

section of four threads of the effects, A, B, C, and D. Here 4-shaft weaves have been employed, but plans on 2, 3, 5, 6, etc., shafts are also used, only the sectional effects would, as explained, in compounds of these weaves, consist of two or four, three or six, five or ten, six or twelve, or other numbers of threads consistent with the multiple of ends and picks on which the weaves are respectively constructed.

239. *Waved "All-Over" Designs.*—This basis of design is originated in the same way as ordinary decorative types, that is in the first instance, sketched on plain paper, and, when a correct repeat unit has been determined, transferred on to the ruled paper for looming. Fig. 265 is such an "all-over" pattern, effective in composition, seeing that it may be woven in a shaft-mounting. The intersections in the design are representative of a definite weave unit, which implies that the design is intended to be applicable to different builds of fabric, according to the weaves used in its development. Four methods of working out the example are as follows—

- I.—In two single-plain weaves, when the order of colouring should be 1-and-1 in both warp and weft.
- II.—In double-plain makes, and in the same method of warping and wefting, producing the ground and coiled forms in distinct shades.
- III.—In a plain ground with weft figuring, weaving with a cotton warp and silk weft.
- IV.—In two simple twills, as a warp prunelle twill for the ground, and a weft prunelle twill for the pattern features.

Actual weaving data for these methods of fabric construction are specified below—

METHOD I.—COTTON

Warp.

1 thread of 2/40's cotton, tint 1.
 1 " " " " 2.
 36's reed 2's.

Weft.

1 pick of 20's cotton, tint 1.
 1 " " " " 2.
 70 picks per inch.

METHOD II.—WORSTED

Warp.

1 thread, 2/60's worsted, shade 1.
 1 " " " " " 2.
 21's reed 4's.

Weft.

Same as warp, 80 picks per inch.

METHOD III.—UNION

Warp.

2/60's cotton, 40's reed 2's.

Weft.

30's spun or artificial silk.
 80 picks per inch.

METHOD IV.—WOOLLEN COSTUME

Warp.

18 skeins woollen, 10's reed 3's.

Weft.

A darker tone of the warp.
 28 picks per inch.

240. *Scroll Surface Decoration.*—The scroll and waved form of pattern is strictly a species of "all-over" decorative effect. Thus, Fig. 266 is a running pattern resembling in formation a twisted ribbon. The waved lines, being continuous, should be equally distributed throughout the area of the texture. Unless this rule is observed in originating the sketch, when it is applied to the loom plan and produced in the fabric, bars or stripes of detail are formed, destroying balance of style. For working out the looming design, sateens, plain and repp, or twilled weaves may be combined. Fig. 266 is developed in 5-end makes, with the warp effect in the ground and the weft effect in the ribbon-like lines, so that it is applicable to silk, cotton, and worsted goods, varying the setting with the counts of the yarn employed, and the fineness of the fabric produced.

241. *"All-over" Patterns Spotted.*—Well-balanced "all-over" schemes of design are suitable for spotting, in which case they are used for decorating the ground of the fabric.

Either Fig. 265 or 266 may be thus treated, developing the supplementary spotting details, in the former, in extra weft,

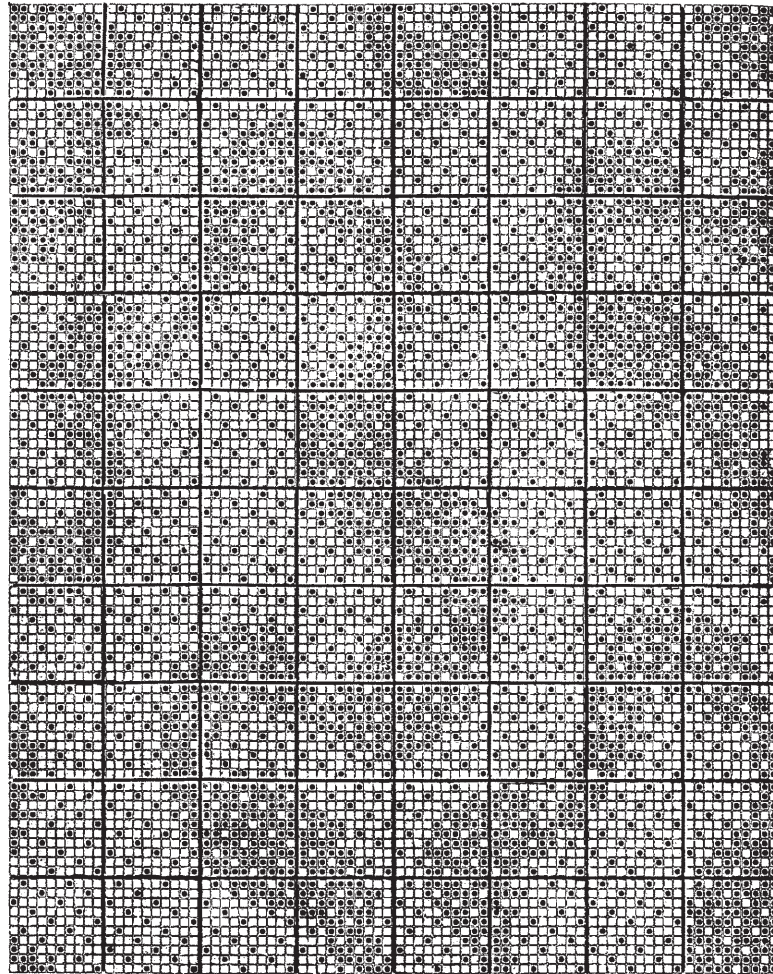


FIG. 266.—RIBBON OR WAVED STYLE.

and in the latter, in extra warp ; or the spotted types are weavable in distinct kinds of crossing from those in which the "all-over" pattern features are constructed. Drafted varieties of "all-over" designs (e.g. Fig. 264) are also spotted by each

of these practices. Another method of construction is illustrated in Fig. 267, where, on the irregular mottled ground in weft sateen and plain, two oval forms—the interior of which

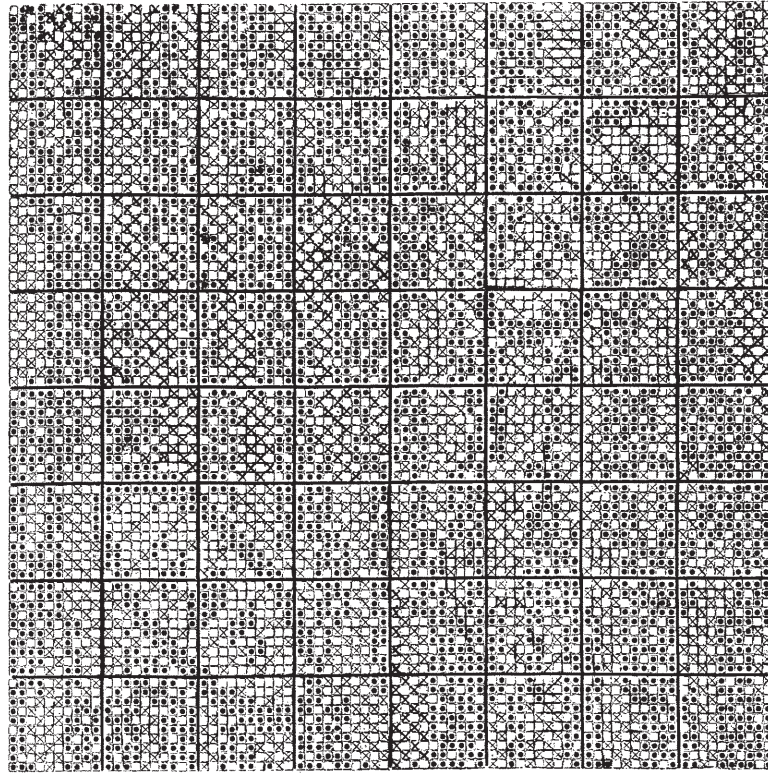


FIG. 267.—TRANSPPOSED SPOTTING ON “BLOTCHED” GROUND.

