

been accustomed to see about, and it was feared that his education might interfere with running the dye-house well, that he would be effeminate and above his position. Some few young men who had the advantage of education and a little special training, took up the dyeing business. They found difficulty in getting a foothold, but after they had done so the results produced by them, especially in corporations where strict account was kept, showed such marked improvement in quality and so great reduction in expense that the kid glove young man is sought, the bars are in the path of the man he succeeded. This type of manufacturer is also passing, and broader-minded men are filling his place. His successors are founding and encouraging textile schools.

In talking to you about the cotton fiber I placed considerable stress upon the preliminary operations, the operations that must be performed before the fiber enters the dyehouse. Now I value the correct performance of preliminary operations upon the wool fiber no less than those upon the cotton fiber. Of course I refer to the scouring of wool. At the time when I entered the dyehouse, which you will see was not a very ancient period in history, the wool scourer was usually a character. Not unfrequently he was a man who had proven himself inefficient with the pick and shovel, and as a sort of lukewarm charity upon the manager he was employed to do the wool scouring. Now this man has probably wasted thousands of dollars, because when he scoured his wool clean he used alkali so strong that no inconsiderable part of the wool was dissolved and became an alkaline salt. This alkaline salt passed into the sewers or polluted the waters of rivers or brooks upon which the factories were located. This wool scourer, by no more exact quantitated methods than what we call rule of thumb, would heat the bath to a temperature determined by putting his hand in the scouring box, and put into the scouring box a greater or less quantity of alkali. Then, with sundry winks and in a stealthy manner, so that no one could steal his trade, he would drop in a little salt until he thought the liquor about the right heat and strength to scour the wool. Many times it was great quantities of yellow, greasy wool that he scoured. This wool never could be dyed as it should be, it could not be resoured to be clean. When it was made into goods and came into the finishing room, these goods baffled the skill of the finisher to remove the grease. When a short period of time had elapsed, after the goods had been shipped away, the superintendent came around. He had a letter which he read to the finisher, a letter about the foul-smelling goods which the customers in New York or some other market justly complain about. It is almost in vain for the finisher to protest that the responsibility does not lie on his shoulders. The burden of proof was to show that he did not do it. "If you are not responsible, who is?" said the superintendent.

Those of you who become superintendents will acquire knowledge here that will enable you to tell whether your wool is scoured clean or not. I think none

of you will regard the man I have described as economical in the scouring department. I think none of you would accept a present of his services. You will want a man who uses his alkali and salt with discrimination. The man who can give you the greatest yield of wool and can give it to you clean, lofty, and in condition to spin, so that you can scour it when it comes to the finishing room, this sort of man is cheaper for your concern even though you pay him more wages than his predecessor received. Perhaps when you come to take the active charge of affairs the man whom I have described will have passed away. For your peace and comfort I hope he will.

We do work to-day upon entirely different principles from those upon which our fathers wrought. Dyes and drugs which were familiar to them are not seen about the dyehouse to-day; except it may be as dead stock in some unused corner of the drug room. It may never come into your experience to use cochineal. Probably none of you will ever dye anything with madder, except to satisfy your curiosity. The rapid development of the coal tar dyes may be brought home to you when I say that since I have been actively connected with the dyeing business nearly all the anilines, excepting fuchsin, have come into use, and all the alizarines, with the single exception of alizarine red, have been introduced. Figures are dry things to talk about, but you will pardon me if I introduce them to show the saving in cost that this discovery of alizarine has effected. In 1894 the value of the alizarine consumed in the United Kingdom was \$251,698, in the United States, \$790,011. Computing one pound of alizarine equivalent to nine pounds of madder, alizarine at 14 cents a pound, and madder at 8 cents a pound, the difference between the cost of alizarine and an equivalent color-producing quantity of madder would be \$1,399,041 in Great Britain and \$4,062,338 in the United States, or, for both countries, \$10,800,636.

Another preliminary operation which merits our consideration is the mordanting of wool. A great deal of felting is caused by want of knowledge of the laws governing operations which take place in a boiling kettle. When the sample cards issued by representative firms who deal in dyestuffs contain instructions to enter cloth and yarn in the cold or only lukewarm chrome baths, it is not to be wondered at that many dyers embrace the delusion. When dyeing pieces it reduces the time they have to be run if they are entered into a boiling bath. The agencies which cause them to shrink in either width or length are reduced. The steam used to heat a kettle containing pieces running over a reel is enormous and can well be saved. Again, time is wasted when they have been entered cold, because the mordanting does not begin to take place until nearly the boiling point has been reached. Goods will mordant as even where they are entered into the mordanting bath boiling as they will if they are entered cold. If uneven dyeings are being obtained, the dyer may well abandon search-