BRITISH COTTON.

THE words British Cotton will perhaps sound as significantly as Gooseberry Champagne, conveying to the mind the embodiment of one of the "shams" of the present age. Some may "pooh, pooh!" the flax-cottonising process as very much akin to a discovery for converting silver into lead, linen goods being dearer than those made from cotton; whilst not a few express their astonishment at the recent "Flax Movement," and wonder why we should be so desirous of finding any substitute for what has hitherto answered, and still continues to answer our purpose remarkably well.

The annual importation of raw cotton into Great Britain has risen enormously since the commencement of the present century. In 1800, it amounted to fifty-six millions of pounds; in 1815, to one hundred millions; in 1835, to four hundred millions; and at the present time it is upwards of seven hundred millions of pounds, equal to one thousand tons a-day. Nearly the whole of this arrives at the port of Liverpool. Seventeen-twentieths of this aggregate is imported from the United States of America, the remainder from the Brazils, the East Indies, and Egypt. About one-seventh leaves the country for other places in the raw state; so that fully six hundred millions of pounds are wrought into goods in our factories, the greater portion of which are in Lancashire, affording employment to a million-and-a-half of inhabitants. The quantity manufactured is thus disposed of:—one-tenth is wasted in the process, in dirt and refuse; one-fourth is worked up for home consumption; and the balance is shipped to other countries as

manufactured goods. The present yearly value of the Cotton manufacture of this country is estimated at forty-five millions sterling, of which thirty millions are believed to be paid away in wages; one-third being the original cost of the raw material. In some inferior descriptions of goods the value of the material is far beyond that of the labour and skill expended on them. In others, the labour bestowed in their production is infinitely more costly than the original value of the material operated upon. Samples of cotton yarn have been recently produced so exquisitely fine in texture, that a single thread is found to be invisible to the naked eye, unless placed upon some dark substance. A hank of cotton measures eight hundred and forty yards; yet it would require more than two thousand hanks of this gossamer to weigh one pound. Twenty-five pounds weight of such a fibre would encircle the globe at the equator, whilst in value it would far exceed it own weight in gold. In the importation of the raw cotton into this country, and in the exportation of the manufactured goods, about eight hundred thousand tons of shipping are yearly employed.

Perhaps a better idea of the magnitude of this branch of our national industry can scarcely be embodied than in these two facts:—Firstly, a rise in the price of the raw material of twopence the pound, costs the manufacturers four millions sterling; Secondly, in the simple process of starching the fibres whilst being spun, two hundred and fifty thousand barrels of flour are annually used, worth about half a million sterling.

Such is the Cotton trade of England; unequalled by any industry of any other country in the world. It is not difficult, therefore, to understand how important becomes any question affecting the future supply of this great staple commodity. We are at present dependent upon another nation for the staff of our national prosperity, and that nation depends upon the labour of a race of slaves. Let any great social or physical convulsion visit that country, and England would feel the shock from Land's End to John O'Groat's. The lives of nearly two millions of our countrymen are dependent upon the cotton crops of America; their destiny may be said, without any sort of hyperbole, to hang upon a thread. Should any dire calamity befal the land of cotton, a thousand of our merchant ships would rot idly in dock; ten thousand mills must stay their busy looms; two thousand thousand mouths would starve for lack of work to feed them.

It is not, however, sufficient that we glance at the Cotton manufacture; we must say a few passing words touching that of Linen, before pointing out the operation of the present "Flax Movement." For the supply of flax, we are equally dependent upon foreign countries; not more than one-fourth of the flax required, that is, a hundred thousand tons, being grown in Great Britain. We pay to other countries for flax, for linseed, and for oil-cake, not much under seven millions sterling annually; whilst we ship linen goods to the yearly value of three millions sterling. Flax is employed in the manufacture of the most delicate French and Irish cambrics, and of the coarsest sail-cloth and tarpaulins; of the most beautiful laces from Lisle and Valenciennes, and of the heavier sacking and towelling. The folds of snowy lawn that deck a bishop's arms, and the stout storm-sail that rides out the fiercest gale, are both the produce of the same plant.

The propriety of rendering ourselves independent of other nations for the supply of cotton, is no new idea. It has been entertained for many years past. The manufacturers of Manchester have been urging the cultivation of cotton in our Indian possessions, where vast tracts of land are known to exist well suited to the cultivation. Our own chilly climate is utterly unfitted for the growth of this plant; with flax, however, the case is different, and, as already stated, about one-fourth of our requirements of this article is raised on British ground. There appears to be no reason whatever, why the remaining three-fourths should not also be grown upon our own soil. Besides which, recent experiments have demonstrated that flax may be substituted for one half of the cotton at present in use, which would give an additional demand for the article of five hundred tons daily, requiring for their growth twelve thousand acres every week. The experiments alluded to were made by the Chevalier Clausson, who has thus originated what is known as the "Flax Movement." By these he discovered a simple and at the same time beautiful and effective process, by which flax may be "cottonised" or converted into what is termed "British Cotton."