is spotted in weft details on a warp twill ground—are arranged in transposed positions.

Standard weave units should be used in the origination of these and similar types of pattern, which in decorative minutiae in the ground and in the spotting, are intended to be suitable for either dress or blouse textures woven in different qualities and counts of yarn. The composite structure and the sinuous but balanced figuring, if clearly defined in the fabric,

necessitates the employment of regular crossings in its development. Generally, such figuring is formed in weft-face weaves in contrast with a finer description of weave, as plain and sateen in Fig. 267, warp and weft prunelle twills (I Method, Paragraph 239), Fig. 265, and in two sateens, Fig. 266, but warp and weft cords, plain and twill, and plain and repp plans, may also be selected. The description of weave applied is governed by the character of the scrollwork, and by the class of manufacture desired.

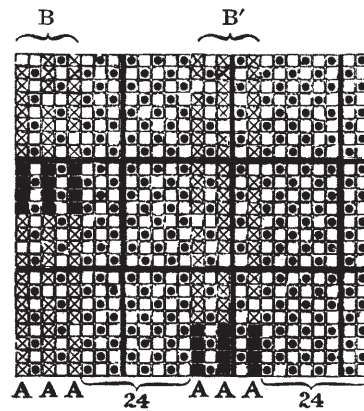


FIG. 268.—SINGLE THREAD EXTRA WARP SPOTTING.

242. *Extra Warp Effects*.*—Spotting or figuring in extra warp or weft, that is in threads or picks, in addition to the yarns employed in making the fabric proper, render the manufactured cloth two or multiply in such sections of the style as the special series of yarns occur.

Referring to the extra warp principle as illustrated in Fig. 268, it will be observed that, in parts B and B', the supplementary sets of threads A, would spot the surface of the texture where marked in ■'s. The ground of the cloth is plain woven. Any structure of weave or plan of decorative design is, however, usable in the production of the piece. The details

* See Chapters XV and XVI in *Colour in Woven Design*, and also Chapter IX in *Union Textile Fabrication*.

obtained in the extra threads are an additional element, but should be in keeping with the design due to the ordinary warp and weft of the cloth, and yet, in a structural sense, they require to be treated as a distinctive feature. It follows that the use of such yarns is in producing—on the face of a common or special type of manufacture—effects in a different tint or different quality of thread from the colour of the warp and weft yarns utilized in building a given grade of fabric. Thus, in Fig. 268, the cloth is plain throughout, but decorated by the threads A, so that by warping and wefting as below, a striped cotton blouse cloth would be made—

	<i>Warp.</i>										
2/30's cotton, bright colour	.	.	1	1	1	-	-	-	-	-	
” ” white ”	.	.	1	1	-	2	1	2	2	1	2
” ” toned ”	.	.	-	-	2	1	2	4	2	1	2
						30's reed 2's.					

Weft.
2/30's cotton, white, 60 picks per inch.

Obviously, the scheme of grouping the coloured threads in the warp must fit in with the arrangement of the design, while the ground sections are lined in the toned colour on the white ground. By employing cotton for the plain fabric, and worsted yarns for the spotting, the goods are adapted for piece-dyeing, tinting the threads made of the wool fibre, and leaving those made of the vegetable fibre in the natural or undyed state.

243. *Grouping of Spotting Threads.*—The spotting threads may be grouped singly or in series, or in accordance with the origination of any special motive or effect in the cloth. Systems of single-thread spotting with plain, striped, or checked grounds, are exemplified in Table XIII, shown on page 418.

The plans for the ground, which may be of a plain, twill, mock leno, or fancy weave structure, should be constructed to allow the spotting yarns to float over three or more ground picks in succession. In the first order of colouring, four ends

TABLE XIII
METHODS OF COLOURING SINGLE-THREAD WARP SPOTTED
EFFECTS

<i>Warp.</i>							<i>Weft.</i>
I	A 30			B 45			
Ground Shade or White . . .	4	4	8	8			White or Ground Shade.
Fancy Shade (1) or Tone 3, Plate IV, C.W.D.*	1	1	-	-			
Fancy Shade (2) or Tone 9, Plate IV, C.W.D. . . .	-	-	1	1			
II							
Ground Shade or White . . .		8	8	8			White or Ground Shade.
Fancy Shade (1) or Tint 4, Plate IV, C.W.D. . . .		1	-	-			
Fancy Shade (2) or Tint 10, Plate IV, C.W.D. . . .		-	1	-			
Fancy Shade (3) or Tint 14, Plate VI, C.W.D. . . .		-	-	1			
III	A 36			A 27			
Ground Shade (1) or White . . .	4	4	-	-			
" " (2) or Tint 14 Plate VI, C.W.D. . . .	-	-	4	4			White or Tint 14 and checked like Warp in ground.
Fancy Shade (1) or Tint 4, Plate VI, C.W.D. . . .	1	-	-	-			
Fancy Shade (2) or Tint 11, Plate IV, C.W.D. . . .	-		1	-			
IV							
Ground Shade (1) or White . . .	6	6	-	6	6	-	White Tint 11,
" " (2) or Tint 11, Plate VI, C.W.D. . . .	-	6	6	-	6	6	White, Tint 11, and 6 picks, White.
Fancy Shade (1) or Tint 5, Plate VI, C.W.D. . . .	1	-	-	-	1	-	12 " Tint 11.
Fancy Shade (2) or Tint 11, Plate IV, C.W.D. . . .	-	1	-	-	-	-	6 " White.
Fancy Shade (3) or Tint 14, Plate IV, C.W.D. . . .	-	-	1	-	-	1	
V							
Ground Shade (1) or Tint 4, Plate VI, C.W.D. . . .	5	5	-	-	-	-	White, Tints 4, 10, 14, and
Ground Shade (2) or Tint 10, Plate VI, C.W.D. . . .	-	-	5	5	-	-	10 picks, Tint 4
Ground Shade (3) or Tint 14, Plate VI, C.W.D. . . .	-	-	-	-	5	5	10 " " 10
Fancy Colour, Tint 10, Plate IV, C.W.D. . . .	1	-	1	-	1	-	10 " " 14
VI	A						Repeat A
Ground Shade (1) or White . . .	4	4	4	4	4	-	-
" " (2) Tint 6 Plate VI, C.W.D. . . .	-	-	-	-	-	4	4
Ground Shade (3) Tint 18, Plate IV, C.W.D. . . .	-	-	-	-	-	4	4
Fancy Shade (1) Tint 4, Plate IV, C.W.D. . . .	1	-	1	-	1	-	1
Fancy Shade (2) Tint 10, Plate VI, C.W.D. . . .	-	1	-	1	-	1	-

VI.—*Wefts.*—White, Tint 6 or 10 and checked in the ground colours to match the order of warping.

