

bars of wood, taking care to use only that description of wood of which there is no danger of it transmitting a stain to the fibre. Several of these rods or bars are placed across the steam chest, and are supported by the ends resting on a ledge, which runs along each side of the chest. Chests of the size which I have indicated above would take two tiers of fibre at one and the same time.

The fibre may, if it be considered necessary, before being subjected to the action of the steam, be treated with a solution of soap or alkaline solutions, such as salt of soda, potash, or caustic soda, &c., &c., allowing all superabundant moisture to drain off before admitting into the chest.

*Steaming under Pressure.*—This operation, though successful in itself, is objectionable on account of the cost of the plant and the time consumed in filling and emptying the steam boiler. The boiler requires a perforated false bottom for the flax to lie in. The action of high-pressure steam renders the leaf very soft, and very greatly facilitates the after process of extracting the fibre, and immensely increases the extent of its division. To use the ordinary shaped boiler for this purpose would be to entail endless labour in filling and emptying it. The only way in which this difficulty could be overcome with advantage would be in employing boilers of the same construction as those used for steaming timber—that is to say, with one end of them entirely removable, so that the flax leaf might be packed up in small cars running on wheels, these wheels being guided by a sort of tramway fixed to the perforated bottom, so that they could be easily run in and out. But, after all, it would be a very expensive undertaking, as the boilers would not contain a very large quantity of leaf, and I do not think this plan likely to be adopted.

This is the last of the chemical processes now in use, as a substitute for the retting of fibrous plant that I shall touch upon. With regard to mechanical operations, I shall merely state that with proper after-treatment there is no doubt that fibre whether steeped, boiled, or steamed, can be produced of a silky-cottony texture, of more than double the value of the ordinary samples that have been hitherto sent home. I do not say it would be of a silky texture, for this reason, that although I have seen several samples of fibre that had a very silky appearance when dry, after being wetted or washed they lost the greater part of their brilliant silky gloss, and bore a very much greater resemblance to cotton.

I think, if not at present, at all events before very long, we shall be ready to admit that however well the fibre of the *Phormium tenax* may be separated, whether by beating or scraping, or by any other entirely mechanical means, so long as the raw leaf is operated upon, and the juices, gum, &c., of the plant which continue to adhere to the fibres, remain in an unaltered condition, that the textile gradually and surely deteriorates, and in a comparatively short space of time—while steeping, boiling, or steaming either the leaf or the fibre, renders powerless and ineffective the action of the substances deposited on the fibres, thereby insuring greater softness and durability. Recent researches made by M. Kolb, on the cleaning and bleaching of vegetable fibres, has led to the establishment of the following facts:—"The gummy substance which adheres to the fibres is nothing else than pectore. The soaking or steeping of the fibre appears to have for its object the determination of the pectic fermentation, and the pectic acid which results remains fixed on the fibre, either mechanically or in part in the form of pectate of ammonia—the caustic alkalies in the cold form gelatinous pectates, which preserve the fibre from being completely attacked. Pectic acid being weak, the alkaline carbonates have in the cold only a feeble action upon the fibre. Ebullition, on the contrary, transforms pectic acid into an energetic acid—metapectic acid; the carbonates are then strongly attacked, and their employment becomes as efficacious as that of caustic alkalies. The carbonate of soda, even in large quantities, is not a cause of the weakening of the fibres, which lose more strength from the employment of caustic soda, especially when the lye is concentrated. The employment of lime, even in the cold, weakens the fibre considerably. But the chief cause of the destruction of the solidity of the fibre is too long digestion, particularly with caustic soda.

There appear to be a great many conflicting opinions as to the proper time for cutting the flax leaf, so as to obtain the fibre when it has arrived at its greatest state of perfection. I was told by Bishop Selwyn, —and I think it will be admitted that he was a good authority on all that relates to Maori matters,—that when the Maoris required good and fine fibre of the best quality, they never used a leaf that was split at the top, as from the time that the leaf commenced to split, the fibre began to deteriorate, until it became harsh, hard, and brittle. I subsequently made experiments upon leaves split and unsplit, by a way of proving their individual merits, and found there was no comparison between the two fibres; that in the unsplit leaf being fine, white, and soft, and was extracted with considerably less expenditure of labour. We could not, of course, put this theory into practice with economy until we began to cultivate. There is also, I am told, a species of the flax plant which thrives both here and in the North Island, the butt-ends of which are comparatively free from colouring matter. In commencing a flax plantation, it would be worth while to try and procure roots of this description. The unsplit leaf is never discoloured at the butt-ends.

The flax plant consists of leaves which radiate from the root in the shape of a fan. When allowed to attain over a certain age before being cut down, the outer leaves of this fan generally yield a fibre coarse, harsh and discoloured, which, however, is found to improve as the leaves approach the centre of the fan, where the very best of the fibre is obtained; so that in one fan or root of leaves we may find four or five different qualities of fibre. Yet we have hitherto in most cases been in the habit of sending home our fibre packed in bales, just as it comes to hand, without the slightest pretence of assorting the different qualities, excepting so far as not to mix scutched stuff with unscutched, or hackled with unhackled. All this is of course taken into account by the buyer at home, as is shown by the following good advice:—"In packing your flax be careful to avoid putting samples of different quality into the same bale; as besides the possibility of its being looked upon as a species of fraud, it is always better to sell each quality separately for what it is worth, than to endeavour to obtain a mean or medium price for the whole, which will always turn out lower than the mean of the highest and lowest prices; for the buyer, in making his estimate of the value, very naturally takes into consideration the time and labour he is obliged to employ in assorting the unequal samples which come into his hands.

In Russia hemp is assorted according to its quality into clean hemp or firsts, out short hemp or