

HOUSEHOLD SPINNING-WHEELS AND THE FIRST SPINNING MACHINE.

(From 'Dr. Ure on the Cotton Manufacture.')



[The Jersey Wheel.—A and B are the hand-cards and bobbins of rovings.]

Two kinds of household wheels have been used by spinsters, probably from time immemorial; the first is commonly called in this country the big wheel, from the magnitude of its rim, or the wool-wheel, from its being employed in the spinning of sheep's wool; it is represented in the figure. It was equally well adapted to spin cotton, from the analogous form of its filaments, which it did at two independent operations. At the first, the spongy cylinder turned off from the hand-card was drawn out and slightly twisted into a porous cord, called a roving; at the second, this cord was stretched and twisted into a fine cohesive thread; in either case the spinster, having fixed round the spindle the extremity of the carding or roving, seized it a few inches from the end with the finger and thumb of the left hand, and while she turned round the wheel with the right, so as to make the spindle revolve, she progressively extended the cotton cord by drawing her hand from near the spindle to the position in which it is placed in the figure. She now completed the torsion by turning the wheel till the thread had acquired the desired degree of twist, and then, by a slow counter-rotation of the wheel, and proper giving-in of the left hand, she wound up the thread upon the spindle into a conical shape, called a pirn or a cop. This is the ancient spinning implement of Hindostan. The first mechanical invention regularly employed with profit upon a manufacturing scale for spinning cotton in England was constructed upon this principle; several spindles, at first eight, afterwards eighty, being made

to whirl by one fly-wheel, while a moveable frame, representing so many fingers and thumbs as there were



[A Hindoo Woman spinning cotton yarn on the primitive wheel of India.]

threads, alternately receded from the spindles during the extension of the thread, and approached to them in its winding-on.

This multiplying wheel, called a spinning jenny, was invented by James Hargreaves, about the year 1764, at Stand Hill, near Blackburn, in Lancashire. He was by trade a weaver, and, being aware of the jealousy

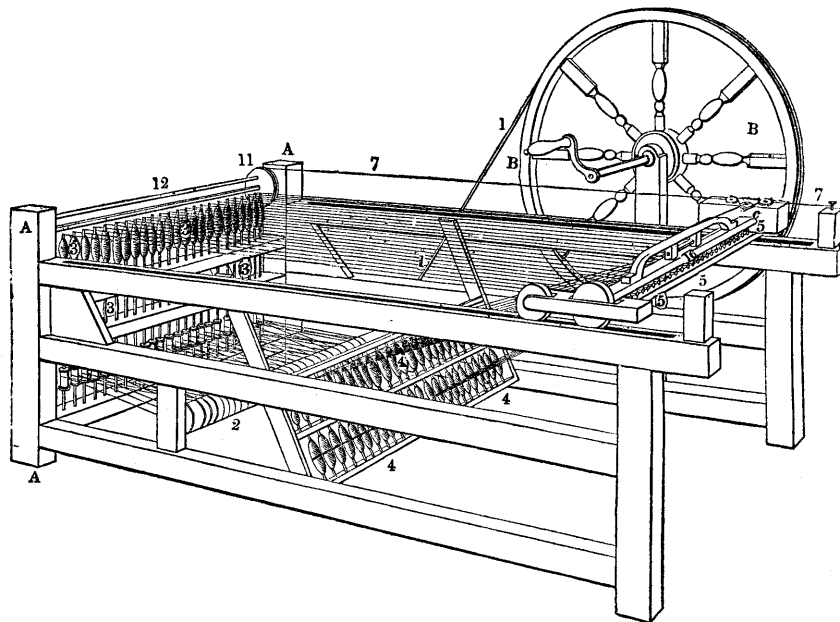
and ill-will likely to be directed against the author of any mechanical substitute for hand labour by his narrow-minded neighbours, he worked in secret, without the aid of any capitalist, under the disadvantages of poverty, and a family of seven children. Before the year 1768 he had, however, mounted and sold several of his jennies. The spindle in the spinster's wheel was always horizontal, but the spindles in Hargreaves' machine were upright, or very slightly inclined from the perpendicular—a position, in fact, essential to its due operation—one which was suggested to him, *it is said*, by observing a common wheel continue to revolve after it was accidentally thrown down on the floor with its spindle turned up.