Some of the more important processes in the manufacturing arts have been the result of mere accident. It was even so with Flax Cotton. The accidental discovery of the new application of the flax-plant has been thus described, in the last edition of the Chevalier Clausson's little work on the subject of the "Movement:"—

Wandering along the luxuriant banks of one of the Brazilian rivers, his attention was attracted to a white, down-like substance, adhering to the branches of trees, overhanging and touching the stream. On obtaining a quantity of it, he was so pleased with its character, that—thinking he had discovered some vegetable product hitherto unknown—he determined to trace it, if possible, to its source, and to ascertain the plant which produced it. Pursuing his task with great ardour, he eventually found that the substance had been washed from a bed of flax-straw, the produce of some of his own land; and which, long before, he had caused to be thrown, as useless, near the banks of

the river. As the swollen waters had occasional access to this heap, fermentation, and the decomposition of a portion of the plant, had taken place; and, in time, the influence of natural chemistry had so separated the filaments of the flax-fibre, as to give the mass a cotton-like appearance. Some of it having been washed by the river, had been arrested by the overhanging branches.

The process thus casually observed in a very imperfect state, Clausson afterwards imitated by the aid of chemistry; and he can now supply the factories of Lancashire with a home-grown substance, capable of being worked up with certain portions of cotton, silk, or wool, with the machinery already in use for those manufactures. And herein lies the great value of the discovery. From the peculiar structure of the flax-fibre, and the consequent nature of the machinery to work it up, it now costs tenpence per pound in the manufacture; whereas cotton is made up for threepence per pound. It is obvious, therefore, that by preparing flax, so as to be capable of being worked upon the ordinary machinery at the same cost as cotton, the process must be one of great value. Next in importance to this, is the greater yield of marketable fibre from a given quantity of straw, than by the old mode of steeping and preparing.

We will now examine the new process; which we witnessed a short time since, at the Chevalier's model establishment at Stepney. An old poorhouse has been converted into a factory; oakum-picking has been supplanted by the magic transformation of chemistry; iron soup-boilers are now busy with mysterious mixtures, producing results which, when the old fabric was built, would have consigned every man and woman concerned to the stake at Smithfield, for sorcerers and witches.

The flax plant is composed of three distinct parts, the wood, the fibre, and the gum-resin, which causes the fibres to adhere together. To remove the wood is the first object; and this, under the old system, was performed by a machine little better than a flail. Here commences the first improvement. At the Stepney factory we saw a small apparatus at work, which costing a mere trifle, removed the wood from the fibre with astonishing rapidity and cleanliness. It is proposed that growers should employ this machine on their farms; by which means they reduce the bulk by one-half, and at the same time retain the portion most useful for manure. In this state it will be brought to market for sale to the manufacturers, who will then have to free it, in the first instance, from the gum-resin. Under the old system, this was effected by steeping the flax in cold water, a process which occupied from four to six weeks, and frequently caused much discoloration of the fibres. The Chevalier's mode consists in boiling the material in a weak alkaline solution for about four hours, after which it is washed first in a slightly acidified liquor, and then in plain water. It is then dried and in a fit state for the various processes of scutching, heckling, &c., necessary to render it fit for the linen manufacture. In order to "cottonise" the flax, according to the Clausson's patent, the fibres are taken from the washing vats direct to a series of other vats, ranged side by side; and it is in these that the magic of chemistry is so brought to bear as to transmute a heavy mass of dark, harsh straw, in the course of some minutes, to a light, silky, snow-white wool.

