

ARKWRIGHT, SIR RICHARD, one of those extraordinary men whose ingenuity has exerted a most powerful influence upon the condition of civilised society, was born at Preston, in Lancashire, on the 23rd of December, 1732. His parents moved in an humble walk of life; and as he was the youngest of thirteen children, we may suppose that the amount of school learning which he received was exceedingly scanty. About the year 1760 he quitted business as a barber, which he had previously carried on in the town of Bolton, and became an itinerant dealer in hair. The profits of this business were increased by means of a secret which he possessed for dyeing hair and preparing it for the use of wig-makers. In reference to Arkwright's pursuits at this period of his history, Thomas Carlyle in his characteristic manner says, "Nevertheless in stropping of razors, in shaving of dirty beards, and the contradictions and confusions attendant thereon, the man had notions in that rough head of his! Spindles, shuttles, wheels, and contrivances, plying ideally within the same; rather hopeless looking, which however he did at last bring to bear. Not without difficulty."

His first effort in mechanics has been supposed to be an attempt to discover the perpetual motion, but Dr. Ure conjectures that Arkwright, alive to the importance of his cotton spinning apparatus, may have during his earlier experiments disguised the real character of his mechanism under that name.

Up to the time we have mentioned, the cloths of English manufacture called calicoes, from Calicut, the place of their original production, were formed by a mixture of linen and cotton; the warp was composed of linen and the weft of cotton, it being found impossible, by any means then known, to spin the fibres of cotton into a thread sufficiently strong to be used as warp. The demand for the cloth soon became so great, that the females in the weaver's family by whom the carding and spinning processes were performed, could not prepare sufficient weft to keep the looms employed, and the weaver was obliged to engage additional hands for preparing the cotton. The limit to which this species of employment could be carried was soon reached, and if some more productive mode of spinning than that by the one-thread wheel, then the only machine known, had not been discovered, the progress of the cotton manufacture must have been stopped, or at best would have been extremely slow. Mr. Guest, in his 'History of the Cotton Manufacture,' tells us, that at this time "it was no uncommon thing for a weaver to walk three or four miles in a morning, and call on five or six spinners, before he could collect weft to serve him for the remainder of the day."

Some have called in question the talents of Arkwright, and his merits as an inventor; and he has sometimes been considered as a plagiarist or pirate of other men's ideas. If however the evidence is carefully weighed, this charge will be seen to rest on very slight grounds, while the proofs which he exhibited of possessing talents of the very highest order in the management of the vast concerns in which he was afterwards engaged, are unquestionable. A patent for spinning by means of rollers was taken out in the year 1733, by Mr.

Charles Wyatt, of Birmingham, in the name of Lewis Paul, a foreigner, with whom Wyatt had formed a partnership. The specification of Wyatt's invention has been published, and there can be no doubt that it contains the principle of Arkwright's patent to some extent. Wyatt's contrivance had been tried in Birmingham and at Northampton in 1741, but was so far from being successful, that the machinery was sold in 1743, and it is not known what became of it. In the 'Case' which Arkwright drew up to be presented to Parliament in 1782, he makes mention of the fact in these words:—"About forty or fifty years ago, one Paul and others of London invented an engine for spinning of cotton, and obtained a patent for such invention; afterwards they removed to Northampton and other places. They spent many years and much money in the undertaking, but without success: and many families who had engaged with them were reduced to poverty and distress." This 'Case' was drawn up at a time when his patent-right was being constantly invaded, and it is incredible, that, if he had possessed a knowledge of the particulars of Wyatt's patent, he should have thus drawn public attention to it, since he must, in that case, have known that the production of the specification would at once have deprived him of every ground upon which he attempted to establish his own rights as an inventor.

To assist him in making the movements for his first projected machine, Arkwright employed a clockmaker, named Kay, first at Preston and afterwards at Nottingham. From the year 1767, Arkwright gave himself up completely to the subject of inventions for spinning cotton. In 1768 he set up his first machine at Preston. At this time Arkwright's poverty was such, that, being a Burgess of Preston, he could not appear to vote during a contested election, till the party with whom he voted gave him a decent suit of clothes. Shortly after, apprehensive of meeting with the same kind of hostility which had a short time previously been shown to a man named Hargreaves, who also had invented a machine for abridging labour in cotton-spinning, Arkwright went to Nottingham, where he made arrangements with Messrs. Wrights, bankers in that town, for obtaining the necessary supply of money; and soon after entered into partnership with Mr. Need, a stocking manufacturer, and his partner, Mr. Jedediah Strutt, the ingenious improver and patentee of the stocking-frame invented by Mr. Lee. Several improvements suggested by Strutt were adopted by Arkwright, and in 1769 he obtained his first patent for spinning by rollers. The validity of this patent was contested in 1772, on the ground of Arkwright not having been the original inventor of the process, but a verdict was given in favour of the patent, which no one afterwards attempted to disturb.

