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- COTTON. *s.* (*cottono*, Ital. *cotton*, Fr.)
1. The down of the cotton tree (*Wiseman*).
2. Cloth made of cotton.

COTTON, in botany. See GOSSYPIMUM.

COTTON LAVENDER. See SANTOLINA.

COTTON TREE SILK. See BOMBAX.

COTTON GRASS. See ERIPHORUM.

COTTON THISTLE. See ONOPORDUM.

COTTON WEED. See FILAGO.

- To CoTTON. *v. n.* 1. To rise with a nap.
2. To cement; to unite with (*Swift*).

COTTON, in commerce, is the produce of the *gossypium herbaceum*, a plant about the size of a currant bush, a native of the torrid-zone, though it is produced in parts of Turkey, as far as 45° of north latitude.

Cotton is separated from the seeds of the plant by a mill, and then spun and prepared for all sorts of fine work, as stockings, waist-coats, quilts, &c. Calico and muslin are likewise made of cotton, and sometimes it is mixed with wool, sometimes with silk, and even with gold itself. The finest sort comes from Bengal and the coast of Coromandel. Cotton makes a very considerable article in commerce, and is distinguished into cotton-wool and cotton-thread. The first is brought mostly from the West India islands, and Smyrna: the most esteemed is white, long, and soft. Those who buy it in bales should see that it has not been wet, moisture being very prejudicial to it.

Of cotton-thread, that of Damas, called cotton d'ounce, and that of Jerusalem, called bazas, have been the most esteemed; as also that of the West India islands. But with the help of the machines now in general use in Britain, we are able to spin it of almost any degree of fineness. Cotton of Siam is a kind of silky cotton in the Antilles, so called because the grain was brought from Siam. It is of an extraordinary fineness, even surpassing silk in softness. They make hose of it there, preferable to silk for their lustre and beauty. They sell at from 10 to 12 and 15 crowns a pair, but there are very few made unless for curiosity.

The generality of cotton is white; but some is of a nankeen colour, and is invaluable in the manufacture of that article, as it fades very little, even with long use and frequent washing. The elasticity of cotton is inconceivable. It may be pressed into a 50th part of the space into which the strongest packers can reduce it by personal exertion: large screws are erected at many sea-ports where cotton is shipped, for the purpose of bringing the bales into the smallest compass, so as to save freight. Cotton can only be imported as a raw material, in which form it comes to us from the Levant, the West Indies, South America, and the East Indies.

The spinning of cotton, or the process of

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converting cotton-wool into yarn or thread, has been variously performed. The most simple method for this purpose, and the only one in use for a long time in this country, was by the hand, upon the well-known domestic machine called a one-thread wheel. But as the demand for cotton goods began to increase, other inventions were thought of for expediting this part of the manufacture. About 60 years ago, one Paul, and others, of London, contrived an engine for a more easy and expeditious method of spinning cotton, and for which they obtained a patent; but the undertaking did not prove successful. Some years after, various machines were constructed by different persons for facilitating the spinning of cotton, but without producing any very material or lasting advantage. At length, about the year 1767, Mr. James Hargrave, a weaver in the neighbourhood of Blackburn, in Lancashire, constructed a machine by which a great number of threads (from 20 to 80) might be spun at once, and for which he obtained his majesty's letters-patent. This machine is called a jenny, and is the best contrivance for spinning woof or shoot that has hitherto appeared. It is now commonly constructed for 84 threads; and with it one person can spin 100 English hanks in the day, each hank containing 840 yards.

COTTON (Carding of), as a preparation for spinning, used formerly to be performed by the hand, with a single pair of cards upon the knee; but this being a tedious method, ill-suited to the rapid operations of the new spinning-machines, other methods were contrived for affording a quicker and more adequate supply. The first improvement for this purpose was likewise made by Mr. Hargrave; and consisted in applying two or three cards to the same board, and fixing them to a stool or stock; whence they obtained the name of stock-cards. With these, one woman could perform two or three times as much work as she could do before in the common way. A still more expeditious method of carding, however, by what are commonly called cylinder cards, was soon afterwards invented, and is that which is now most commonly practised; but as several persons lay claim to this invention, it is not easy to determine to whom in particular the merit of it is due.