* Colour in Woven Design.

of ground weave and one end of spotting are combined for 30 threads, followed by eight ends of ground and one end of spotting for 45 threads. In other words, the order of grouping the two types of yarn requires, in the weave scheme, to tally with the system of warping. Taking, in illustration,

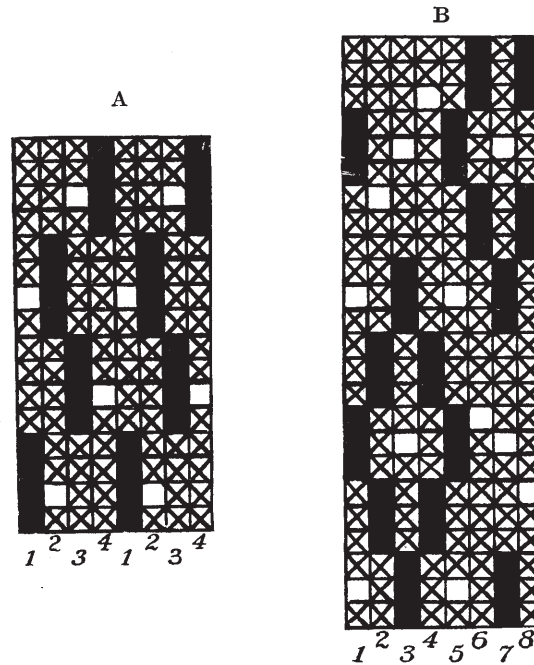


FIG. 269.

the spotting threads to be arranged as in A and B, Fig. 269, the looming practices for Colour Schemes I and II would be—

SCHEME I

- 4 threads of ground weave, e.g. plain or twill, and the first thread of plan A, Fig. 269.
- 4 " " " " plain or twill, and the second thread of plan A, Fig. 269.
- 4 " " " " plain or twill, and the third thread of plan A, Fig. 269, etc.

SCHEME II

- 8 threads of ground weave, e.g. plain, mat or fancy weave, and the first thread of B, Fig. 269.
- 8 " " " " plain, mat or fancy weave and the second thread of B, Fig. 269, etc.

From these sectional plans—A and B, Fig. 269—it will be seen that the spotting ends may be assorted to run in a broken twill, sateen, or other simple arrangement, or they may be made to give a small “motive” effect should eight or more threads be selected for this purpose. Further, it will be understood that, for the purpose of accentuating the spotting, they may first be grouped singly, second in pairs, third developed in thicker yarns than the threads in the ground warp, and fourth, they may be inserted in irregular and frequent order into the ground of the cloth.

On examining the Colour Schemes in Table XIII, the following features of the yarn groupings specified will be apparent—

In Scheme I the spottings would form a striped effect, the threads being grouped four-and-one in section A, and eight-and-one in section B. In Scheme II, three spotting yarns, running in regular sequence, are used, but their order might be varied on such principles as—

- | | | |
|-----|------------------------------------|-----|
| (a) | 3 spotting threads of Fancy Colour | (1) |
| | 1 „ thread „ „ | (2) |
| | 1 „ „ „ „ | (3) |
| (b) | 1 spotting thread of Fancy Colour | (1) |
| | 2 „ threads „ „ | (2) |
| | 1 „ thread „ „ | (1) |
| | 2 „ threads „ „ | (3) |
| (c) | 2 spotting threads of Fancy Colour | (1) |
| | 2 „ „ „ „ | (2) |
| | 2 „ „ „ „ | (3) |

having necessarily the requisite number of ground threads between such spotting ends.

In Scheme III, the ground shade (1) is spotted with tint 4, and shade (2) with tint 11. The spotting colours harmonize with the ground shades. In this system of colouring checked styles are obtained by matching the order of the ground shades in the weft; in Scheme IV the ground sections are

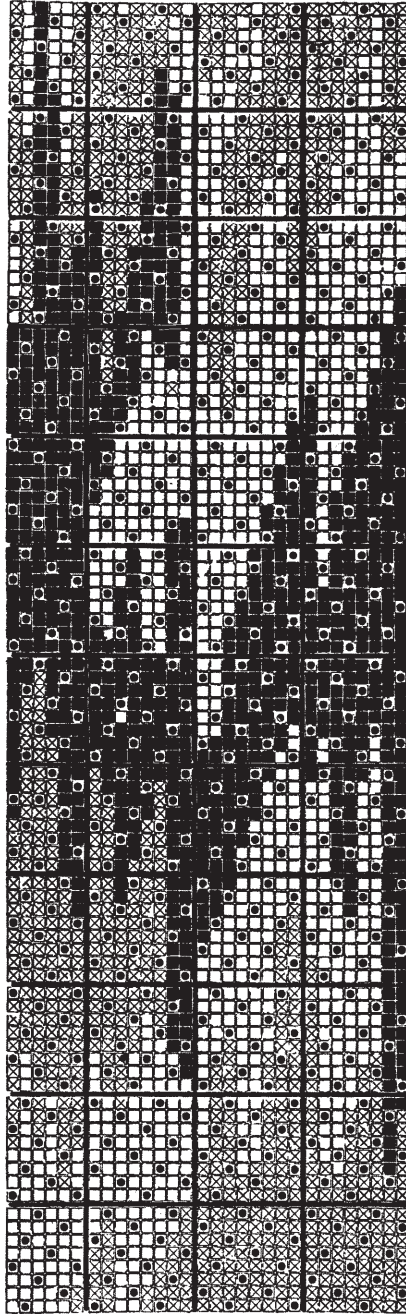
warped 12-and-12 and spotted in three tints: in Scheme V, three ground shades are combined in 10-and-10 order, and spotted with one fancy colour: and in Scheme VI, three ground shades, warped 20-and-20, are spotted with tints 4 and 10, the spotting colours toning with the shades in the ground.

It will be understood that the number of threads in each scheme are simply suggestive of those feasible, and that they would be variable in practice.