Hargreaves contented himself, for some time after making the jenny, with spinning weft, with the assistance of his wife and children, for supplying his own loom, according to the custom of the weavers of that period, who received their warp from the wholesale manufacturers. The secret at length transpired, through an indiscretion of female vanity, and excited such a tumult among the spinsters, and their partisans, of the neighbourhood, that they broke into his house in a riotous manner, and destroyed the hated rival of their fingers. Finding the fruit of his ingenuity, toil, and privations blasted, and his further prosecution of the plan impossible amidst an enraged populace, who even threatened his life, he migrated to Nottingham in 1768, where he found in Mr. Thomas James, a joiner, a partner willing and able to assist him in erecting a small spinning-mill upon the jenny plan. For this invention he obtained a patent in the year 1770, under the following title: "For a method of making a wheel or engine of an entire new construction, and never before made use of, in order for spinning, drawing, and twisting of cotton, and to be managed by one person only, and that the wheel, or engine, will spin, draw, and twist sixteen or more threads at one time, by a turn or motion of one hand, and a draw of the other." "One

person," says he, in the specification, "with his or her right hand turns the wheel, and with the left hand takes hold of the clasps, and therewith draws out the cotton from the slubbing (roving) box; and, being twisted by the turn of the wheel in the drawing out, then a piece of wood is lifted up by the toe, which lets down a presser wire, so as to press the threads so drawn out and twisted, in order to wind or put the same regularly upon bobbins which are placed upon the spindles."

Unfortunately for this inventor he had, under the pressure of poverty, mounted and sold several jennies before the date of his patent; so that when they were beginning to be rightly appreciated, and were promising to procure him a recompense somewhat proportioned to his deserts, he found, while his invention was extensively pirated by the manufacturers of Lancashire, that it could not be sustained in a court of law. In an evil hour also he refused to accept the sum of 3000*l.*, which the delegates of these manufacturers tendered to him for permission to use his machine; he demanded a somewhat larger sum, which was refused, and eventually he got nothing, his attorney having abandoned the prosecution from a conviction that a favourable judgment would not be obtained in a court of law. Hargreaves died in 1778, a few years after this disappointment, but he did not fall a victim to poverty, as some have erroneously stated. The spinning factory of which he was a partner went on tolerably well, and enabled its author to live in humble comfort at least, and to leave a decent provision for his widow and children.

The jenny received some slight improvements, first from Hargreaves, and afterwards from other mechanics; but in fact it is too simple a scheme of spinning to afford much scope for modifications. Crompton, the celebrated inventor of the mule, learned to spin upon one of the original jennies so early as the year 1769. The following figure and description will



[Hargreaves' Spinning Jenny in its most improved form.]

explain the construction of the jenny in its best state, and show that it is merely a many-spindled wheel upon the ancient wool-spinning principle, in which a definite length of roving is let out and extended during the revolution of the spindle to which its end has been previously attached.

The spindles are seen to be arranged at one end of

the frame, and the clasp or clove which holds the rovings, and which is equivalent to the left hands of several spinsters, is mounted upon a carriage, which moves backwards and forwards on a railway, to represent the backward and forward motions of the left arms of these spinsters.

The steel spindles, 3, 3, 3, stand upright, about three

inches apart, at one end, **A A**, of the machine. Their lower ends are pointed and turn in hard brass steps fixed in a cross rail of the frame, and are supported near the middle of their height by passing through brass collars in another horizontal rail; a small pulley, called a whorl, whirl, or wharf, is fixed on each spindle near its bottom, to receive an endless cord which passes round the horizontal cylinder or oblong drum, **2**, of about six inches diameter; this drum is made of tin plate for lightness' sake, is supported by pivots at its ends in the sides of the frame, and lies parallel to the row of spindles, so as to turn them all round together by transmitting a small band about each whorl. The drum is driven by a band (**1, 1**) which passes round a pulley upon its end, and also round the great wheel (**B, B**), fixed by means of a framing attached to the ceiling of the apartment. The wheel, **B**, is turned by applying the right hand of the spinner to winch **B**, just as in the household wool-wheel.

