234),<sup>[5]</sup> China (c. 1270) and Europe (c. 1280), and there is evidence that spinning wheels had already come into use in both China<sup>[a]</sup> and the Islamic world during the eleventh century.<sup>[6]</sup> In France the spindle and distaff were not displaced until the mid 18th century.<sup>[7]</sup>



Scene from *Al-Maqamat*, painted by al-Wasiti 1237

The spinning wheel replaced the earlier method of hand spinning with a spindle. The first stage in mechanizing the process was mounting the spindle horizontally so it could be rotated by a cord encircling a large, hand-driven wheel. The great wheel is an example of this type, where the fibre is held in the left hand and the



Detail of *The Spinning Wheel*, by Chinese artist Wang Juzheng, Northern Song Dynasty (960–1279)<sup>[3]</sup>

wheel slowly turned with the right. Holding the fibre at a slight angle to the spindle produced the necessary twist.<sup>[8]</sup> The spun yarn was then wound onto the spindle by moving it so as to form a right angle with the spindle. This type of wheel, while known in Europe by the 14th century, was not in general use until later. The construction of the Great Wheel made it very good at

creating long drawn soft fuzzy wools, but very difficult to create the strong smooth yarns needed to create warp for weaving.<sup>[9]</sup> Spinning wheels ultimately did not develop the capability to spin a variety of yarns until the beginning of the 19th century and the mechanization of spinning.

In general, the spinning technology was known for a long time before being adopted by the majority of people, thus making it hard to fix dates of the improvements. In 1533, a citizen of Brunswick is said to have added a treadle, by which the spinner could rotate her spindle with one foot and have both hands free to spin. Leonardo da Vinci drew a picture of the flyer, which twists the yarn before winding it onto the spindle. During the 16th century a treadle wheel with flyer was in common use, and gained such names as the Saxony wheel and the flax wheel. It sped up production, as one needn't stop spinning to wind up the yarn.

On the eve of the Industrial revolution it took at least five spinners to supply one weaver. Lewis Paul and John Wyatt first worked on the problem in 1738, patenting the Roller Spinning machine and the flyer-and-bobbin system, for drawing wool to a more even thickness. Using two sets of rollers that travelled at different speeds, yarn could be twisted and spun quickly and efficiently. However, they did not have much financial success. In 1771, Richard Arkwright used waterwheels to power looms for the production of cotton cloth, his invention becoming known as the water frame.



Elder citizen of Suwałki region, Poland - Mrs. Skindzierz-Jakubowska (82) at the spinning wheel, 1976<sup>[10]</sup>

More modern spinning machines use a mechanical means to rotate the spindle, as well as an automatic method to draw out fibres, and devices to work many spindles together at speeds previously unattainable.<sup>[11]</sup> Newer technologies that offer even faster yarn production include

friction spinning, an open-end system, and air jets.<sup>[12]</sup>

## Types

Numerous types of spinning wheels exist, including the *great wheel* also known as *walking wheel* or *wool wheel* for rapid long draw spinning of woolen-spun yarns; the *flax wheel*, which is a double-drive wheel used with a distaff for spinning linen; *saxony* and *upright* wheels, all-purpose treadle driven wheels used to spin both woolen and worsted-spun yarns; and the *charkha*, native to Asia. Until the acceptance of rotor spinning wheel, all yarns were produced by aligning fibres through drawing techniques and then twisting the fiber together. With rotor spinning, the fibers in the roving are separated, thus opened, and then wrapped and twisted as the yarn is drawn out of the rotor cup.

## Charkha

The tabletop or floor charkha is one of the oldest known forms of the spinning wheel. The charkha works similarly to the great wheel, with a drive wheel being turned by hand, while the yarn is spun off the tip of the spindle. The floor charkha and the great wheel closely resemble each other. With both, the spinning must stop in order to wind the yarn onto the spindle.