The next and most capital improvements which this branch of manufacture received were from Mr. Arkwright, a native of Lancashire, afterwards sir Richard Arkwright, of Cromford, in Derbyshire. He first brought forward his new method of spinning cotton in 1768, for which he obtained a patent in 1769: he afterwards, in 1775, obtained a patent for engines which he had constructed to prepare the materials for spinning; though one of these patents, being challenged at law, was set aside some years before it expired. The result of Mr. Arkwright's different inventions and improvements is a combination of machinery, by which cotton is carded, roved, and spun, with the utmost exactness and equality; and

such a degree of perfection attained in spinning warp, as is not to be equalled in any other part of the world. To these improvements this country is entirely indebted for the great extent of its cotton-manufactures; large buildings having been erected for that branch both in England and Scotland, many of which contain several thousands of spindles, each driven by one or more large water-wheels; and some of such extent as to spin at the rate of one thousand yards of twist or warp-yarn in a minute.

Other machines have been invented at different times, and a variety of improvements made by different mechanics and manufacturers; one of which in particular we must not omit to mention. It is called a mule, being a kind of mixture of machinery between the warp-machine of Mr. Arkwright and the woof-machine or hand-jenny of Mr. Hargrave; and was also invented in Lancashire. This machine promises to be of great use in spinning cotton-yarn for muslins to a degree of fineness never before known in this country, being nearly equal in quality to those usually brought from India.

COTTON-MILLS, are large buildings with peculiar machinery for carding, roving, and spinning cotton: see the preceding article. These were entirely unknown in this country before the different inventions and improvements of Messrs. Arkwright and Hargrave; since which time great numbers have been erected in England, and several in Scotland. The first erections of the kind were by Messrs. Arkwright and Hargrave, both in the town of Nottingham, and both nearly at the same time. The engines were then driven by horses: but since that time they have been chiefly erected upon water-falls in different parts of the country; particularly the warp machines, which are better adapted for being driven by water than any other. The most extensive of these is in the village and neighbourhood of Cromford, in Derbyshire, and under the immediate inspection of sir Richard Arkwright. The first that was erected in Scotland was for Mr. Peter Brotherston, under the inspection and direction of Mr. John Hackett, from Nottingham; and is in the neighbourhood of Pennycuik, near Edinburgh. Since which time several have been erected in the neighbourhood of Glasgow, Paisley, Lanark, Perth, &c.

The cotton-mills at New Lanark, in the county of Lanark, in Scotland, are situate on a beautiful and romantic amphitheatre, near the high road between Carlisle and Glasgow. The rapid stream of the Clyde supplies that abundance of water, which is the powerful operator of the machinery. For the purpose of conveying and directing its power, a subterraneous aqueduct is cut for many hundred yards through the solid rock. The first mill, in length 154 feet, was originally erected in 1785; and, having been burnt down, was rebuilt in 1789. The second is exactly of the same dimensions; the third is 130 feet, and the fourth 156 feet, in length.

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The two first mills contain 12,000 spindles for spinning water-twist; the other two are occupied by jennies, for spinning mule yarn. The village of New Lanark owes its existence to the erection of these mills. It consists of neat substantial houses: forming two streets about half a mile in length, and broad, regular, and clean. Near the centre of the village are the mills; and opposite to them a neat mansion, the occasional residence of Mr. Dale, the proprietor, and of his principal manager. The village, consisting chiefly of Highlanders from the counties of Argyle, Caithness, and Inverness, contains about 1,500 inhabitants; of whom all who are capable of work are employed in and about the mills. Of these, there are 500 children who are entirely fed, clothed, and educated by Mr. Dale. The others lodge with their parents in the village, and have a weekly allowance for their work. Such was the state of New Lanark before it was occupied by the present proprietor, Mr. Owen. What it has become in his time may be learned from his publications.

Having given these particulars relative to the manufactory of cotton, we will now present the reader with a general sketch of the mode of procedure with regard to this important article of commerce pursued by the Lancashire manufacturers.