244. *Figuring in Two or Three Extra Yarns.*—For figuring in extra warp yarns, the supplementary threads may be run in regular sequence with the ground warp threads. This makes it possible to produce pattern features in all parts of the fabric, and in a manner distinct from spotting its surface at intervals, as when the extra yarns are sectionally inserted into the cloth. By taking a figured effect of this character, and using two extra yarns, this design practice will be understood from the example in Figs. 270 and 270A. Here is seen the actual formation of the mottled or blotched type of effect which would be woven in the cloth if three shades of warp yarn were used. Each thread in the plan corresponds to three threads in the looming, so that the □'s are to be considered as representing one effect, the ⊠'s a second, and the ■'s a third effect. Assuming the order of the warp to be—

1	thread	of	2/60's	cotton	white
1	„	„	60's	2-fold	silk tinted grey
1	„	„	„	„	„ toned grey

and the weft white, with 180 threads and 80 picks per inch in the loom, the sections in □'s would be in white, those in ⊠'s in tinted grey, and those in ■'s in toned grey. As in Fig. 268, the spotting ends float on the underside of the fabric when not used on the right side for decorative purposes, so in this structure each shade of yarn, when not appearing in the figure, is intersecting in sateen order on the reverse



123456

FIG. 270. (Section only.)
EXTRA WARP "BLOTCHED" TYPE.



FIG. 270A.

side of the cloth. The sectional plan (Fig. 270A) makes this clear. It is composed of threads three, four, and five of Fig. 270, in the exact relation in which they would occur in the weaving process. Each of these three threads corresponds to three separate warp yarn units in the textures, giving nine threads in the cloth arranged thus—

Thread 3, Fig. 270—

Intersections in	□'s	= white or thread	. 1	in Fig. 270A.
„	„	⊗'s	= tinted grey or thread	2 „ „
„	„	■'s	= toned grey or thread	3 „ „

Thread 4, Fig. 270—

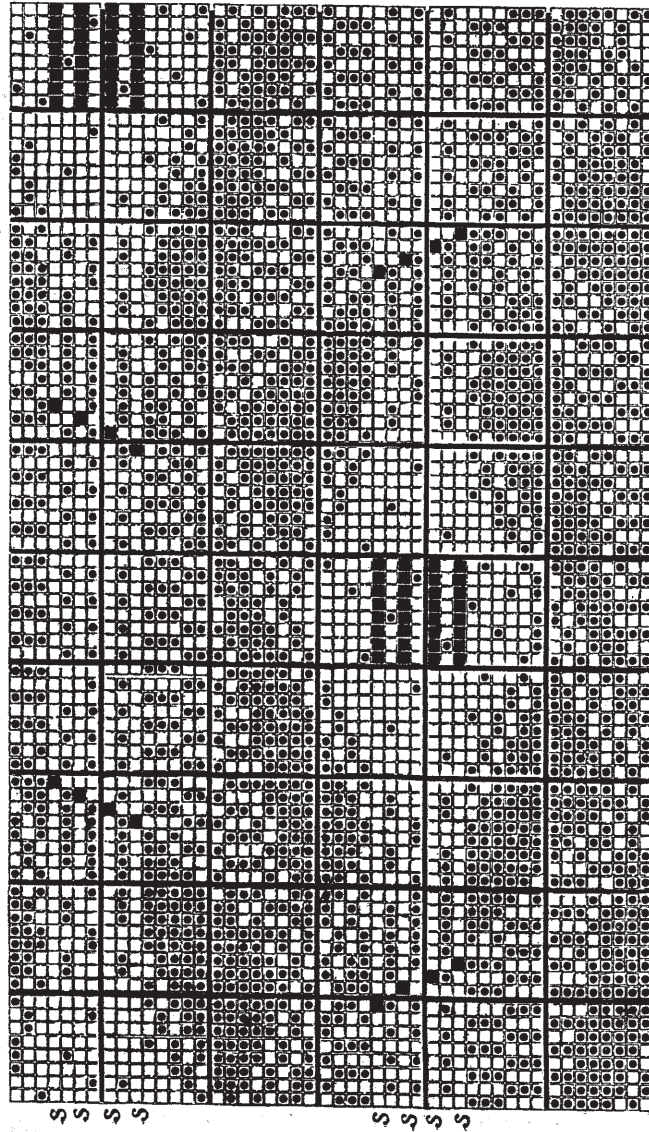
Intersections in	□'s	= white or thread	. 4	„ „
„	„	⊗'s	= tinted grey or thread	5 „ „
„	„	■'s	= toned grey or thread	6 „ „

Thread 5, Fig. 270—

Intersections in	□'s	= white or thread	. 7	„ „
„	„	⊗'s	= tinted grey or thread	8 „ „
„	„	■'s	= toned grey or thread	9 „ „

In addition to this example illustrating the principle of extra warp design construction, it is illustrative of an economic system of manufacture in which only one third of the number of picks as threads is needed. The weft neither shows on the face nor on the back of the fabric, but lies between the three series of warp yarns. Hence, each of the threads—white, tinted, and toned grey—in Fig. 270A, where not interlacing in warp sateen on the right side of the cloth, interlaces in warp sateen (as shown in the details [a]) on the underside. Here 5-shaft weaves are combined, but 7-shaft and 8-shaft sateens and diamond and twilled makes, may also be applied.

245. *Extra Weft Spotting*.—The method of inserting weft spots, or of using extra yarns in the weft, for special colour effects, is first shown in Fig. 271, the design for the *piqué* texture in Fig. 271A. Apart from the spottings in ■'s, it is an effective build of fabric, with the ground in $\frac{3}{3}$ warp cord, and the pattern details in flushed weft and in warp



sateen, the specimen having been produced in 2/60's mercerized cotton warp, 32's reed 4's, and wefted—

		13 picks of 2/30's mercerized cotton, ground shade.				
For	{	1	„	„	„	fancy cotton.
7	{	1	„	„	„	mercerized cotton or silk.
		17	„	„	„	„ ground shade.
For	{	1	„	„	„	fancy cotton.
7	{	1	„	„	„	mercerized cotton.
		3	„	„	„	„ ground shade.
		60 to 64 picks per inch.				

The extra picks in the design run on the back of the texture—except in the parts in which they decorate the face of the



FIG. 271A.

cloth—on the same system as the extra threads A in Fig. 268. This is the rule for the insertion of the spotting picks in this class of patternwork. Consider, for instance, the development of the spotted motives in Figs. 222 and 263. They involve the picks on which they occur, being stamped twice in preparing the designs for the loom, for each of the picks in parts S represents two shots of weft in the weaving of the fabric. Thus, in Fig. 222, the details *a* indicate the positions in which the spotting picks would be tied on the underside

of the fabric ; but such picks also constitute the ordinary weave effect in the ground of the texture : hence, for preparing the cards for, say, the first two picks of the design, the order of stamping would be—

1st Weft line 1 = first ground pick — lift or cut ■'s and □'s.
 2nd Weft line 1 = first spotting pick — ,, ,, grey marks ,, □'s.
 3rd Weft line 2 = second ground pick — ,, ,, ■'s ,, □'s.
 4th Weft line 2 = second spotting pick — ,, ,, grey marks ,, □'s.

The stitching points are not shown in Fig. 263, but the method of stamping for the spotting picks would follow that of Fig. 222, that is, with the addition of the necessary number of ties for securing such picks regularly to the underside of the fabric.

