Since the rack bar actuating means 9 is operated first in one and then in the opposite direction it will impart to the rack bar 3, through the flexible straps 11, a pull to move the rack bar in one direction, and then a pull to move it in the opposite direction, avoiding any spring or buckling of the rack bar. This movement of the rack bar is secured from an actuating means disposed at one side of the loom, thus readily accessible for the fixer.

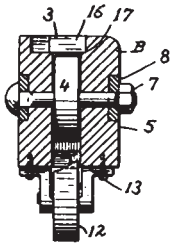


Fig. 238

The guide roll 12 is secured to the batten by screws 13, so that the device can be used on either a right or left hand batten, by simply changing the guide pulley 12 to one or the other end of the batten.

Each end of the batten has an L-shaped recess 14 formed therein, the upper portion of which terminates in a stop or wall 15, the ends of the rack bar having side projections 16 to which the flexible connections 11 are secured. Said projections 16, and consequently the rack bar 3 are thus limited in their reciprocating movements lengthwise of the batten, the said projections riding on the ledge 17 (Fig. 238) thus effectively preventing any tipping movement of the rack bar 3 as it is reciprocated.

The latter engages the rack teeth on a number of small shuttles disposed to move in short circular or curved paths through the several sheds formed in the loom. To define the beginning and end of each reciprocation, *i. e.*, that the shuttles will be entirely clear of their sheds prior to their picking movement and be carried clear of the shed at the end of the picking movement, a simple adjustment of one or both of the rollers 4, which serve to alter or adjust the path of movement of the rack bar and consequently that of the shuttles, is all that is necessary. This mechanism can also be readily applied to looms of older construction, now installed in mills.

Theory of the Acid Dye-bath.

Fort summarizes in an article in the Journal of the Society of Dyers and Colorists, the results established in his previous papers, in which it is shown that the sulphuric acid employed in the dye-bath combines with the wool base to form an additive salt, which reacts by double decomposition with the salt of the color acid of the dyestuff.

This theory has been supported by experimental observation of the course of the reaction and identification of the products; by quantitative estimation of the interacting quantities of dyestuff and acid; by variation among the factors of equilibrium in the equations assigned to express the mechanism of dyeing, showing that dyeing and its reversal, stripping, are adequately expressed by these equations. These considerations have now been extended by observations carried out on simple bases in place of the complex protein base.

SCARF AND NECKTIE SILKS.

Silks most popular for scarfs and neckties are those woven with satins, mat and ottoman weaves, each system providing an endless source for pretty effects.

Figured Satins.

Of all the varieties of weaves in use in the manufacture of scarfs and neckties, without question those most popular are the satins. The basket or the rib weave, during one or the other seasons, may be conspicuous by its absence, but never the satin. From the small polka dot or ball to the all-over method of ornamentation, nothing is more saleable than this class of fabric, when offered for the personal adornment of the male sex.

Fig. 1 is a design for a small figured satin, in the construction of which two systems of filling and one system of warp are employed. In designing these small effects, in which the figures are dotted all over the surface at regular intervals it is necessary to observe the planning of using two (or more) colors in the filling, and with this object in view prepare your design.

Fig. 1

Sketch Fig. 1 clearly explains this subject in connection with using two colors in the filling. The figure in our design for this purpose must be so constructed that it can be clearly divided with reference to change of filling, so as to give us a chance to produce an extra color effect in the fabric, without additional expense to the mill in weaving the fabric.