The word *charkha* which has links with Persian چرخ: charKh, wheel, is related to the word "circle" (rather like "church" is to "kirk"). The charkha was both a tool and a symbol of the Indian independence movement. The charkha, a small, portable, hand-cranked wheel, is ideal for spinning cotton and other fine, short-staple fibres, though it can be used to spin other fibers as well. The size varies, from that of a hardbound novel to the size of a briefcase, to a floor charkha. Mahatma Gandhi brought the charkha into wider use with his teachings. He hoped the



Woman spinning with a wheel, from the Elizabethan era, early 17th century



A depiction of spinning by Diego Rodríguez de Silva y Velázquez, 1644-1648



A woman spinning with a Charkha in MG Road Boulevard, Bangalore

charkha would assist the people of India achieve self-sufficiency and independence, and therefore used the charkha as a symbol of the Indian independence movement and included it on earlier versions of the Flag of India.<sup>[13]</sup>

## Great wheel

The great wheel was one of the earlier types of spinning wheel. The fiber is held in the left hand and the wheel slowly turned with the right. This wheel is thus good for using the long-draw spinning technique, which requires only one active hand most of the time, thus freeing a hand to turn the wheel. The great wheel is usually used to spin short-staple fibers (this includes both cotton and wool), and can only be used with fibre preparations that are suited to long-draw spinning.



Modified and portable compact Charkha



2Spinning wool on a great wheel at a demonstration in the Conner Prairie living history museum loom house

The great wheel is usually over 5 feet (1.5 m) in height. The large drive wheel turns the much smaller spindle assembly, with the spindle revolving many times for each turn of the drive wheel. The yarn is spun at an angle off the tip of the spindle, and is then stored on the spindle. To begin spinning on a great wheel, first a leader (a length of waste yarn) is tied onto the base of the spindle and spiraled up to the tip. Then the spinner overlaps a handful of fiber with the leader, holding both gently together with the left hand, and begins to slowly turn the drive wheel clockwise with the right hand, while simultaneously walking backward and drawing the fibre in the left hand away from the spindle at an angle. The left hand must control the tension on the wool to produce an even result. Once a sufficient amount of yarn has been made, the spinner turns the wheel backward a short distance to unwind the spiral on the spindle, then turns it clockwise again, and winds the newly made yarn onto the spindle, finishing the wind-on by spiralling back out to the tip again to make another draw.

## Treadle wheel

This type of wheel is powered by the spinner's foot rather than their hand or a motor. The spinner sits and pumps a foot treadle that turns the drive wheel via a crankshaft and a connecting rod.

This leaves both hands free for drafting the fibres, which is necessary in the short draw spinning technique, which is often used on this type of wheel. The old-fashioned pointed driven spindle is not a common feature of the treadle wheel. Instead, most modern wheels employ a flyer-and-bobbin system which twists the yarn and winds it onto a spool simultaneously. These wheels can be single- or double-treadle; which is a matter of preference and does not affect the operation of the wheel.

## Double drive



A double drive wheel

The double drive wheel is named after its drive band, which goes around the spinning wheel twice. The drive band turns the flyer, which is the horse-shoe shaped piece of wood surrounding the bobbin, as well as the bobbin. Due to a difference in the size of the whorls (the round pieces or pulleys around

which the drive band runs) the bobbin whorl, which has a smaller radius than the flyer whorl, turns slightly faster. Thus both the flyer and bobbin rotate to twist the yarn, and the difference in speed continually winds the yarn onto the bobbin. Generally the speed difference or "ratio" is adjusted by the size of the whorls and the tension of the drive band.

The drive band on the double drive wheel is generally made from a non-stretch yarn or twine; candlewick is also used.

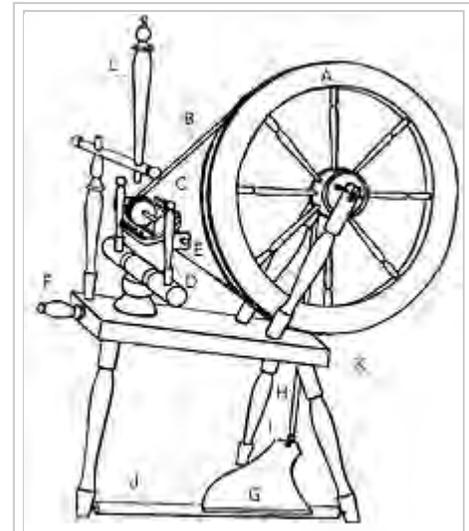
### Single drive

A single drive wheel has one drive band that goes around both the flywheel and the flyer, and a short tension band which goes only over the bobbin. The tension band adds an adjustable amount of drag to the bobbin and thereby increases the yarn take up force.