246. *Weft Ground and Extra Yarn Spotting.*—When warp-face weaves are employed in the ground of the texture, parts of the spotting may be produced in the ground weft, and special parts in the extra weft yarn. Prunelle, $\frac{1}{3}$ and sateen twills, warp cords and warp-face corkscrews, etc., are all used in this build of cloth. The examples—Figs. 272 and 273—are suggestive of the employment of a twilled make in the ground. This enables a pattern quality to be obtained in the ordinary weft—marked in □'s—as well as in the extra yarn—marked in ■'s. Each line of weft in the sections bracketed A and B, in Fig. 272, corresponds to two and three picks of weft as explained relative to Figs. 222 and 263. While the use of the ground weft here, proves economical in weaving, it somewhat restricts the diversity of colouring, particularly as regards the degree of contrast admissible between the colour of the extra weft yarn and that of the warp yarn. The reason for this is, warp-face twills do not provide such suitable positions for the insertion of the ties as weaves in which the warp and weft are equally intersected. It should, however, be understood that a warp-face plan, in the ground sections, helps to emphasize the figuring due to the shuttling yarn applied in the construction of the fabric.

247. *Warp and Weft Orders of Colouring applied to Decorative Pattern Construction.*—Each weave unit not only produces a specific build and variety of fabric, but, in fixed orders of warping and wefting, yields definite and standard types of pattern. It follows that the “colour effects,” characteristic of the different plans of intertexture, are combinable in the

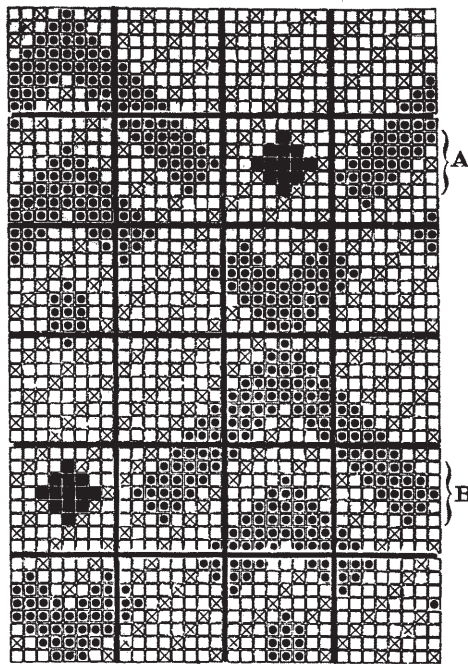


FIG. 272.—MOSAIC TYPE WITH EXTRA YARN FEATURES.

formation of geometric, spotted, and mosaic styles of design, in which the integral features are formed in distinctive weave units, and developed in certain arrangements of warp and weft threads, such as 1 and 1; 2 and 2; 3 and 2; 2, 1, 1 and 1; 2, 2 and 2; 3 and 3, etc. The practice involves, first, the working of the design sketch on point paper in colour, using three or four tints; second, the selection of weave elements

adapted to the effective development of the several sections of the design; and third, the application to the latter of schemes of warping and wefting suitable for delineating the several outlines and features of the style.

Factors I and II have been treated of, and are common to

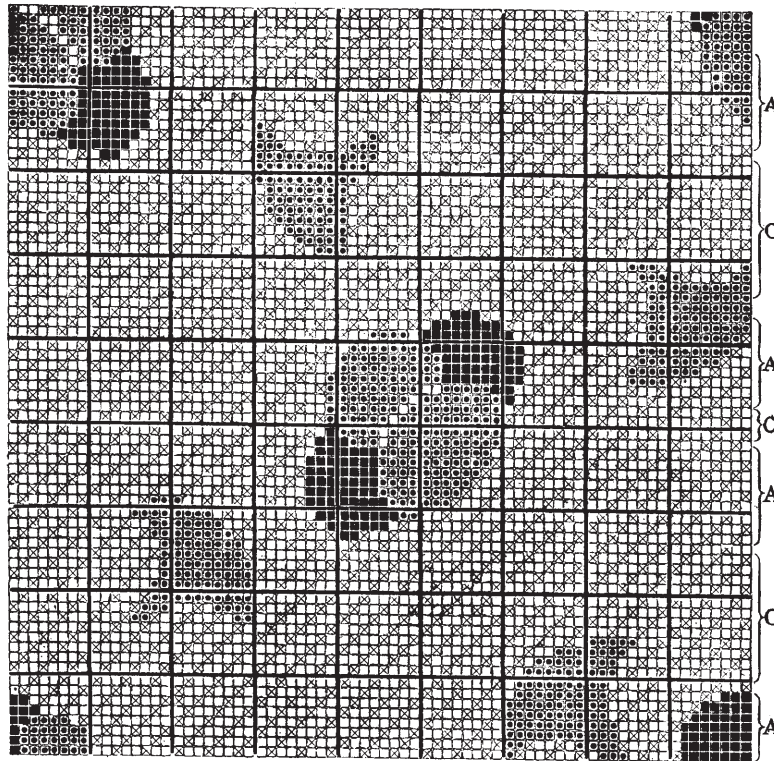


FIG. 273.

SIX-END SATEEN SPOTTED BASE, WITH EXTRA YARN SPOTTINGS.

all descriptions of decorative design. The third factor comprises both the theory and principles of textile colouring as understood in applying orders of warping and wefting, in two, three, and more colours, to standard weave structures. Interlacing, for example, two shades of warp and weft yarns, 1-and-1 in a plain woven texture, gives hair-line stripe effects;

in the cassimere, two varieties of step twill; in the double-plain make, one shade of cloth over another; in warp cord, transverse lines in the two colours; and in weft cord, lines in the two shades warp-ways of the cloth. Changing the order to 2-and-2 produces in the plain crossing the type of effect at *b* in Fig. 65 B; in the cassimere a small check, and in the 2-and-2 mat a star check. Different systems of yarn grouping such as those specified in Table XIII, and different weave elements, modify the pattern types obtained. Textural details, due to colour and weave, of this character, are usable in developing spotted and figured designs, as may be explained by reference to Figs. 226, 264, and 273, when warped and wefted thus—

FIG. 226.—*Warp and Weft.*

1 thread of shade (1)
1 „ „ „ (2)

FIG. 264.—*Warp and Weft.*

2 threads of shade (1)
2 „ „ „ (2)

changing (Fig. 264) the sections in □'s to plain and those in ■'s to $\frac{2}{2}$ twill.

FIG. 273.—*Warp and Weft.*

1 thread of shade (1)
1 „ „ „ (2)

changing—Fig. 273—the prunelle to plain weave, and producing the spotted sections in □'s in double plain, and those in ■'s in the inverted double-plain crossing.