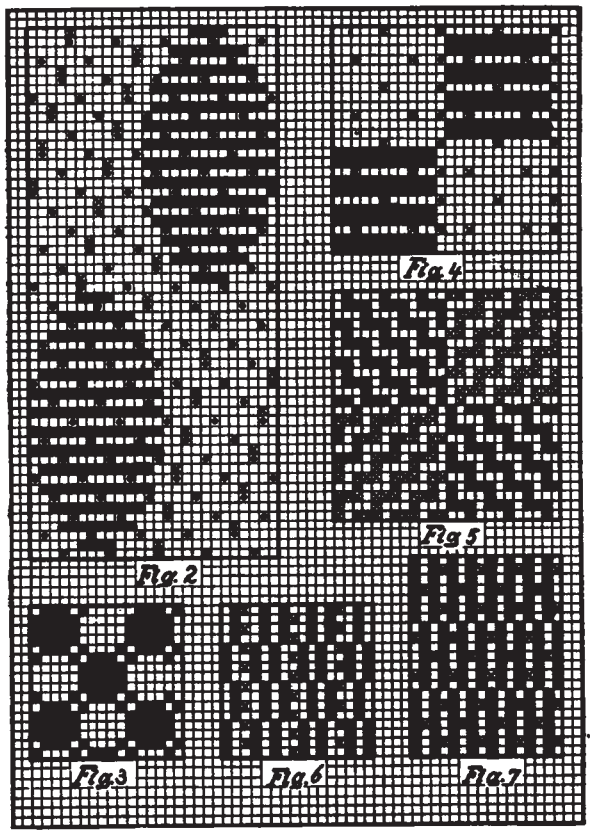
In our design of a fabric sketch, the *rosette* is kept quite clear of and does not overlap the *two leaves* under it. This pattern may have its leaves produced in pale blue and the rosette in pink, or some such combination, or the figure may be woven entirely in one shade of color.

In drawing the pretty all-over figures often seen in scarfs, the same principle may be adopted, if proper care is taken in the planning of the pattern. In these days especially, anything which can reduce the cost of an article, while maintaining its quality intact, should receive due attention. And really, in the present instance, a waste of filling is not necessary, because, in the majority of cases, good and effective all-over patterns can be produced, where changing of shuttles can be accomplished with the best results.

In showing the method of interlacing of a figured satin where two systems of filling are employed, take for example, Fig. 2 which is a small polka dot pattern, and here, again, it may be observed that the two dots

or balls are quite clear of each other, so that each may be produced in a separate color. This figure shows the open style of drafting, *i. e.*, pick and pick. *Dot* type shows the satin, and the *cross* type, the figure pick binding.

It will be observed that the latter binding comes exactly in the same position as the satin, or, to use a technical term understood in the trade, "the two interlacings are on the same foot." This is necessary, since otherwise, the satin face would have a broken appearance. This is the principle adopted in drafting a pattern of this nature, whether it be a spot, a small figure, or an all-over effect. But in actual practice, a more ready method would be employed. That is, the



pattern would be drawn on every pick, and only the figure binding would be indicated upon the ruled paper, the ground satin being understood.

In cutting the cards, all that would be necessary would be to cut five cards for the ground satin on a Royle Piano machine, and then duplicate them as many times as required for the full design on a Royle Repeater, the cards being then laced alternately one ground satin and one figure.

In connection with the construction of some fabrics, floating of the filling on the face of the fabric is specially guarded against, but, in the present instance, floating often improves the beauty of the face of the fabric. In our design the float is over fourteen warp-threads (considering *empty* squares for risers) and this is not too long. The weave plan, in order to simplify the subject, is shown face down on the loom; cutting *empty* squares for risers will weave face up.

A satin composed of one system of warp and two systems of filling has been dealt with, but in some instances there is a ground warp as well as a satin warp used, in which case the figure filling should be bound with the former and not with the satin warp. This has the effect of keeping the satin clear of the figure pick.

The broad principles upon which figured satins for scarfs and neckties are designed have been given, but it will be obvious that these principles may be applied to the drafting of any satin fabrics, irrespective of the scope of the design.

Mat Patterns.

This class of weaves is much in vogue for the fabrics under notice, since some very pretty effects can be produced with these weaves by the use of warp and filling being of different shades of color.