Cotton comes to us without any farther preparation than having been tolerably carefully picked out of the pod in which it grows; but still much dirt, husk, and other impurities, remain in it. This is first separated by women, who beat the cotton with sticks upon hurdles, and pick out the more gross impurities with their fingers. It is then taken to the carding engine, where it is first scribbled, as the wool-carder would say, and afterwards, by a contrivance of much ingenuity, divided into perpetual cardings, which are caught by, and coiled round the sides of long tin cylinders. These coils are taken to the mules, first to be roved, which answers to slubbing, and afterwards to be spun into threads of any requisite fineness. The invention of the mules forms quite an epoch in the history of the cotton trade. A vast improvement had been made, about forty years ago, by the introduction of the spinning jennies, by which from twenty to forty spindles were turned at a time. Still, however, the rovings, or coarse half-twisted threads, partaking somewhat of the nature of cardings, though approaching in some degree to spun twist, were obliged to be prepared by the hand-wheel. The invention of mules entirely supplied this defect; and, while it enabled the spinner to prepare her rovings as fast as she before could spin, at the same time it put her in a way of performing her farther work much more expeditiously and completely. The machine is called a mule, because it is a sort of mongrel, partaking of the nature both of carding and spinning, or uniting together the action both of the roller and spindle. It consists of three sets of fluted brass rollers, the flutes of which

turn into each other: the first set goes faster than the second, and the second faster than the third, between which, when the roll of carded cotton enters, it is a little lengthened out, still more by the second, and farther still by the first, after passing which, it is slightly twisted by the rapid circular motion on its axis, communicated by a leather band to a perpendicular tin cylinder, into which it falls. If the roving be not made thin enough by the first operation, it is made to undergo a repetition of it, and it is then carried to the spinning mules; which differ from the former only in this, that when the threads have passed the rollers, they are drawn out and twisted by a course of spindles, which are set in motion after a sufficient quantity of the roving has passed the rollers, which are themselves, at this time, stopped. The advantage of this mode of preparing the threads we understand to be, that the fibres of the cotton are all laid longitudinally, and in as small a number as is wanted, before they are begun to be much twisted, by which means, threads of any required fineness are made much stronger than they were from rovings prepared upon the spindle, which twisted them too much in the first instance; and in the subsequent processes for rendering them finer, many of the fibres were necessarily broken. On one of these mules 240 threads are often spun at once, and two of them may be managed by one woman, with a child to each, to tie the threads which may occasionally break. A large factory for these operations usually consists of a vast cellar to hold the raw material, of a ground floor for the pickers and beaters; and in the upper floors, first teasing and carding engines, then roving machines, afterwards mules, and lastly, machines for winding the thread or twist: the whole occupying a building of six or seven stories, and all moved, either by a large water-wheel, or by a small steam-engine, which, if of Bolton and Watts' construction, occasions very little inconvenience to the neighbourhood, as it consumes nearly all its smoke. For winding the thread regularly off the spindles upon bobbins, various contrivances are in use: none, however, appears more simple than a heart-shaped axis, which moves the bobbin to the right or left, according to the position of the apex or the base of the heart. Other portions of the thread are wound in quills for the shuttle; and others, again, are formed into hanks, some of which are tightly bound at certain intervals, previous to their being dyed, in order to prevent the parts so tied from taking the colour. This is done, that the threads may be disposed in the warp, so as to produce the clouds which are seen in various species of the cotton goods, particularly ginghams. The only colours which the cotton manufacturer has hitherto been able to render so permanent as to withstand the effect of bleaching are, the Turkey red, the dark-blue, and the buff. A durable green would certainly make the fortune of any chemist who should discover it.

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The warp being fixed in the loom, or, in the language of the country, gaited, is divided to give passage to the weft in the shuttle, either by two, three, or more treadles; or, if the pattern, or course of changes in the order of raising and depressing the threads of the warp, be various, so that the weaver could not manage the requisite number of treadles, by a great number of strings which pass over pulleys above the loom, and are drawn, one after another, by a little boy, above whose head they are orderly disposed in two rows, by the side of the looms. These looms are therefore called drawboys. These boys, however, will shortly be set aside for machinery, which is rapidly introducing as a substitute.—For the formation of sprigs, &c. of various colours, there are often as many shuttles as colours; or a number of little swivel-looms, such as they use for the weaving of tapes, are introduced occasionally, as many as there are sprigs in the breadth of the piece. Quiltings appear to be two distinct cloths, tied, as it were, together, by stitches which go through both cloths; and in some cases, as in bed-quilts, there is a third shuttle, which throws in a quantity of coarsely spun cotton, to serve as a kind of wadding.—The counterpanes are woven with two shuttles, one containing a much coarser weft than the other; the coarser weft is thrown over at certain intervals, and the thread is picked up with an iron pin, rather hooked at the point, so as to form knobs disposed in a sort of pattern.