If the tension band were extremely tight and the bobbin could not rotate at all, yarn would be taken up onto the bobbin by the rotation of the flyer constantly at a rate of one wrap per revolution of the flyer. In practice, the tension is set such that the bobbin can slip, but with some drag, generating the differential rate of rotation between the flyer and the bobbin. This drag is the force which winds new yarn onto the bobbin.

While the spinner is making new yarn, the bobbin and the flyer turn in unison, driven by the single drive band. When the spinner feeds the yarn onto the bobbin, the drag on the flyer slows it and thus the yarn winds on. The tighter the tension band is, the more pull on the yarn, because the more friction the bobbin has to overcome to turn in sync with the flyer.

### Castle style



Parts of a treadle wheel: A - Wheel, B - Drive band, C - Flyer assembly, D - Maiden, E - Bearings, F - Tension Screw, G - Treadle, H - Footman, I - Treadle connection, J - Treadle bar, K - Table, L - Distaff



A single-drive wheel with the drive band around flyer and brake on the bobbin

When the spindle and flyer are located above the wheel, rather than off to one side, the wheel is said to be a castle wheel. This type of wheel is often more compact, thus easier to store. Some castle wheels are even made to fold up small enough that they fit in carry-on luggage at the airport.

### **Electric spinning wheel**

Electric spinning wheels or e-spinners are powered by an electric motor rather than via a treadle. Some require mains power while others may be powered by a low-voltage source, such as a rechargeable battery. Most e-spinners are small and portable.

One of the attractions of an e-spinner is that it is not necessary to coordinate treading with handling the fiber (drafting), so it is generally easier to learn to spin on an e-spinner than a traditional treadle-style spinning wheel. E-spinners are also suitable for spinners who have trouble treading for various reasons.

E-spinners represent an evolution of the tools used in the craft of handspinning, similar to what has occurred in sewing, quilting, woodworking, and other crafts.

## **Importance**

The spinning wheel increased the productivity of thread making by a factor of greater than 10. Medieval historian Lynn White credited the spinning wheel with increasing the supply of rags, which led to cheap paper, which was a factor in the development of printing.<sup>[14]</sup>

## **Culture**

The ubiquity of the spinning wheel has led to its inclusion in the art, literature and other expressions of numerous cultures around the world, and in the case of South Asia it has become a powerful political symbol.

### **Political Symbolism**

Starting in 1931, the traditional spinning wheel became the primary symbol on the flag of the Provisional Government of Free India.

Mahatma Gandhi's manner of dress and commitment to hand spinning were essential elements of his philosophy and politics. He chose the traditional loincloth as a rejection of Western culture and a symbolic identification with the poor of India. His personal choice became a powerful political gesture as he urged his more privileged followers to copy his example and discard—or even burn—their European-style clothing and return with pride to their ancient, precolonial culture. Gandhi claimed that spinning thread in the traditional manner also had material advantages, as it would create the basis for economic independence and the possibility of survival for India's impoverished rural areas. This commitment to traditional cloth making was also part of a larger swadeshi movement, which aimed for the boycott of all British goods. As Gandhi explained to Charlie Chaplin in 1931, the return to spinning did not mean a rejection of all modern technology but of the exploitative and controlling economic and political system in which textile manufacture had become entangled. Gandhi said, "Machinery in the

past has made us dependent on England, and the only way we can rid ourselves of the dependence is to boycott all goods made by machinery. This is why we have made it the patriotic duty of every Indian to spin his own cotton and weave his own cloth."



Mahatma Gandhi spinning yarn on a charkha.

## Literature and folk tales

*The Golden Spinning Wheel* (*Zlatý kolovrat*)<sup>[15][16]</sup> is a Czech poem by Karel Jaromír Erben that was included in his classic collection of folk ballads, *Kytice*.

*Rumpelstiltskin*, one of the tales collected by the Brothers Grimm, revolves around a woman who is imprisoned under threat of execution unless she can spin

straw into gold. *Rumpelstiltskin* helps her with this task, ultimately at the cost of her first-born child; however, she makes a new bargain with him and is able to keep her child after successfully guessing his name.

Another folk tale that incorporates spinning wheels is the classic fairy tale *Sleeping Beauty*, in which the main character pricks her hand or finger on the poisoned spindle of a spinning wheel and falls into a deep sleep following a wicked fairy or witch's curse. Numerous variations of the tale exist (the Brothers Grimm had one in their collection entitled *Little Briar Rose*), and in only some of them is the spindle actually attached to/associated with a spinning wheel.

