

full green is obtained from light green S F, with chinolin or tartrazine, according to shade. For violet, the safest color to use is alkali violet, though in many instances an acid violet, shaded to a reddish tinge with rhodamine or fast acid violet A 2 R, will suffice. Methyl violet, although giving a finer color, has been abandoned owing to its tendency to rub off.

For dyeing the various fancy colors and marine blue, patent blue A J I, cyanol extra, fast acid violet A 2 R, acid violet 6 B N, azo carmine, and chinolin yellow are used. Yellow does no harm when added in small proportion only. For the deeper, yellow-tinted colors, such as olive, green, bronze brown, etc., tartrazine is used, being stronger than chinolin yellow. This dye equalizes well when added in large quantity, but less satisfactorily when used in small proportions for fancy colors. Orchil substitute is suitable as red color for browns, and Campeachy or naphthylamine black 4 B is used for black, as are also numerous other similar dyestuffs.

Rather dark, full colors, which only appear as small stripes or figures on white grounds, are produced by alizarin dyes, shaded if necessary with the prescribed direct-acid coloring material.

In order that one may decide on the most suitable method of dyeing to be adopted, it is necessary to have, not only a sample of the yarn, but also a cutting of the pattern to work from.

Shawl-yarn dyeing is, as a rule, performed with the same materials as used for coverlets. For stronger yarns for pattern shawls, alizarin and light and dark vat colors are employed. In the case of more expensive shawls, faster colors are generally taken than for coverlets, the necessity for this arising from the circumstance that shawls are worn in all weathers, and have, moreover, to be washed, so that running colors cannot be used. On the other hand, coverlets are not required to stand so much, the chief necessity being for them to pass the ordeal of fulling and finishing: if they do this they will behave satisfactorily under their subsequent treatment. On the foregoing account vat blue is preferred for shawl yarns, since mostly only narrow blue stripes are in question, and therefore the cost of the shawl is not materially increased, the dyeing being effected more quickly and the yarn remaining in better condition than if alizarin dyes are employed. Quick dyeing is the only method adopted. Notwithstanding that the finished shawls have merely to be washed and scarcely fulled at all, care is necessary in selecting the colors to go along with white. Shades of orange prepared with orange 2, and of scarlet from ponceau 3 R, when associated with white in the made-up article, have been found to color the white when washed and acidified, whereas the same shades produced from flavine and cochineal in the first instance (unfortunately the bath used for this attacks the finer yarns considerably), and in the latter case from diamine scarlet B, leave the white in undiminished purity. For single-colored articles, with, perhaps, variegated corners, the former colors, however, act satis-

factorily enough, these articles being in some cases never subjected to washing.

Thin shawls dyed in the piece are generally dyed direct in an acid liquor with good distributing colors, so that the fringes do not suffer. If dyed in the automatic machine, it is best to let the shawls run through in lengths of from 65 to 75 yards: if shorter lengths are used, the speed of the machine must be reduced, since if the same rate were maintained it would be impossible to avoid producing felted fringes, owing to the somewhat greater friction in this machine than in hand dyeing. This method is, however, preferable on account of the more even distribution of the dye. Shawls fringed all round are unsuitable for dyeing in the machine, the friction of which would very soon spoil the fringe on the longer sides. In this case care is necessary, even in hand-dyeing, to see that the shawls are not wound too quickly and that the liquor does not boil too much, if at all. Fancy colors can be dyed quickly, there being plenty of good distributing colors at disposal. For light blue, Victoria blues B and R are used with a weak acid bath, and scarlet is obtained most rapidly with orange 2 and rhodamine B, this being the brightest, although not the cheapest, color of the kind. It is well to use an old bath liquor for scarlet dyeing, as well as in the case of Burdeaux, the latter being more uneven than scarlet in a fresh bath, so that time is saved and distribution facilitated by using an old liquor. For ordinary scarlets and orange colors in fresh bath liquor, 2½ lbs. of hydrochloric and 2½ lbs. of sulphuric acid, with 15 - 20 lbs. of Glauber's salt, are required to 80 - 100 lbs. of goods. The following batch needs only 1½ lbs. of each acid and 10-12 lbs. more Glauber's salt.

White or Turkey-red cotton selvages, when dyed in a good acid bath, will keep their original color. If black is in question, care is necessary, since not only will the direct-dyeing weak acid blacks dye the white cotton fibres, but will also dye the red. The simplest method of dyeing is to use a direct-dyeing black; and if this be adopted, the greater part of the color absorbed by the cotton can be removed by dipping the rinsed shawl in a lukewarm bath containing three litres of hydrosulphite per 500 litres of water, for ten to fifteen minutes, and then rinsing out once more. This subsequent treatment may, however, be avoided, and better stripes obtained—these stripes adding to the appearance of the shawl—by dyeing the black as follows: 6 lbs. of acid green 5 G, 4 lbs. acid violet 2 B, and 18 lbs. of orange 2 are taken to 130 lbs. of (worsted) goods, the treatment occupying an hour and a quarter. Any desired shade can be imparted to the black by increasing one or other of these colors.

For pale green, acid green 5 G, in conjunction with chinolin yellow and a little tartrazine, is preferable to the light green SF used for yarns.

There are, of course, many other colors suitable for the same purpose, but constant changing about from one to another is undesirable, and the preceding are