As a result of the order of colouring for Fig. 226, the design would be developed in hair-line effects, with the sections in grey in the lines lengthways of the texture, and the sections in ■'s across the texture. The “all-over” drafted pattern, Fig. 264, when modified as indicated above, would consist in the ground of the effects seen at A, Fig. 67, and, in the $\frac{2}{2}$ twill sections, of small checkings; while the ground of Fig. 273 would be in fine lines, and the spottings printed in □'s in shade (1), and those printed in ■'s in shade (2). Weave

430 *DRESS, BLOUSE, AND COSTUME CLOTHS*

and colour assortment are, in these examples, observed to retain the pattern form in each instance, but to alter completely the textural style and tone.

Spotted and "over-all" schemes of design are specially adapted for this practice in looming, arranging the spotted motives on a sateen or geometric basis, and constructing the "all-over" patterns on the drafted principle. The weave plans and orders of colouring commonly employed in making such styles, with the types of effect they severally produce, are described in Table XIV.

TABLE XIV
PATTERN TYPES DERIVED FROM FUNDAMENTAL WEAVES IN SIMPLE
ORDERS OF WARPING AND WEFTING*

<i>Order of Warping and Wefting.</i>	<i>Weave Unit.</i>	<i>Textural Effect.</i>
1 thread of Shade (1) 1 " " " (2)	Plain	Hair-line stripes in the direction of the warp or in the direction of the weft.
Ditto, in the Warp crossed with one shade of Weft yarn	Warp-cord	Transverse lines in the two yarn shades.
Ditto, in the Weft, using one shade of Warp yarn	Weft-cord	Longitudinal lines in the two yarn shades.
1 thread of Shade (1) 1 " " " (2)	$\frac{1}{2}$ Twill	Small step twill in the shades combined.
ditto	Warp Swansdown	Similar to the plain but in finer set cloths.
ditto	Weft	Ditto, but in transverse lines.
ditto	Double-plain	Two textures, one over the other, in Shades (1) and (2) respectively.
2 threads of Shade (1) 1 " " " (2)	Plain	Small lines in Shade (2) at right angles to each other on a ground woven in Shade (1).
2 threads of Shade (1) 1 " " " (2)	Prunelle	Hair-line stripe with the lines in two threads in Shade (1), and in one thread of Shade (2).
2 " " " (1) 2 " " " (2)	Plain	As in Fig. 67A.
ditto	$\frac{1}{2}$ Twill	Small checking.
ditto	$\frac{1}{2}$ Mat	Star Check.
3 threads of Shade (1) 1 " " " (2)	Warp Swansdown	Hair-line stripe with the lines in three threads in Shade (1) and in one thread in Shade (2).
ditto	Weft "	Ditto, but across the piece.

* See Chapter VIII, *Colour in Woven Design.*

TABLE XIV—(continued)

<i>Order of Warping and Weaving.</i>	<i>Weave Unit.</i>	<i>Textural Effect.</i>
3 threads of Shade (1) 2 " " " (2)	2^2 Twill	Irregular check.
ditto	2^2 Mat	Lines in the warp or in the weft.
3 threads of Shade (1) 3 " " " (2)	Plain	Broken check.
ditto	2^2 Twill	Well-defined twilled check.
ditto	2^2 Mat	Broken check.
1 thread of Shade (1) 1 " " " (2) 1 " " " (3)	Plain	Three groups of lines at right angles to each other.
ditto	3^2 Twill	Ditto, but lines less defined.
2 threads of Shade (1) 1 " " " (2) 1 " " " (3)	Warp Swansdown	Hair-line stripe with lines in two threads in Shade (1) and in single threads in Shades (1) and (2).
2 " " " (1) 1 " " " (2) 1 " " " (3)	Weft	Ditto, but across the piece.
2 " " " (1) 2 " " " (2) 2 " " " (3)	2^2 Mat	Effect A, Fig. 68B.
ditto	3^2 Twill	Similar effect, but more broken in structure.
2 threads of Shade (1) 1 " " " (2) 1 " " " (3) 1 " " " (4)	5-end Warp Sateen or Twill	Hair-line stripe with lines in two threads in Shade (1), and in single threads of Shades (2), (3), and (4).
ditto	5-end Weft Sateen or Twill	Ditto, but across the piece.
1 thread of Shade (1) 1 " " " (2) 1 " " " (3) 1 " " " (4) 1 " " " (5)	5-end Warp Sateen or Twill	Hair-line stripe in five shades.
ditto	5-end Weft Sateen or Twill	Ditto, but lines across the piece.

248. *Compound Weave Spotting and Figuring.*—The principles and technicalities of decorative design in compound weaves are specially analysed in Chapter IX. Here, however, some explanation of the use of these weaves in originating spotted patterns, needs to be given. The ordinary makes employed are—

Double-plain ;
 Double-prunelle ;
 Double-cassimere, and
 Double-sateen.

Three-ply weaves are also employed and compound makes with different weave units on the two surfaces, and also treble makes, in which the face, centre, and backing weaves may differ, or be the same in structure, such as—

DOUBLE STRUCTURES.*

- (a) Plain-woven on one side, and mat or twill-woven on the other side, with the two textures interchangeable.
- (b) Cassimere on one side, and mat or cord on the other side, with the two textures interchangeable.
- (c) Sateen on one side, and twill-woven on the other.

THREE-PLY STRUCTURES.*

- (a) Plain weave face, centre and back, with each texture interchangeable.
- (b) Prunelle twill face, centre and back, with each texture interchangeable.
- (c) Cassimere twill face, centre and back, with each texture interchangeable.
- (d) $\frac{2}{3}$ twill face, plain centre and $\frac{2}{3}$ mat back, with each texture interchangeable.
- (e) $\frac{2}{3}$ twill face, prunelle twill centre, and $\frac{2}{3}$ mat back, with each texture interchangeable.

Double-weave structures produce one cloth unit composed of surface and underside textures, and in three-ply weaves they produce one cloth composed of three textures, one over the other, with, as stated, two or three textures interchangeable in position, that is, they may form either the face or back of the fabric in the double-makes, or the face, centre or back successively in the treble makes.

The subject is illustrated in plans A, B, and C, Fig. 274, three double-plain effects forming striped, checked, and spotted pattern types. If coloured, in the warp and in the weft, one thread of light fawn and one thread of tinted green, the grey and black details in the plans would be in fawn in the cloth, and the white and dotted details in green. Otherwise dissected, section 1 in A, Fig. 274, would give a plain-woven fawn texture covering a plain-woven green texture,

* See Chapter XIII, *Woollen and Worsted*.

and section 2 a green covering a fawn texture. This possible interchange of the two textures from face to back and *vice versa*, renders it practicable to produce any description of spotted or decorative style by applying weave 1 to the coloured sections of the design on the point paper, and running weave 2 on to the ground. Adapting this practice to Fig. 238, the pattern would be sketched in colour on the ruled paper to the required scale, then weave 1, Fig. 274, would be dotted on the pattern thus prepared, and weave 2 applied to the ground ;