The most important feature of this machine was the use of two pairs of rollers, technically called drawing-rollers, the first pair revolving slowly in contact with each other, and the second pair revolving in like manner, but with greater velocity. The lower roller of each pair was fluted longitudinally, and the upper one covered with leather, and the two were pressed together with a gentle pressure by means of weighted levers, in order that they might take sufficient hold of the soft-cotton passed between them. The fibres of the cotton-wool were first laid smooth and straight, by carding or combing, so as to produce a soft loose ribbon or cord called a sliver, the end of which was introduced between the first pair of rollers. In passing between them it received no further change than a slight compression, but as from them it was conducted to the second pair of rollers, moving with twice, thrice, or more times the velocity of the first pair, it was extended or drawn out to two, three, or more times its original length, its thickness being reduced in like proportion. As this action is effected by the sliding of the fibres upon one another, the distance between the two pairs of rollers must be so adjusted, in relation to the average length of the fibres, that the two pairs may never have hold of one fibre at the same time. By these processes the thick soft sliver or carding is converted into a fine, hard, and compact yarn or thread.

Arkwright's spinning-machine was, in the first instance, worked by horse-power; but in 1771 the partners built a spinning-mill for working by water-power at Cromford, in Derbyshire, from which establishment, "the nursing-place," as it has been styled, "of the factory opulence and power of Great Britain," the machine took the name of the water-frame, and the yarn produced by it that of water-twist.

Although previous to this time no establishment of a similar nature had existed to which the same system of management was applicable, Arkwright at once introduced a system of arrangement into his works which has since been universally adopted by others, and which, in all its main features, has remained unaltered to the present time.

The great invention, which has been described above, was followed up by various improvements and combinations of machinery, for which a second patent was obtained in 1775. His right to this patent was disputed in 1781, on the plea that some of the contrivances which it comprehended were not original; and his monopoly was invaded to such an extent by other cotton-spinners, that to maintain it he was obliged to bring actions against nine different parties. The first of these actions was tried in July, 1781, when he was non-suited, on the ground that the specification or description of the invention which he had enrolled, did not contain a sufficiently full and particular account of the invention.

The result of this trial occasioned Arkwright not only to abandon

the other eight actions which remained to be tried, but also, for a time at least, to forego the rights derived from his second patent. It was on this occasion that he drew up and published a pamphlet, to which allusion has already been made, and which he called his 'Case.' The object of this pamphlet was to impress the members of the legislature with the propriety of interfering for his protection.

Having in the beginning of 1785 obtained the testimony of several competent persons in favour of the sufficiency of his specification, Arkwright then commenced a new action, which was tried in February of that year, and decided in his favour, thereby reinstating him in the possession of his monopoly. The Lancashire cotton-spinners formed an association for the purpose of contesting the point, and cancelling the patent. They also engaged scientific gentlemen to discover the technical defects of the patent and to arrange the evidence for its overthrow. On this occasion Kay was brought forward to show that, previously to his having been employed in 1767 to make a model for Arkwright, he had been similarly engaged by another person, who was likewise called to corroborate the fact, and upon this evidence the jury found a verdict for the crown, and thereby annulled the patent. A new trial was applied for in the following term, on the ground that Arkwright had procured evidence to rebut that upon which the verdict was grounded, but the motion was refused by the court.

Although the yarn which Arkwright made was so far superior to that produced by the old method of spinning that it could be used for warp, the manufacturers combined to discountenance its use. A very considerable stock lay upon his hands in consequence, and he and his partners were driven to undertake the conversion of this yarn into manufactured goods. They first used it with perfect success in making stockings, and soon after established the manufacture of calicoes, such as they are made at the present day. But here another difficulty assailed them. Their orders for this description of manufacture, then new to England, were exceedingly great, but could not be complied with, on account of the demand on the part of the officers of excise of a duty of sixpence per yard, as being calicoes similar to those imported, and upon which a like duty was levied, while other English-made cloths were subject to only half that rate. It was not until application for relief had been made to parliament that this obstacle was removed, and a large accumulated stock of cloths was disposed of. An Act of Parliament was passed, declaring the cotton-manufacture "not only a lawful but a laudable manufacture," and fixing the duty at "threepence per square yard on cotton printed, painted, or stained with colours."