When the goods are come from the loom, most of the sorts of them, previously to their being bleached, are dressed or fired, by being drawn, and that not very quickly, over very red-hot cylinders of iron, by which the superfluous nap is burnt off. To see such an operation performed upon so combustible a substance, naturally fills the stranger with the utmost astonishment. They are then washed in a wheel with soap and water, and, having been well scoured with an alkaline lixivium, are dipped in the oxygenated muriatic acid diluted to its proper strength. These operations are repeated alternately, till the goods have attained the requisite degree of whiteness; and between each dipping, they are laid out upon the ground, exposed to the action of the sun and air. When completely bleached, they are either smoothed upon long tables, with smoothing-irons, or calendered, that is, stretched and pressed between a course of rollers, by which they acquire a fine gloss. Calicoes are printed exactly in the same way as the kersymeres in Yorkshire; but the works are usually upon a much larger scale.—Thick-sets, corduroys, velveteens, &c. are cut upon long tables, with a knife, of a construction somewhat like the sting of a wasp, terminating in a very sharp point, defended on each side by a sort of sheath. This point is introduced under the upper course of threads, which are intended to be cut, and with great ease carried forward the whole length of the table.

The manner of manufacturing cotton in

India forms a remarkable contrast to the European method. In Europe, a vast apparatus of machinery is used in every part of the process, while in India the simplest instruments are made to produce fabrics of that exquisite fineness, which it is the boast of our manufacturers to imitate, and which as yet they can scarcely equal. The cotton wool in India is prepared for the spinner without cards, is spun for the weaver without wheels, and is woven in looms without any frame-work, which the weaver can move from one place to another with as much facility as the web itself.

The operation which our manufacturers perform by carding engines, is executed by the Indian with nothing more than a bow; the percussions of whose string snapped over the cotton wool in repeated vibrations, raises it to a fine downy fleece; in this same way our hatters prepare their furs for felting; an operation which may be seen in most towns.

The fine thread, or yarn, from which the choicest muslins are made, are spun from cotton thus prepared, by the distaff and spindle, a mode which it is evident was practised by the Romans, Greeks, and Egyptians, from their history, their fables, and their sculptures, and than which nothing can be more simple; this yarn is then wove on the loom. See INDIAN LOOM.

For a valuable account of the manufactures carried on at Bangalore, and the processes used for dyeing silk and cotton, which, we regret, is too long to be inserted here, we refer to Buchanan's Journey through the Mysore, &c. or Nos. 119, 120, of Tilloch's Philosophical Magazine.

The following will show the progressive increase of the importation of cotton into Great Britain since the year 1780:—

In the year	1781	imported	5,101,920 lbs.
	1782		11,206,310
	1783		9,546,179
	1784		11,280,238
	1785		17,992,888
	1786		19,151,867
	1787		22,600,000
From 1786 to 1790	average		23,443,673 perann.
In the year	1799		46,000,000
	1800		56,010,732
	1802		65,850,395
	1806		75,000,000

The cotton imported for the manufacture of 1787 was of the following growth:—

British West Indies, about	6,600,000lbs.
French and Spanish settlements	6,000,000
Dutch settlements	1,700,000
Portuguese ditto	2,500,000
East Indies, <i>via</i> Ostend	100,000
Smayrna and Turkey	5,700,000
	22,600,000

The application of this cotton to the different branches of manufacture was supposed, according to the statement of Dr. Hux, to be=

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Candlewicks . . .	1,500,000 lbs.
Hosiery	1,500,000
Silk and linen mixtures	2,000,000
Fustians, &c.	6,000,000
Calicoes and muslins . .	11,600,000
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	22,600,000

In the branches applicable to muslin and calico alone, it was calculated that employment was given in England and Scotland to 130,000 men and women, and at least 60,000 children. From the latest accounts, it appears that the cotton manufacture of these realms gives employment to 800,000 persons, and that its annual value is upwards of 30 millions of pounds sterling.

London and Liverpool are the great marts for cotton, and of these London was long the principal; but the situation of Liverpool, in the centre of the cotton manufactures of the north, has rendered it the principal market in the kingdom; and indeed great part of the cotton belonging to the merchants in London is now consigned there.