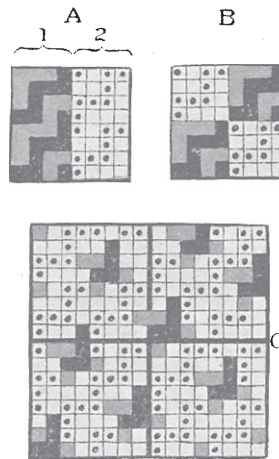


FIG. 274.—DOUBLE PLAIN STRUCTURES.

so that with the order of colour specified for Fig. 274, the design features in Fig. 238 would be developed in fawn colour on a green surface. To produce the same pattern in twill or in twill and mat, it would only be necessary to select double-weaves of the description given above. Should the decorative elements be desired in two colours, and in two types of texture, with the ground in a third texture, then the "rosette" forms, Fig. 238, would in transferring the sketch on to point paper, be drawn in one colour, and the line characteristics in a second colour, and three-ply weave structures employed, such as plans made on the principle of

(*d*) or (*e*). This would, however, require to be made in three forms, namely, for plan (*d*)—

(1)	{	1	thread	and	1	pick	face	=	$\frac{1}{2}^2$	twill.
		1	„		1	„	centre	=		plain.
		1	„		1	„	back	=	$\frac{1}{2}^2$	mat.
(2)	{	1	„		1	„	face	=		plain.
		1	„		1	„	centre	=	$\frac{1}{2}^2$	mat.
		1	„		1	„	back	=	$\frac{1}{2}^2$	twill.
(3)	{	1	„		1	„	face	=	$\frac{1}{2}^2$	mat.
		1	„		1	„	centre	=	$\frac{1}{2}^2$	twill.
		1	„		1	„	back	=		plain.

If these three plans should be used, thus—

No. (1) in the ground, No. (2) in the floral forms, and No. (3) in the line effects; they would result in the ground being twill woven on the face and mat woven on the back, the floral forms in plain on the face and mat on the back, and the line features in mat on the face and plain on the back.

249. “*All-over*” *Patterns Developed in Double Weaves*.—“*All-over*” patterns of the class illustrated in Fig. 264, are producible in double weaves. Providing that, in this design, the number of threads in sections A to D should be increased respectively to 6 and 12, and two double-plain makes arranged—

1 thread of ground yarn,
1 „ „ spotting or figuring yarn, and
1 „ „ ground yarn—

should be applied, the style acquired would be of the type sketched in Fig. 275, which has been warped and wefted thus—

For	{	1	thread	of	worsted	yarn,	dark	shade.
48 threads.		1	„		„	„	„	light shade.
		1	„		„	„	„	dark shade.
For	{	1	„		„	„	„	dark shade.
48 threads.		1	„		„	„	„	light shade.
		1	„		„	„	„	dark shade.

In the specimen—Fig. 275—the weave units interchange the positions of the two groups of yarn according to their

distribution, or according to the system in which they are combined, which, in this example, consists in applying a double-plain make, which takes the spotting yarn on to the underside of the fabric in the place of the plan marked in □'s, in Fig. 264, and a double-plain make, which brings this yarn on to the surface, in the place of the plan marked in ■'s. That compound makes of this order are also combinable in constructing spotted styles in which the motives are planned

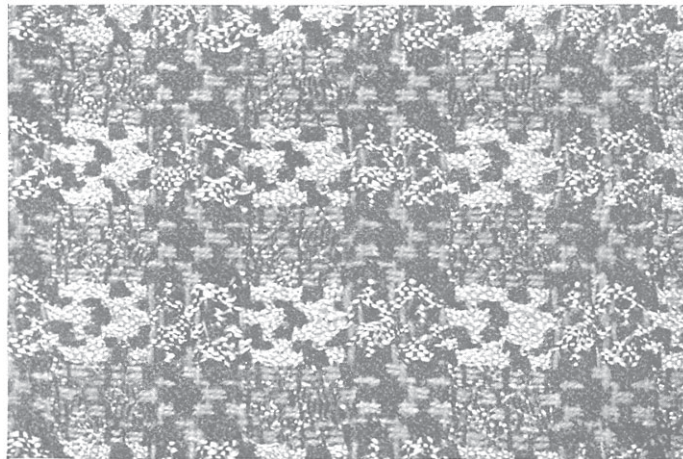


FIG. 275.—ALL-OVER EFFECT IN DOUBLE-PLAIN WEAVES.

on a geometric base, is evident from the illustration in Fig. 276. Here the threads and picks marked in ⊠'s, ⊡'s, and in ■'s interlace plain, the order of the threads being—

- 1 end of ground ;
- 1 „ spotting ; and
- 1 „ ground in both warp and weft.

The ground yarns in the design make a common twilled texture, but the plain weave, or any other suitable plan might also be used. Examining the threads and picks, S, S', it will be seen that they intersect plain throughout, but only appear on the face in such positions of the design where marked in

the symbols \square 's and \blacksquare 's, that is, in the spotted features. Assorting the yarns in the looming and in the shuttling—

- 1 thread of toned brown,
- 1 " " tinted brown, and
- 1 " " toned brown,

would produce a cloth on the surface with the ground in

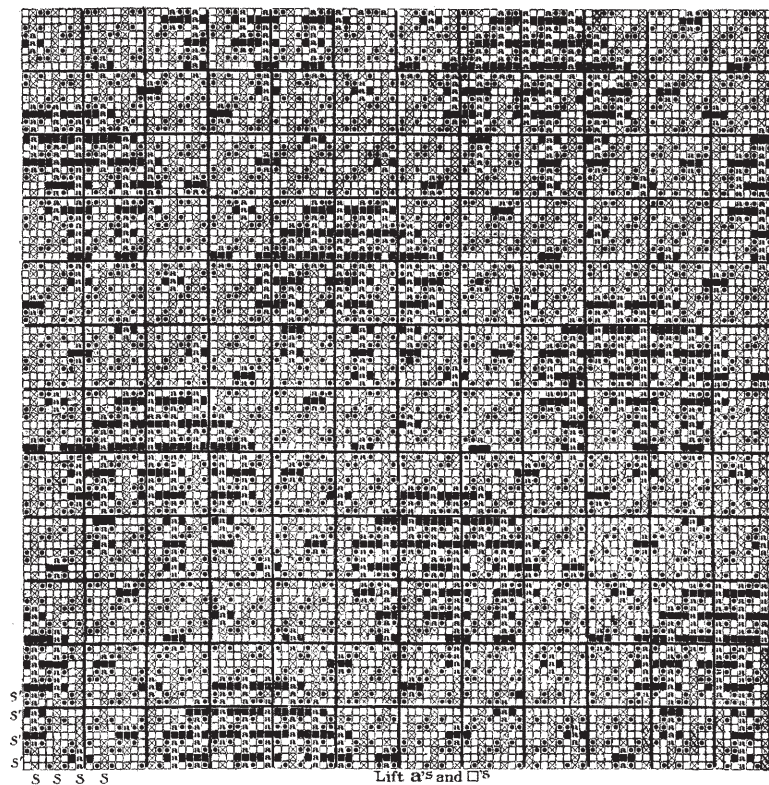


FIG. 276.—REVERSIBLE MAKE OF SPOTTED DESIGN—EIGHT-END SATEEN BASE.

toned brown, and the spottings in tinted brown, and on the underside, with the two colours interchanged in position.

