

SPINNING, the art of combining animal or vegetable fibres into threads or cords, by twisting them together, as wool, silk, cotton, flax, hemp, &c. The machines employed for spinning are of very different kinds, and adapted to the materials to be operated upon. The most ancient mode of spinning was by the spindle and distaff, and this method is the simplest of all others. This was succeeded by the spinning wheel, which is used both for wool and flax, and too well known to need a description. A very considerable improvement was made by Mr. Antis, of Fulneck near Leeds on the common spinning wheel. It is well known that much time had previously been lost by stopping the wheel in order to shift the thread from one staple on the flyer to another; but in Mr. Antis's wheel the bobbin is made to move backwards and forwards, so as to prevent the necessity of this perpetual interruption, as well as to obviate the danger of breaking the thread and losing the end. This is effected by the axis of the great wheel being extended through the pillar next the spinner, and formed into a pinion of one leaf, which takes into a wheel, seven inches diameter, having on its periphery ninety-seven teeth; so that ninety-seven revolutions of the great wheel cause one of the lesser wheel. On this lesser wheel is fixed a ring of wire, which, being supported on six legs, stands obliquely to the wheel itself, touching it at one part, and projecting nearly three quarters of an inch at the opposite one: near the side of this wheel is an upright lever about fifteen inches long, moving on a centre, three inches from its lower extremity, and connected at the top to a sliding bar; from which rises an upright piece of brass, which working in the notch of a pulley drives the bobbin backward and forward, according as the oblique wire forces a pin in or out, as the wheel moves round. To regulate and assist the alternate motion, a weight hangs by a line to the sliding bar, and passing over a pulley rises and falls as the bobbin advances or recedes, and tends constantly to keep the pin in contact with the wire. It is evident, from this description, that one staple only is wanted to the flyer; which, being placed near the extremity, the thread passing through it is by the motion of the bobbin laid regularly thereon. For this invention the society instituted at London for the encouragement of arts, &c. gave the author a premium of twenty guineas.

It was not until the latter end of the last century, that spinning machines of greater powers were constructed; but all threads were spun by one of the machines to which we have alluded. The first improvement of any importance in spinning, was that of the spinning-jenny, invented by Hargraves. This machine consists of a number of spindles, similar to those of the one-thread wheel, which are all mounted in a perpendicular direction in the same frame, and turned round by one large wheel, situate in an horizontal direction, and put in motion by a crank at the upper end of its spindle. The threads are guided between two rulers of wood, called the clasps, instead of the finger and thumb of the spinner. These rulers are made to fit together, so as to hold the fibres between them, and are fitted up with wheels at the end to run upon the frame, and thus advance or retreat at pleasure from the spindles. It was not attempted with this machine to spin a finished thread immediately from the lock of wool or cotton, but coarse and loose threads are previously prepared on the hand-wheel, which can be done with great rapidity, and the coppins or balls of these loose threads are placed in the jenny, and conducted, first between the clasps or rulers before mentioned, and then to the spindles. By this means,

when the carriage of the clasps is drawn backwards from the spindles, the clasps being separate, the threads draw between them from off the coppins, and at the same time that portion of each thread which is between the clasps and the ends of the spindles, receives its twist; but having drawn out a certain length of each thread in this manner, the clasps are shut together; and the motion of the spindles, as also the retreat of the clasps, is continued, by which means the threads are stretched out to their intended fineness, and being thus finished, the threads are wound upon the spindles, by being brought opposite to the middle part of the spindles by a rail of wood, called the faller, which moves upon centres, so as to descend horizontally before all the spindles, and depress all the threads together, so that they will wind up by the motion of the spindles, and as they wind, the clasps return towards the spindles. The next improvement in spinning-machines was the introduction of the slubbing-machine, or billy, for preparing the rovings for the jenny; an operation which was at first performed by the hand-wheel. This machine has similar parts to the jenny, but they are differently arranged, to adapt it to spin the wool as it comes from the carding machine, in the state of cardings, which are locks of wool drawn out to about the size of candles, and from two to three feet in length. The inventions of Sir Richard Arkwright soon superseded these machines. See ARKWRIGHT. See also COTTON MANUFACTURE. His principal invention in the spinning was the introduction of the rollers, to draw out or extend the fibres to their full length, which is by this means much more perfectly performed than by the fingers of the spinner. For the immediate twisting of the thread, he adopted the spindle, bobbin, and flyer of the old flax wheel, placed in a vertical position, but added to it the important improvement of raising and lowering the bobbin, to distribute the thread regularly and equally upon all the length of it, the same which we have before described as being applied by Mr. Antis to the common spinning-wheel.

The great success which attended the spinning of cotton by these machines, induced many persons to attempt the spinning of flax and wool by similar means. Short wool, for the manufacture of cloth, is spun by the billy and jenny; but flax and long wool for worsted require very different treatment from cotton and short wool, particularly the flax, owing to the great length of the fibres, and to their being of such irregular lengths; in consequence, when they are extended by the rollers, on Arkwright's principle, some fibres will be broken, if the distances between the rollers is too small; and on the other hand, if the distance is too great, the fibres will not be properly extended. The latter, however, is the least evil of the two, and, in consequence, the spinning-frames for flax have the rollers, between which the extension or drawing out is effected, placed at a distance of from fourteen to eighteen inches between the first two pair of rollers, through which the flax passes; the next two pair six or eight inches; after which it is passed between the third pair of rollers at a distance of five or six inches, and then delivered to the spindles, which are similar to those of the water-frame, but placed in an inclined position. The rollers are made in a very different manner from those for cotton, being only narrow wheels just wide enough to receive the fibres of flax between them; and the fibres are prevented from getting out sideways by small tin spouts, through which the flax passes, as the rollers draw it forwards. The reason of this is, that the flinty surface of the flax would soon wear a hollow part round a plain roller, which would then let the flax slip through; but the narrow wheel

wears down equally over the whole breadth of its edges. The lower pair of these rollers, or wheels, revolves in a small trough of water, in the same manner as a grindstone, and thus keeps the flax constantly wet, which is necessary, in order to soften the fibres, and make them spin into a firm and smooth thread. Worsted is also spun in a frame resembling the water frame of Arkwright, from which it only differs in the relative distances of the rollers by which the drawing out or extending of the fibres is effected.