Five years expired from the first establishment of the works at Cromford before any profit was realised, but after that time wealth continued to flow in abundantly to the proprietors. The establishments were greatly extended, several new ones were formed, and, in many cases, Arkwright took a share with other persons in the erection and working of cotton-mills. This prosperity continued, notwithstanding the adverse decision of the courts in regard to his patent. For several years, the market prices of cotton twist were fixed by Arkwright, all other spinners conforming to his scale. His partnership with Mr. Strutt terminated in 1783, after which time he retained the works at Cromford, which were subsequently carried on by his son, while Mr. Strutt continued the works at Belper, which were founded about 1776. How greatly the cotton-manufacture was extended by Arkwright's improvements may be conceived from the fact that the imports of cotton-wool, which averaged less than 5,000,000 lbs. per annum in the five years from 1771 to 1775, rose to an average of 25,443,270 lbs. per annum in the five years ending with 1790. In 1845 the imports of cotton-wool from all parts amounted to 713,020,161 lbs.; in 1849 to 755,469,012; and in 1860, the year preceding the civil war in America, to 1,390,929,792 lbs.

Arkwright was a very early riser; devoted himself most assiduously to business; was a severe economist of time; was exceedingly sanguine in his disposition; and entertained an unbounded confidence in the wealth-producing powers of machinery and manufactures. To his credit it is recorded that when upwards of fifty years of age he made strenuous efforts to retrieve the deficiencies of his early education; redeeming time from the hours usually devoted to sleep in order to apply one hour a day to grammar, and another to writing and orthography. In 1786, on occasion of presenting an address to George III. after the attempt on his life by Margaret Nicholson, he received the honour of knighthood; and in the following year he served as high sheriff of Derbyshire.

Notwithstanding the increasing inconvenience which he experienced from a severe asthma, with which he had been occasionally afflicted from early life, Sir Richard continued to give the most unremitting attention to business, and superintended the daily operations of his large establishments, adding from time to time such improvements to the machinery as were suggested by experience and observation. He sunk at length under a complication of disorders, accelerated if not produced by his sedentary habits, and died in his house at Cromford, on the 3rd of August, 1792, in the sixtieth year of his age, leaving behind him a fortune estimated at little short of half a million sterling.

Considering the difficulties in which he was placed by the deficiency of his early education and the unfavourable tendency of his early employment, Arkwright must be acknowledged to have been a very

extraordinary man. Even without claiming for him the honour of having been an original inventor,—an honour which, upon the best consideration we can give to the conflicting evidence brought forward, we are still inclined to award him,—we may certainly ascribe to him the possession of a clear and comprehensive mind, as well as the most unerring judgment. His plans were laid with skill, and pursued with energy; he displayed the most unwearied perseverance in pursuit of his object under difficulties which would have borne down most men; and he forms one among the bright instances afforded by the annals of this country, that talent, when allied with patient energy and persevering industry, will not fail to ensure ultimate success to its possessor.

Our information concerning Arkwright's private or personal history is of limited extent. In early life he married Patience Holt, of Bolton, who, in December, 1755, became the mother of his only son Richard. After her death he married again, either in 1760 or 1761, his second wife being Margaret Biggins, of Pennington, in the parish of Leigh; and from this wife, who is the only one mentioned by most biographers, he separated, but when or under what circumstances, is not very certain, although according to some accounts it would appear to have been in consequence of some disagreement arising from his adventurous scheming disposition. By his second wife he had one daughter, who married Charles Hurt, Esq., and inherited part of his property. He left directions to his son, the late Richard Arkwright, Esq., for the completion of a church which he was erecting at Cromford, and also of Willersley Castle, which he was building as a family mansion. That gentleman inherited his father's sagacity and aptitude for business, and became, it has been asserted, the wealthiest commoner in England. He died on the 23rd of April, 1843, in his eighty-eighth year, leaving a large family; and his property was sworn, on the proving of his will, to exceed 1,000,000*l.*, that being however merely a nominal sum, taken because the scale of stamp duties goes no higher. The probate bore a stamp of 15,750*l.* Further information respecting the controverted points in the history of Arkwright and his inventions, may be found in the works of Baines, Guest, and Dr. Ure, on the 'History of the Cotton-Manufacture,' and in a copious memoir in the 'Biographical Dictionary of the Society for the Diffusion of Useful Knowledge.'