Fig. 3 is an example of a mat weave, which produces a tissue exactly alike on both sides. The number of warp-threads and picks per inch may be varied according to the quality of the material to be woven. With 200 warp-threads per inch and 100 picks per inch, it then would be necessary to draft double the number of warp ends in comparison to that of the filling, thus requiring the use of 8 by 4 ruled point paper. The same weave could be drawn on a greater number of ends and picks than is shown in example, with good results.

Fig. 4 is another weave for a mat effect. This is a fairly good specimen, and would make a saleable cloth for any purpose where both sides are not required to be exactly the same.

Fig. 5 will also produce a mat effect pattern, but in this case the pattern would be the same on both sides. The beauty of a good mat effect in a fabric, lies in the floating of the warp and filling being unbroken, and also in its being a perfect reversible fabric, and we therefore give preference to the example in Fig. 3, but the others will also be useful.

This class of weave has been dealt with as far as the ground fabric is concerned, but many very good effects are produced by introducing figures, dotted about at intervals, keeping, however, within the mat formation. For instance, by using an extra shuttle, a diamond or a zig-zag, or other small figures can be introduced which can be varied in color by a change of shuttle. Take, as an example, black and steel blue for warp and filling, and a small figure with the extra filling of rose pink changing to white.

Further good effects are obtained by the use of striped warps, bringing up the squares of the mat in different colors by the aid of a change in shuttles. Take, for instance, Fig. 3 and stripe the warp alternately with five ends of tan and five of white, then, in the filling give ten picks of white and ten of steel blue, alternately, and a very pretty cloth is produced. The same method might be employed in the production of large checks or tartans, of course more colors being employed.

Ottoman Patterns.

To produce a perfect ottoman pattern, the rib should be the same on both sides; weave Fig. 6 possesses this qualification. Of course, the same weave could be used to produce a heavier rib, by introducing more picks. The example given is known in the trade as a four and four shoot. *Cross* type indicates the use of a ground (binder) warp, which is necessary in order to keep the fabric flat. This ground warp may be of cotton, without in any way injuring the appearance of the silk face of the fabric.

Another good ottoman weave is given in Fig. 7, which is useful for fabrics to be made into ties, be-

cause it is only a one-faced ottoman, whereas Fig. 6, being both sides alike, can be used for loose scarfs, that is, scarfs which the wearer folds and ties himself. A repeat and a half, filling ways, is given, to better show change of ribs at repeat, *i. e.*, 21 picks of the repeat of 14 picks in pattern are given.

Striping and dotting are favorite methods of ornamenting ottomans. As to a striping effect, for example weave twenty ribs of the ottoman in black filling, of course having a black warp, then change the shuttle and throw in about twenty picks of cardinal, say, a satin effect; then a few more ribs succeeded by another twenty picks of cardinal; then repeat the order. By this means a good striped fabric is obtained.

DYESTUFF PRODUCTION IN AMERICA.

According to the Bureau of Census, the production of synthetic dyestuffs in our country during the year 1914, amounted to about 3,300 short tons, valued at about $3,000,000.

The importations of coal-tar dyestuffs from Europe for the fiscal year 1914 were 25,700 short tons, valued at $9,102,000.

The domestic production was, however, confined largely to the assembling into finished dyestuffs of semi-manufactured materials. The only genuinely American contribution consisted in about 900 tons of aniline, made from benzol of domestic origin, the manufacture of which was started in 1910. Six factories were devoted to this branch, and 400 operatives were employed.

The advent of the war involved an almost complete cessation in the shipment of the coal-tar *intermediates* employed in our dyestuff plants, as far as they were of German origin.

Since March, 1915, no artificial dyestuffs have been received from Germany, which formerly contributed 86 per cent of our foreign supply.

All American industries dependent upon the use of artificial colors (and they are scores in number) were threatened by paralysis or discoloration.

