

is great danger of wearing away the cloth that comes in contact with them.

In dyeing, too, it is possible for salts used in coloring, or in mordanting, to be employed in such quantities that they do not all dissolve, and when this is the case, if undissolved crystals are left in the bath to get into the meshes of the cloth, or to stick in the holes of the perforated linings, it is by no means a difficult matter to have the goods so worn and rubbed in places by their action that the effect will be noticeable in the finished cloth. Of course the only way to avoid this with certainty is to make it a point to see that perfect dissolution shall be accomplished, and the reliable dyer will certainly do this. Unless care is taken, too, in the matter of the water that is used in the dyeing, as well as in the finishing, small lumps of mineral deposits, or other hard ingredients, are more or less apt to get into the vat or tub, and if these stick in cracks or crevices they are a constant menace to the safety of the cloth.

To return to the finishing. When we come to the gigging there is not so much likelihood of producing thin spots in the goods, unless the cloth is already unevenly fulled. It is quite possible to gig in streaks which, on account of a streaked nap, will give the goods an appearance of being thin in streaks, but thinness in spots is not so apt to result. If, however, a fabric comes to the gig with worn spots in it, it is evident that the treatment at the gig can only add to the difficulty. The same also may be said with regard to the action of the shears, for in themselves, unless it is from the presence of flocks or knots upon the back of the goods, the shears can hardly be said to act very greatly toward making thin spots on the fabric. The shear, however, has the effect of greatly accentuating the wornness or thinness that has already existed. And in case a piece is fulled so as to be thicker in places, then the shear, by working upon these places, will have the effect of weakening them, and so of destroying the value of the piece altogether. Faulty brushes at the shears, or on the presses, will be pretty sure to conduce to the making of thin and worn spots in the nap. The only way to avoid these results is to attend particularly to the presence of knots, dust and flocks. And by keeping the machine and all its parts, as well as the cloth, free from these materials, and by giving attention to the condition of the brushes and rollers, and by seeing to it that all rests and rods over which the cloth must pass are as clear as possible of obnoxious substances that could get on to the surface of the cloth, we will be very apt to reduce to a minimum the real danger to which we have been referring.

GOOD ROVING.

Unevenness in any one strand of roving varies in character according to the causes from which it arises. Short thick bunches, or nubs, come from imperfectly carded stock. They may be large or small, but generally have equal diameters in all directions. Larger and at the same time longer enlargements of the strand

are almost always due to bunches taken into the wool card by the licker-in, either from imperfect feeding, badly set rolls, or because of an overloaded licker-in.

Of the setting of the feed rolls enough has already been said. There is only one right method of doing this, but the same changes in the feed that will conduce to the comparative evenness of the strands with each other may under certain conditions cause the licker-in to take the stock unevenly.

To make the drawing from the second breaker finer and softer, a writer in the *Manufacturers' Review* gives the following advice: slow the feed on the finisher, so as to get more doublings; give a more acute angle to the feed by slowing the tension bands on the long side of the table, or giving a flatter lay to the strands by lowering the presser bar. These are the most efficient methods for getting the feed in shape to avoid the bunches. Sometimes any one of them will suffice, while again all of them together will not bring about the desired result.

Then we must turn to the licker-in itself. It may be dulled by accident or long use, or become too full of waste stock or dirt, or may have, if the work is very heavy, too slow a speed for the amount of stock it is obliged to carry. The remedies for these conditions are obvious. If clothed with diamond wire, it should not be ground until necessity compels it, as the original cut point is by far the best, but a ground point is better than no point at all. It is very much the same in regard to cleaning. For such wire, the less done the better for the wire, its point and the work. But when long stock is so wound into the teeth that the fed stock must press itself to the points in order to have them take hold of it, or when the teeth are so filled with dirt that the gum rounds up their front edge clear to their point, it is time to clean out partially at least. When obliged to resort to higher speed, do not increase more than needed; too high a speed is wearing to both wire and stock.

Such unevenness as was last noticed occurs oftenest in the outer strands from automatic feeds, and when any of the above causes exist their effects are aggravated because of the doubling of the web at that point. Even when everything else is all right, very bad bunches may result from the doublings being too far in from the edge of the card, or because sufficient space has not been allowed for the waste end ring on the doffer. This not only gives an uneven strand, but a coarser one, while from the other causes mentioned, the extra stock in the bunches is taken from the other portions of strand, and is consequently followed by places in the strand lacking this stock, and consequently is much finer than the required size of the roving, as the bunches are coarser. Bunches resulting from these causes are seldom uniform in size, but come in series, gradually diminishing from large to small. Each series generally has its largest bunches at the beginning as the strand comes from the machine.

An unevenness very like the above is sometimes caused by untrue workers. In this case, however,