

extremely accurate and exact, especially when the object is to obtain a perfect match to a given sample. The dyer is mostly very glad to have the whole thing exact and to have succeeded in actually producing such a perfect match, and it is exceedingly annoying for him to see how these colors are then spoiled by an arbitrary and injudicious addition of such substances to the dressing. Although there are to-day artificial direct dyeing dyestuffs wherewith such colors can be dyed, and with which such additions to the dressing have no influence upon the color, I believe, says a writer in *The Deutsche Farber Zeitung*, that a large proportion of these grays is still produced with fustic, Brazil and iron. If now a gray that has been dyed with histic, etc., is dressed with a neutral dressing, it will be found after the yarns have been dried, that the color has become a little lighter and more yellow. The color, must, therefore, from the beginning be made a little grayer than the sample. But a very different result is obtained when the color is treated with a dressing which contains alum or bluestone. If the former, the color turns to a much greater degree lighter and yellower, while with the latter the color becomes duller and redder. But in both cases the tone of the color is after dressing such that does absolutely not match with the given sample. Again, if a yarn which has been dyed with paranitranilin, nitrosamine, azophorred or nitrazol, is dressed with a dressing which is mixed with bluestone, a turbidity of the color will unavoidably be produced and that to a greater extent the hotter the dressing is applied. As is evident from the foregoing, it would be desirable that parties who do not know the effect of such additions would keep hands off, and leave to the dyer the composition of the dressing. It may happen in certain cases, that one or the other addition to the dressing is indispensable: if, for instance, a mode gray has turned out too dark in dyeing, an addition of alum does good service and becomes even necessary if the dyeing operation has been ended with the treatment upon a separate bath containing alum. An addition of bluestone is recommendable, when a gray that was dyed with fustic and Brazil, is after drying found to be a shade or two too yellow; then a redder tone is obtained with such addition. In all cases, however, such additions must not be made by guessing, but only after ascertaining by experiment, how much of one or the other may be safely applied.

WHAT MUST BE DONE TO SPIN FINE YARN ON A FILLING FRAME *

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There is no question that filling yarn requires more careful attention than warp. It is more easily affected by atmospheric changes and by variations in the length of the staple. It is a final process, and has not the spooling and warping where it is possible to discover poor work before it is put into the loom. It cannot be handled under unfavorable conditions, as well as on the mule, as there is no opportunity to vary the strain on the yarn with the ease that it can be done with the fallers and the winding motion on the latter machine. This fact is recognized in the desire to obtain the best ring spinners available by paying more per side on the filling than on the warp frames and thus using a more economical class of help.

In fact the continued increase in the demand for frame spinners will make it advisable to pay even more per side to secure a permanent class of hands, that will take a personal interest in their work, and ensure better quality and larger product. If such operatives are employed a better grade of work can be expected and demanded than from the average run of spinners in the mills.

This care must be given in the whole supervision of the room from the overseer to the doffer. It would almost seem as if it should be stated the other way, as the doffer is a very important factor in the running of the filling in the loom. It is absolutely necessary that he should start the yarn on the bobbin, so that it will weave off clean on the loom. The finer the yarn, the more important his work, as the strength of the yarn will not allow any extra strain. The bobbin next claims attention, it must be kept exactly right for the spindle. If it needs reaming on the top or the base, it should be done at once, so that it will be kept in place. As the filling frame requires straight dosing, more or less waste will collect in the bobbin, this must be kept cleaned out so that the bobbins will stand in line, each in its proper place on the spindle.

Have the bobbins made as large on the top as it will pay to run, make the size three-quarters of an inch rather than five-eighths; and, after leaving coarse yarns, it is not economy to use half-inch, and even on these the larger size is preferable. If it is necessary to spin a finer number than the one that is running on the frames, use the bobbin larger on top with the requisite taper, and it can be done as well or better than by changing the ring. This is a very important point in spinning fine filling with success, as the strain on the yarn is always on the small part of the bobbin. It is better to have ridges, rather than grooves, not only on account of making the bobbin stronger, but also to give the larger diameter to relieve the strain on the yarn in spinning. In using this style of bobbin, there is a tendency for the yarn to slip over the ridge if the wave comes up to one at the end of the traverse, but the thread can be bound in place by running up slowly and using the quicker part of the cam on the downward course of the traverse. A short cone is better than a long one with lifts of medium height, cut hooking, so that the yarn will not slip off, and a groove cut on the bobbin between the cone and the base will make a better bobbin for weaving. The long cone decreases the length of the yarn that can be put on the bobbin and requires more stoppage, as the frame will require to be doffed oftener. The ring should not be larger than $1\frac{3}{8}$ inches up to number 55 yarn, from this up to 70, $1\frac{1}{4}$ inches, and for finer numbers $1\frac{1}{8}$ inches. In making a choice between two sizes of rings, should give the preference to the smaller, as not a few of the difficulties in spinning fine numbers can be overcome by the use of the smaller ring. It goes without saying that a good ring is required, one that is round, and it will be worth while to try them all and reject those that are not up to the standard.

The traveler should be as light as possible without making too soft a bobbin, and still heavy enough to keep the thread from ballooning so much as to require a separator. The latter should not be used if it can possibly be avoided, as it catches a good deal of waste and adds more or less of it to the yarn, even with the best care in keeping it properly brushed. It also interferes with the proper examination of the bobbins on the frame, to see that they are all at the same height and in the proper place on the spindle. The traveler must be made with the right flange for the ring used, and as small a circle as will go on the ring without undue breakage, and it is best to use the round point traveler.

The spindle speed should be low rather than high, as frame spindles are now run. On 60 yarn 7,800 to 8,000 turns is a satisfactory speed, and from that to 8,500 on 36 yarn, but even on this a slower speed will not be a mistake, as less speed means less breakage and less twist. The matter of twist is one that gives the most trouble, as on carded stock there must be more than the standard mule twist. It will need from one and a half to two and a half turns more on average cotton. How much only the running of the spinning will determine,

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