Perhaps surprisingly, a traditional spindle does not have a sharp end that could prick a person's finger (unlike the walking wheel, often used for wool spinning). Despite this, the narrative idea persists that *Sleeping Beauty* or *Briar Rose* or *Dornrosen* pricks her finger on the spindle—a device which she has never seen before, as they have been banned from the kingdom in a forlorn attempt to prevent the curse of the wicked godmother-fairy.

Walt Disney included the Saxony or flax wheel in their animated film version of Perrault's tale and *Rose* pricks her finger on the distaff (which holds the plant fiber waiting to be spun). Whereas only a spindle is used in Tchaikovsky's ballet *The Sleeping Beauty* which is closer to the direct translation of the French "un fuseau".<sup>[17]</sup> Spinning wheels are also integral to the plot or characterization in the Scottish folk tale *Habitrot*<sup>[18]</sup> and the German tales *The Three Spinners*.<sup>[19]</sup> and *The Twelve Huntsmen*<sup>[20]</sup>

Louisa May Alcott, most famous as the author of *Little Women*, wrote a collection of short stories called *Spinning-Wheel Stories*,<sup>[21]</sup> which were not about spinning wheels but instead meant to be read while engaging in the rather tedious act of using a spinning wheel.



St. Elisabeth of Hungary spinning for the poor, a depiction of the castle style spinning wheel in art. Note also the distaff used to hold the fiber.

## Music

### Classical and symphonic

In 1814, Franz Schubert composed "Gretchen am Spinnrade", a lied for piano and voice based on a poem from Goethe's *Faust*. the piano part depicts Gretchen's restlessness as she spins on a spinning wheel while waiting by a window for her love to return.<sup>[22]</sup>

Antonín Dvořák composed *The Golden Spinning Wheel*, a symphonic poem based on the folk ballad from *Kytice* by Karel Jaromír Erben.

Camille Saint-Saëns wrote *Le Rouet d'Omphale (Omphale's Spinning Wheel)*, symphonic poem in A major, Op. 31, a musical treatment of the classical story of Omphale and Heracles.<sup>[23]</sup>

A favorite piano work for students is Albert Ellmenreich's *Spinnleidchen (Spinning Song)*, from his 1863 *Musikalische Genrebilder*, Op. 14.<sup>[24]</sup> An ostinato of repeating melodic fifths represents the spinning wheel.

### Folk and ballad

*The Spinning Wheel* is also the title/subject of a classic Irish folk song by John Francis Waller.<sup>[25][26]</sup>

A traditional Irish folk song, *Túirne Mháire*, is generally sung in praise of the spinning wheel, but was regarded by Mrs Costelloe, who collected it,<sup>[27]</sup> as "much corrupted", and may have had a darker narrative. It is widely taught in junior schools in Ireland.<sup>[28]</sup>

*Sun Charkhe Di Mithi Mithi Kook* is a Sufi song in the Punjabi language inspired by the traditional spinning wheel.

### Opera

Spinning wheels also feature prominently in the Wagner opera *The Flying Dutchman*; the second act begins with local girls sitting at their wheels and singing about the act of spinning.

### Art

Spinning wheels may be found as motifs in art around the world, ranging from their status as domestic/utilitarian items to their more symbolic role (such as in India, where they may have political implications).

## See also

- Ashoka Chakra
- Spinners weasel
- Spinning (textiles)

- Spinning jenny

## Footnotes

- According to Mark Elvin, 14th-century Chinese technical manuals describe an automatic water-powered spinning wheel. Comparable devices were not developed in Europe until the 18th century. However, it fell into disuse when fiber production shifted from hemp to cotton. It was forgotten by the 17th century. The decline of the automatic spinning wheel in China is an important part of Elvin's high level equilibrium trap theory to explain why there was no indigenous industrial revolution in China despite its high levels of wealth and scientific knowledge.

## Notes

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## External links

- Demonstration of spinning wheel (https://www.youtube.com/watch?v=xY5YWre-op0) (Video)
- Demonstration of spinning wheel (https://www.youtube.com/watch?v=dTrAVk2qKC8) (video)
- Free detailed plan for making wooden spinning wheel (http://www.craftsmanspace.com/free-projects/spinning-wheel-plan.html)
- Info on hand spinning wheels (http://www.joyofhandspinning.com/)

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