In front of the spindles, and about a foot higher than their tips, a long horizontal cross-rail, **16**, is shown, supported at each of its ends in the wooden blocks, **c, c**, resting on friction-wheels, to run on the railway, so that the rail or carriage, **16**, can move horizontally forwards and backwards through a space of five, six, or seven feet, without deviating in the least to the right or left, and therefore with a precision surpassing that of the hand-spinster's left arm. The under side of the cross-bar or rail, **16**, is notched to let the rovings pass through, which notches may be partially filled by projecting pieces upon the lower bar of the clasp, when this is raised to pinch the rovings preparatory to their elongation into threads. When the lower bar or jaw is let down, the roving cord can pass freely through the notches. The rising and falling of the under rail is effected by small cords attached to it at every yard of its length, which pass over small pulleys sunk into the substance of the upper bar, **16**, and run to a handle placed over the middle of that bar, and beneath an arched bar fastened to the top of the clasp. The spinner holds this handle in his left hand, while with the right he turns the wheel, and with the fingers of the left hand he can lift the lower rail, **5**, of the clasp, and draw it close to the upper one, where it is kept by a spring catch; when this catch is pushed back, the lower rail falls by its own weight, and, releasing the rovings, lets the proper length of them easily pass through for another draught of yarn.

The cops, or bobbins, of rovings to be spun are supported in the inclined frame **4, 4**; they are mounted upon iron wires, or skewers, in two rows, one above the other, the number of cops in each row corresponding to half the number of spindles.

The spun threads are guided by the wire **12**, when they are to be wound upon the spindles. This wire is attached to a horizontal rail, which turns at its two ends on pivots close to the row of the spindles, and it may be lowered so as to depress the thread to any level at the pleasure of the spinner by his pulling the cord **7**, and turning round the pulley **11**, which depresses the wire **12**.

The jenny is worked by one person, male or female, who stands within the frame, and turns the wheel **B** with the right hand, whilst he holds the clasp in the left, so as to be able to run it backwards and forwards along its railway at pleasure. The rovings are drawn through between the bars or jaws of the clasp **16** and **5**, the end of each being attached to its particular spindle. The clasp being open, its carriage is drawn backwards from the spindles till the requisite length of rovings has run freely through or be given out (as it was anciently between the finger and thumbs) by being uncoiled from the balls, or bobbins, at **4**. This length is regulated by a mark made on the frame of the machine, to indicate when the clasp carriage has arrived

at its proper position; the jaws of the clasp are then made to close by raising the handle under the catch as above described, so as to pinch all the rovings. The spindles are now caused to revolve rapidly by turning the wheel **B**, at the same time that the carriage is drawn regularly backwards from them; thus twisting and extension go on simultaneously, and in any proportion to each other, according to the relative actions of the right and left hands of the spinners; when the threads have gained their utmost length they receive a finishing twist to strengthen them, especially for warp yarns. In order to wind up these threads they are pushed down upon their respective spindles by depressing the faller-wire, **12**, during which movement the wheel **B** is made to revolve slowly, in order to wind the thread regularly upon the spindles, in proportion as the clasp-carriage is moved towards them; as soon as the carriage has got home one series of threads is finished, and another series is begun by an operation similar to the preceding.

In Hargreaves' original jenny-frame the *presser-wire*, which distributes the yarn over the spindle into a shapely cop, was connected by a cord going over a pulley to a piece of wood, which was lifted up by the toe of the spinner in the act of winding on the threads.

This implement may be considered as having still a domestic character, and was in fact speedily spread as such through the houses of a great many weavers in Lancashire, supplying the long-felt deficiency of spinning hands; as a woman could with it easily spin as much as sixteen, twenty, or thirty persons, with the one-thread wheel. It therefore gave a fresh impulse to the old Manchester fabrics of fustians, &c., with linen warp; for the yarn which it furnished, though somewhat more evenly, was of the usual wett quality. It was round about Blackburn, the inventor's place of residence, that the jennies were most rapidly multiplied, not altogether by his own hands, but by surreptitious imitations; which were very easy for any clever carpenter or wheelwright to make, on account of their great simplicity and analogy to the ancient spinning-wheel. The memory of Hargreaves deserves to be honoured for his multiple hand-wheel, though it realized nothing new in the principle of spinning itself.