In the first of these vats is a weak solution of carbonate of soda: here the previously boiled and washed fibres are steeped for about fifteen minutes, during which time they become completely saturated with the soda liquid. To explain the chemical action which follows, it is necessary to point out the structure of the flax fibre. These fibres, minute though they be, are cellular, composed of a number of smaller cylinders, united closely at their side. It is the separation of these finer fibres, and the consequent addition to the length and surface of the whole mass, that has now to be accomplished; a process that may well be likened to hair-splitting. These cellular fibres being thoroughly saturated with the soda in most minute quantities, are removed from the first vat, and placed in vat number two, containing water slightly acidulated with one part in five hundred of sulphuric acid. The change which now takes place is instantaneous. A rapid frothing and ebullition of the liquor may be observed, and the heavy mass of flax which, in the first liquor, sank far below the surface, is now seen floating lightly on the face of the water: it is no longer flax—it is British Cotton. And how has this happened? The acid in this liquor, finding its way into the little cylinders already saturated with the soda, immediately effects a chemical change; the sulphuric acid combines with the alkali, and forms sulphate of soda, giving out the carbonic acid gas from the carbonate of soda, which, seeking its liberation, expands and bursts open the cellular tubes. The cottonised flax is next placed in a weak solution of soda, in order to free it from any remaining acid; and thence transferred to the bleaching vat, which contains a mixture of solution of chloride of lime and sulphate of magnesia. Here it remains during two hours, at the end of which time it wears a perfectly snow-white appearance. The process is then completed by washing, first in a weak acid liquor, and afterwards in pure water. It then only remains to dry the flax-cotton, in order to fit it for the after processes, preparatory to spinning. The same method as has been here described can be made available for converting the refuse tow from the flax establishments into a fine white article, admirably adapted for paper-making, and at a less price than he pays for linen

rags. The value of this latter preparation may be estimated, when it is known that one manufacturer of linen in the north of Ireland throws aside "refuse tow" to the yearly value of five thousand pounds sterling; all of which, at present, is utterly useless.

From what has been stated, it is evident that the objection held against this process, of its converting a dear article into a cheap one, does not hold. Not only is the value of the British cotton greatly enhanced by being rendered capable of spinning at the low cost of ordinary cotton goods, but the yield of marketable fibre is much increased, and at a much less cost of time and labour than was needed under the old method. The new fibre is so completely assimilated in character to cotton, that it readily receives the rich dyes imparted to the latter, and is, in short, capable of being printed or dyed in a precisely similar manner.

At the Stepney model factory we examined specimens of flannel, felt, and woollen cloth, manufactured of equal parts of British cotton and wool; also, a felt that was composed entirely of the former material. All of those goods had a remarkably stout feel, and appeared to be strong in their body.

Combined with silk, British cotton may be worked up with great ease on the existing silk machinery, and when so wrought, is capable of receiving the same colours in dying, and materially adding to the strength of the fabric manufactured.

We saw two other substances, which, it appears, are quite as susceptible of being "cottonised" as flax: one was a coarse species of China silk, at present of little value; the other was "Jute," or Indian hemp. Both of these fibres were materially improved in appearance and feel, and are, no doubt, in their new form, adapted to purposes for which they were not at all available, previously.

Looking at this "Flax Movement" in an agricultural point of view, we shall find as many advantages likely to arise from it in that direction as in any other. Hitherto it has been a most prevalent opinion that flax crops were exceedingly exhaustive in their effect upon the soil. Experiments fairly carried out have shown this to be a fallacy. Chemical analysis of the plant, and a series of flax crops taken from the same land, have proved beyond a doubt, that not only does this cultivation not weaken the soil, but tends to keep it in a state of great productiveness.

An examination of the structure of the plant demonstrates that those portions of it which absorb the alkalies and the nutritive properties of the soil, are those which are not required for the purpose of manufacture; namely, the woody part, the resinous matter, and the seed. The fibres derive their elements almost entirely from the atmosphere, one hundred parts containing not more than two parts of mineral matters. Under the old process of steeping, the nutritive portions contained in the wood and gum, as well as the whole of the seed, were lost in the fermentation during steeping; so that nothing whatever was restored to the land. By the new method, these properties are capable of being returned whence they were taken. The seed may be either employed in feeding cattle, or crushed for oil; the oil-cake being in that case returned for the cattle-yard.

Estimates, based upon several years of actual experience, go to show that, by this cultivation, the farmer may realise a yearly profit of from fifteen pounds to eighteen pounds the acre, and that, too, upon land which has been just previously heavily cropped in cereals. Many thousands of acres which hitherto have yielded but indifferent and uncertain crops, or which have scarcely been worth cultivation, may be brought under flax without any fear of the result. Hitherto, the absence of linen manufactures, and the consequent want of markets, in so many parts of England and Scotland, have proved a serious obstacle to any attempts at extending flax culture. But now that every grower may, by the purchase of an inexpensive and simply constructed machine, convert the flax-straw into a fit condition for economical and convenient transport to a market, and now that conveyance is so much lessened in cost, and that the patent process will before long be in active operation in every agricultural county of Great Britain and Ireland, it is to be hoped that a widely extended cultivation of this article may take place, affording active employment to a vast number of persons of all ages.

Already the patent has been taken in hand in Scotland: arrangements are in progress for a similar undertaking in Ireland; and, should the like activity be manifested in England, there can be little doubt that two most important results will have been attained—the providing a great portion of our poorer population with good employment, and rendering our manufacturers less dependent upon the United States for the supply of flax and cotton.