heap, because that is the spot where the strongest fermentation takes place, and the best fibre prepared; as it is also the position in which it soonest receives injury, if through any neglect or mistake the steeping goes on too long. A space ought to be left quite round the stack of steeping flax in case of any unforeseen derangement of the heap, in order that the men who have to enter the water for the purpose may remedy the accident with greater facility. It is wise to prefer the situation which affords an opportunity of washing the bundles in running water after the steeping. The fibre so treated will be easier to work and will give out a smaller quantity of that acid and irritating dust which is so injurious when flax is beaten by the scutchers or finished off by the hackles. For the benefit of scutchers or hacklers, or those whose business makes it necessary for them to be present while the operation is being performed, I will here mention two infallible methods of preventing the irritation caused to the air passages and the lungs, and the consequent evils attendant upon constantly breathing air charged with such quantities of dust. One is to wear a respirator to cover both mouth and nose, made of thin layers or veneers of charcoal. This effectually prevents the passage of any dust, but as these respirators may not be readily obtainable, or may perhaps be too expensive for the bulk of persons requiring them, I will give another and cheaper method by which the same results may be obtained. Take two pieces of thin cotton cloth, sufficiently large to cover well both the mouth and nose. Between these, place a thin layer of cotton wool or the inside of a piece of wadding, tack them together loosely so as to prevent the cotton wool from slipping out of its place; then tie over the mouth and nose. It will not interfere with the breathing, and will be found to be a perfect dust arrester. When foul the cotton wool may be thrown away, the cloth washed, fresh wool put in to replace that thrown away, and you have a new respirator at a very nominal cost.

We now come to boiling and treating the leaf and fibre with hot water. The remarks made above with regard to the quality of the water, &c., required for retting or steeping apply equally to that used for boiling. There is also another precaution that must be taken in boiling, and that is always to be careful to use a sufficient quantity of water. Great mistakes are apt to be made in this respect. For instance, we try an experiment on a small scale in boiling the flax leaf or fibre with or without chemicals, as the case may be; we place the leaves, perhaps four or five, weighing together about two pounds, into a pot or boiler containing possibly from two to four gallons of water. Now supposing the result of this experiment to be sufficiently encouraging to induce us to repeat the experiment on a larger scale, let us see how we set about it; generally thus—we obtain a 400-gallon tank which we convert into a boiler, and put into it half a ton and more of green leaves, and then add the water; the tank being already nearly filled with flax leaves, will hold perhaps fifty or a hundred gallons of water, certainly not more. Now let us compare the two experiments: in one case we have upwards of a gallon of water to a pound of leaf, in the other we have more than twelve pounds of flax leaf to the gallon of water, or about an ounce (about two table-spoonfuls) of water to a leaf, and yet we are surprised if the results do not tally in colour as well as in all other respects. Most of us know that a give quantity of water will only dissolve a certain ascertained quantity of sugar, salt, gum, &c. Now by way of illustration let us take a pint of water: this quantity will dissolve about two pounds of sugar, forming a thick syrup, but it will only dissolve five and three-quarter ounces of common salt. Thus we see of those substances which dissolve in water some are much more readily soluble than others. In the case of the sugar and the salt, we find it takes only one pint of water to dissolve two pounds of the former, while it requires nearly six pints or three quarts of water to dissolve two pounds of the latter. This rule applies with equal force to the gum, &c., of the flax leaf, and unless there is a sufficiency of water the dissolution will be incomplete. In boiling the flax leaves, either before or after bruising them, (passing them through a stripper set rather wider than they are generally used would, I think, be sufficient, but we must bear in mind that the most difficult part of the leaf to clean after undergoing the operation of boiling is the thin or top end, which we should be careful to have properly bruised—one great advantage accruing from bruising the leaf prior to boiling is, we may confidently rely on obtaining the fibre of a good and bright colour,) I should prefer making use of wooden vats heated by steam pipes. The expenses of iron boilers, setting them in brick, building chimney, &c., &c., would thereby be saved; furthermore, my experience leads me to avoid the use of any iron vessels in this or other operations, as I have never found the results so satisfactory as when wooden ones are used; but the wooden vessels must be kept clean.

There is one important item to notice—and that is, the leaf or fibre should not be immersed in cold water and then brought to the boil, but the water should boil before the flax is put into it, for the flax when treated with the cold water first and then boiled is much more difficult to clean, and the steeping is not so thoroughly effected. This applies in all instances, whether chemicals are used or not. There should also be about one gallon and a half of water to each pound of flax leaf or fibre. The boiling is to continue from two to two hours and a half; the exact time can only be arrived at by experiment. If soap is used, many experiments have shown the best proportions to be one pound of soft soap to forty-eight pounds of flax, and forty-eight pounds of flax to six hundred and fifty pounds of water, equal to eighty-one gallons; and where the shape and size of the boiler will allow, the flax leaves when unbruised should be tied in bundles and stood upon their butt-ends, and kept in this position during the boiling. On removing the fibre or leaf from the boiler, it should not be exposed to the wind, but be placed under cover, as it is important that it should cool gradually. Among the chemicals that may be used I find soap safest and most effective; carbonates of soda will greatly increase the colour of the fibre; guano, or any substance containing ammonia; all highly nitrogenous substances, such as bean or pea-meal, &c., salts of soda and linseed oil; wood ash and tallow, &c., &c., will be found to have a certain effect; but some of them are too expensive and others discolour the fibre. In boiling under pressure ammoniacal water or sulphurous acid may be used to impregnate the water. These at a pressure of from eighty to ninety pounds to the square inch, are known to give good results; but the expense and trouble attendant upon this operation will, I fear, put a bar to its adoption.

Highly satisfactory results have been obtained by steeping the flax, &c., in water heated, but not of the boiling point. Dr. Campbell in a recent work on "The Preparation of Vegetable Fibres," and which is now in its fourth edition, says, "The latest improvements in the process of steeping seem to have developed its ultimate properties to the fullest extent; for by macerating in water heated to 160 deg.