

three times, so that it may gradually combine more firmly with the fibre.

For shawls the colors most used are, in addition to those named above, black, green, and orange. The latter color, which is prepared from a flavine and cochineal with the above-mentioned bath, is seldom used alone for selvages, being more generally employed along with other colors in colored shawls. Green, on the other hand, is often used for white shawls. Not every green color is, however, suitable for selvages, but a mixture of light green SF and tartrazine (Badische Anilin und Soda Fabrik) acts very well. Shawls with green selvages require careful treatment, and should not be left wet for any length of time, or they will need to be acidified as soon as washed. A too strongly alkaline washing liquor will take the color out of light green SF or alkali blue, leaving only a muddy tint (tartrazine predominating) behind, which, however, can be restored by the aid of sulphuric acid. Should the injury to the color be extreme, then saccharic acid is used, being more energetic in this respect than sulphuric acid; generally, however, the latter will suffice. In sulphuring, care is also necessary to limit the exposure to 1 or  $1\frac{1}{2}$  hour, otherwise the light green SF is attacked and the yellow tinge of the tartrazine stands out.

Since dyeing such shawls with colored selvages is generally avoided, only those with black selvages being as a rule so treated. Formerly very dark vat blue, which turned black under the subsequent dyeing, was used for these selvages, but this practice has been superseded by the simpler alizarine-black process, and is now only followed when white shawls with dark-blue selvages are in question. Occasionally Turkey-red and white cotton or silk fringes are provided, the former of which require to retain their original color after the shawl is dyed in the piece.

Coverlet yarns are strong and generally very soft, on which account dyeing must be effected rapidly, since the wool fibre suffers if boiled too long, becoming stringy and losing its open, woolly character, whereby the quality of the finished article is impaired. The dyeing process for the individual colors depends on the ground color; if this is white or other delicate shade, then the darker colors in the design require to be fixed more permanently than where there is a less susceptible ground. Alizarin colors have been tried and used, but gradually abandoned (at least in part), other direct dyes being found equally efficient and requiring less time, as well as producing a superior-looking yarn. The main point is to establish a system for the various associated colors, and to adhere to it until a simpler and more effective method is discovered.

So far as the various grades of scarlet are concerned—e.g., brilliant, victoria and palatine scarlet, they are all suitable for designs containing Bordeaux, brown, olive, dark green, or other dark colors, but not—or at least not without danger—for light fancy colors. The same applies to the Bordeaux grades, such as amaranth, fast red, azorubin, etc. These are much used, although chiefly for shading with one and the

same color or in adjusting shades, as is the case with scarlet. In order to prepare both scarlet and Bordeaux sufficiently fast for white and other delicate shades, the best material in the former case is diamine scarlet B, and in the latter diamine scarlet 3 B, both of which are found to act very well. Diamine scarlet 3 B, which gives a very bright light Bordeaux, can also be shaded dark by other acid-dyeing colors, and particularly by adding to the dyeing bath a little acetic acid, and, if necessary, a little cream-of-tartar preparation, deepening by the aid of patent blue A J I and fast acid violet A 2 R. When this is attempted, a sufficient amount of diamine scarlet should be taken at the outset to counteract, by its yellowish tint, the bluish tendency of the other two colors. The subsequent addition of diamine scarlet is attended with conditions increasing the length of the operation, since owing to the acid in the bath liquor causing rapid and unequal absorption, a certain amount of the liquor must be run off if more scarlet is added, and be replaced with fresh water, a proceeding that of course decreases the dyeing strength of the bath.

A simpler, but not quite so efficient, method is to shade with chinolin yellow when the yellow tint is deficient. In commencing to dye with diamine scarlet it is not necessary that the liquid should have been previously cooled down to body heat; a boiling temperature may be employed, provided there is a sufficiency of Glauber's salt and only a slight quantity of acetic acid in the bath. More acid is then added by degrees, the color in such case developing slowly, but still more rapidly and securely than if the whole of the acid had been used at once and in a merely warm bath.

Very fine strawberry tints can be obtained from diamine scarlet B, especially when shaded with azo-carmine and fast acid violet, and the same applies to the dark fast rose color obtained by shading with rhodamine. Less permanent, but still very useful, strawberry colors can be produced from azo-carmine and chinolin yellow, or cyanol extra or patent blue the two latter being used for dulling the color. For dark brilliant yellow rose it is necessary to employ a fast scarlet, since if only rhodamine and chinolin yellow are used, a large proportion of the former is essential, the result being that the limit of saturation is easily exceeded and the color rendered liable to run.

For pure yellows with a reddish tinge, tartrazine is to be preferred, but chinolin yellow for those having a greenish cast. However, since both of these are dangerous to use with white grounds, recourse is had to the safer flavine.

Good results are also obtained from diamine golden yellow, which colors less brightly than the three already mentioned; and this dye can also be safely used alongside white. The addition of rhodamine will shade it to dull orange. Orange 2 is often used for fugitive colors, but is better avoided for coverlet dyeing. If it is desired to produce bright orange stripe effects, the safest method is that prescribed for selva ge yarns.

For peacock blue and delicate green shades, patent blue N, A J I, and cyanol extra are used. A brilliant