

Fahr., it forms an entirely new staple; it becomes silky, more delicate and beautiful than the finest flax, and that when the process is properly carried into execution this new article will supersede cotton. "This great heat has the effect of perfectly disorganizing the cellular tissues, which glue the fibres together, with such tenacity, as to furnish only a comparatively coarse material under the ordinary course of steeping." By this process "the cellular tissue which glues the parcels of tubes together is dissolved, and the ultimate single fibrils are separated, so that the staple produced must necessarily be as delicate as the spider's most attenuated web, seeing that they are so fine as to be visible only through a microscope."

Another good method of steeping in hot water, is to place the flax in a vat filled with water heated to about 90 deg. Fahr., the water to be maintained at that temperature by means of steam pipes; the time required to effect the setting is from three to four days.

This method of steeping would entail constant attention by day and night to regulate the flow of steam necessary to keep the water at the required temperature, with as little fluctuation as possible.

Steaming is the last process that will be referred to; and I am of opinion that steaming holds out such superior inducements, as an operation to be substituted for the maceration of flax, that on its advantages becoming generally known, it will eventually supersede all other modes of attaining by artificial means the results derived from steeping, both on the score of efficiency and economy. I have succeeded in effectually steaming flax under the most unfavourable circumstances, and with the crudest apparatus. Thus with an old oil-can for a boiler, that was not in any way steam-tight,—in fact more steam escaped from the boiler than I was able to conduct to the receptacle in which the flax was placed, the said conductor being a piece of common gas piping about nine feet long, in no way covered or protected; and the steam chest, in which were the flax leaves, a common unlined packing case;—with such unsatisfactory apparatus I contrived to steam effectually as many leaves as I could conveniently arrange in the box; the time occupied was about two hours and a half, and the experiment took place in the open air, in a situation in no way protected from the weather. In erecting some perfect apparatus for steaming flax, I should be inclined to recommend steam chests or closets of the following dimensions:—Inside measurement, breadth, five feet; depth, five feet; height, eight or nine feet, according to the length of the flax leaf likely to be operated upon, this to include a false bottom, six inches to a foot from the true bottom; the false bottom to be made of wood, or if of iron the metal to be covered with wood, so that the flax will rest on the wood without touching the iron. These chests or steam closets should be made of stout boards, and might be lined with zinc. They are then to be enclosed in an outer casing of a size to admit of six or eight more inches of sawdust being packed round the steam chest. The doors of the steam chest will open in the same way as the door of a room. It is necessary that these steam closets should be in some building, not perhaps in the same compartment as the engine or flax-dressing machinery, but somewhere near at hand. It will be found that when once the flax deposited in these steam chests has attained the required heat from steaming (for a time in which experience must be our guide,) after stopping the supply of steam, will retain a high temperature for several hours, so that flax put into the steam chest by 5 o'clock in the afternoon would be quite hot at 8 o'clock in the morning, or even up to 12 o'clock at noon, because the sawdust packing so completely prevents the escape of the heat, and there are no currents of air to carry off any other heat by convection. When the steam has been allowed to flow into the closet for the length of time which will be found necessary, the steam cock is closed, and the rest of the operation is performed by slow digestion, no more heat being added.

Some of the great advantages of this method is its simplicity, economy, and practical application. There is no complication of hot water or air pipes to retain the heat, no mechanical combination whatever for producing a high degree of heat by steam pressure; consequently there is no necessity for steam valves, or other combinations which would render the use of the apparatus difficult or dangerous. Any person will without difficulty be able to use the apparatus to advantage after once having witnessed it in operation. In subjecting the flax leaves to the action of steam in those or any other chests, it should be tied loosely in bundles, not of too large a bulk, and placed upright upon their butt-ends. Two important objects are gained by this position,—

Firstly, the leaf standing on its butt-end has only its own weight to support, and the steam easily and quickly percolates through and among the leaves. It is true the bundles of leaves will seek support by leaning one against the other, but this may be prevented by placing bars across the chest; and when they become softened, will perhaps sink down; but even this may to a great extent be obviated by the exercise of a little ingenuity. However, they can never be subjected to the unequal pressure that is exerted on individual bundles of leaves when they are packed in the chest one on the top of the other. In this case the lower tiers of leaves must have a very heavy pressure on them, which will naturally render them more difficult to steam thoroughly.

Secondly, the butt-ends and the portion of the leaf adjacent is the part where the greater quantity, if not the whole, of the colouring matter and gum of any importance is accumulated. In the case where the leaves stand upon their butts, all the colouring matter, gum, &c., as it is loosened and expelled, together with the sap, juices, &c., of the leaf as they are softened and diluted by the action of the steam, fall at once upon and through the perforated false bottom of the chest, and do not in any way come into contact with the upper portion of the leaf, by which means the fibres therein contained are not subjected to the risk of being discoloured or stained. But when the leaves of the flax are merely laid in bundles one on the top of the other with, most likely, alternate butts and thin ends, all the gum colouring matter, &c., as it exudes from the upper layers, slowly trickles down, and is filtered through the fibres of the lower tiers, not without depositing some considerable portion of its *res impedimenta* among the intervening fibres. Again, it appears that the softening process is accelerated, and all the results are more satisfactory, when the leaves are placed in the steam chest in the natural position of their growth.

In the case of steaming the fibre, after having partially cleaned the leaf, by putting it through the ordinary stripper, or otherwise, you may confidently rely on obtaining a very good colour to your fibre. There are several methods of arranging the fibre in the steam chests. The way in which I should effect this part of the work would be as follows:—Hang several hanks of fibre over rods or