Under untoward conditions American chemists and American capital have grappled with a serious problem and sought to relieve temporary distress, while laying the foundations for a comprehensive, self-contained American coal-tar chemical industry which should free us from dependence upon trans-Atlantic sources.

During the past year and a half a large amount of constructive work has been done. It has meant the creation of the industry from the bottom up, the multiplication of sources of coal-tar *crudes*, the organization of the manufacture of the many *intermediates*, and the construction of new units for the production of finished colors.

The recovery of coal-tar *crudes* from the by-products of coke plants has now been so perfected that the output is more than sufficient to cover the needs of a national color industry. Two years ago the annual output of these crudes was estimated as follows: Benzol, 9,600 short tons; toluol, 3,200 tons; naphthaline, 1,500 tons; and phenol, 75 tons. To-day the estimated annual output is: Benzol, 90,000 tons; toluol, 22,440 tons; naphthaline, 12,500 tons; phenol (chiefly synthetic), 10,000 tons.

About 33 companies, many of which are, however, small, are now occupied with the manufacture of coal-tar intermediates. The leading product is aniline, of which the output for 1916 will exceed 15,000 tons. Over 3,000 tons of other intermediates are currently produced by the same companies. Large additional amounts are made in the works of the companies directly engaged in manufacturing colors and making their own intermediates.

The number of these latter has expanded from 6 in 1914 to 16 in 1916. Many of these 16 are small concerns engaged in experiment work and in laying the foundation for future development. The current output represents an annual production of 15,000 tons of finished dyes. Of this amount about 3,000 tons is aniline used directly in dyeing aniline black upon fabrics, replacing temporarily an equivalent amount of sulphur black.

To a notable extent this sudden expansion in the American output of synthetic colors is due to the multiplication, on a vast scale, of the facilities for the production of direct blacks and sulphur blacks, thus meeting the most pressing needs of the textile interests, and effecting the largest possible manufacture of coloring material at a minimum expenditure of time and effort. There has, however, been a regular production of other colors, especially of blues, and steps are being taken to rapidly increase the extent and variety of the output in this field.

Natural Dyestuffs.

The Bureau of the Census reports a domestic output of such dyes in 1914 valued at $1,866,000.

The chief constituent was logwood extract, amounting to 14,500 short tons, and valued at $1,312,000. This represents an increase for this dyestuff of 32 per cent over the production of 1909.

Other natural dyestuffs (quercitron, fustic, cutch, archil, etc.) increased in value from $144,000 in 1914 to $544,000 in 1915, or 285 per cent.

It is evident that during the past few years there was a notably enlarged appreciation of the real value of natural dyestuffs on the part of American textile manufacturers. Colorists were gradually recognizing that the marvelous ease of application, attendant upon the use of synthetic dyes in most cases, had led to a neglect of natural colors, not justified by their unquestioned worth, under suitable conditions. Processes were perfected which broadened the field of application and heightened the degree of fastness attainable upon the use of individual vegetable dyes.

Under the pinch of famine conditions this trend has been swiftly accentuated. American extract works were fortunately in a position to enlarge their output rapidly, and were hampered only by difficulty in securing raw material from the West Indies and elsewhere as quickly as wanted.

As a result, it may be claimed that the natural dyes have materially aided in lessening the acuteness of the shortage in colors, and that they have been restored to a position which they should legitimately occupy in the well-balanced systematic tinctorial methods. There has been an increased recognition of the technical value of our indigenous quercitron and the utilization of the handsome yellow obtained from our osage orange in place of imported fustic has become an accomplished fact.

Mineral Dyes.

The production of such mineral colors as chrome yellow, orange, and green, iron buff, Prussian blue, ultramarine, etc., amounted in 1914 to 2,500 short tons, valued at $594,000. The increase in the value of the output during the quin-quennial period was 52 per cent. There has been no very noteworthy increase since 1914 in the manufacture of these wares, except in the case of ultramarine, for which there had been a considerable dependence upon European sources prior to the war.