250. *Figured Pattern Origination by the use of Double Weaves and Orders of Warp and West Colouring.*—It has been

explained how, by combining several weaves in one simple order of colouring, the ground and the decorative elements in figured designs are produced. With two or three double-weave units, the "colour effects" they give are interchangeable on like principles as in the combination of single-weave colour types. Having, for example, double weaves constructed and coloured on the following lines—Table XV—it is feasible to interchange the effects which they produce on the face and back of the fabric respectively.

TABLE XV

INTERCHANGEABLE DOUBLE-WEAVE STRUCTURES IN FIGURED
PATTERN DEVELOPMENT

- A.—Double-plain Weave coloured in both warp and weft in the surface texture—
 1 thread of Shade (1).
 1 " " " " (2).
 And coloured in the underneath texture in Shade (1).
- B.—Double-prunelle Weave coloured in both warp and weft in the surface texture—
 2 threads of Shade (1).
 1 thread of Shade (2).
 And coloured in the underneath texture—
 1 thread of Shade (1).
 2 threads of Shade (2).
- C.—Double-cassimere Weave coloured in both warp and weft in the surface texture—
 1 thread of Shade (1).
 1 " " " " (2).
 And coloured in the underneath texture—
 2 threads of Shade (1).
 2 " " " " (2).
- D.—Double-Structures with Plain face and $\frac{2}{2}$ Mat back, coloured in both warp and weft in the surface texture—
 1 thread of Shade (1).
 1 " " " " (2).
 And coloured in the underneath texture—
 2 threads of Shade (1).
 2 " " " " (2).

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The pattern types obtainable by these compound weave units and colourings comprise—

Plan A.—Face texture, in hair-line stripes.
Under texture, in solid colour.

Plan B.—Face texture, in hair-line stripes, with lines in two threads of Shade (1), and in single threads of Shade (2).
Under texture, in hair-line stripes with lines in two threads in Shade (2), and in single threads of Shade (1).

Plan C.—Face texture, in stepped twill effect.
Under texture, in checked effect.

Plan D.—Plain texture, in hair-line stripes.
Mat texture, in star check effects.

Providing, as explained, two weaves—one the reverse of the other—are employed, e.g. types A and B or C and D, the pattern units in the two weave types are interchangeable in design construction. Outlining in colour, for example, Fig. 239 on point paper, and running weave A on to the ground, and the reverse of A on to the figured sections, would give the ground in hair-line stripes, and the figuring in a plain colour; or changing the weave to C for the figuring, and this weave inverted for the ground, would give the former in a step twill and the latter in small checks.

In selecting weave units for combination in the development of this description of design, their structural character has to be taken into account, and also the character of the effect which they give in a specific order of warping and wefting. If the designs should be full of detail, the smaller weave units and the simpler orders of colouring are the more suitable. On the other hand, should the decorative types employed be framed on a geometric or sateen basis, then the $\frac{1}{2}$, the $\frac{3}{3}$, and the $\frac{4}{4}$ systems of shade arrangement may be utilized. In addition, varieties of figured styles are preparable for the loom in two sateen weaves—warp and weft-face in structure—which are adapted for textural production in hair-line effects in three, four, and five shades.

251. *Spotting in the Backing Threads and Picks of Double Weaves.*—A useful practice in spotting compound-make cloths is that of bringing certain backing yarns on to the face, or on the principle of intertexture illustrated in Fig. 277. In this design the ends A and the picks B interchange from the under to the face side of the fabric in the positions marked in a's, and in ■'s. The ground of such textures is weavable

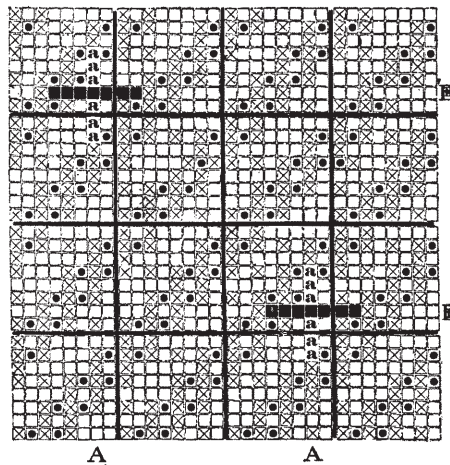


FIG. 277.—DOUBLE-WEAVE SPOTTED WITH BACKING THREADS AND PICKS.

in one shade, or it may be striped or checked with the transposed spotting threads in a bright colour, or in a distinct sort of yarn from that used in the body of the texture, as, for example—

FIG. 277.—WORSTED COSTUME

Warp.

- 6 threads of 2/64's worsted ground shade.
- 1 thread of 2/30's bright colour mercerized cotton.
- 9 threads of 2/64's worsted ground shade.

Weft.

- 9 picks of 2/64's worsted ground shade.
- 1 pick of 2/30's bright colour mercerized cotton.
- 6 picks of 2/64's worsted ground shade.

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FIG. 277.—COTTON DRESS FABRIC
(but changing the design to a double-plain make structure).

		<i>Warp.</i>	
Face yarn—			
Tint (1)	. . .	2	2
„ (2)	. . .	4	—
Backing and Spotting yarn—			
Tint (1)	. . .	3	4
Silk, fancy colour	. . .	1	—
		<i>Weft.</i>	
Face yarn—			
Tint (1)	. . .	3	1
„ (2)	. . .	4	—
Backing and Spotting yarn—			
Tint (1)	. . .	4	3
Silk, fancy colour	. . .	1	—

According to the first of these practices, a worsted cloth in mixture or plain yarns is woven, spotted with mercerized cotton, but in the second practice a double-plain cotton texture is made, checked in the ground on the face, and woven in one colour on the back, and spotted in single threads and single picks of silk.

CHAPTER IX

PRACTICE IN FIGURE DESIGNING

252.—Principles of Ornament. 253.—Sicilian, Florentine, and Genoese Specimens. 254.—Oriental Designing Craft—Chinese and Japanese. 255.—Indian Loomwork. 256.—Design Skeleton or Structural Base. 257.—Textural Dimensions of Antique Decorative Patterns. 258.—Material and Texture. 259.—Setting and Pattern Scale. 260.—Transference of Sketch on to Point Paper. 261.—Structural Types of Figured Patterns. 262.—Weft Figuring on a Common Weave Ground. 263.—Sateen Pattern Production. 264.—Pattern Diversification in Sateen Figuring. 265.—Fine Sateen Structures. 266.—Sateen Weave Figuring in Combination with other Weave Principles of Design. 267.—Form Definition in Extra Yarn Figuring. 268.—Figuring by Colour Insertion in the Shuttling. 269.—Double-Weave Figuring. 270.—Reversible Figured Goods. 271.—Compound Figured Structures. 272.—Matelassé Principle. 273.—Shading Practice in Figuring. 274.—Scale of Intersections. 275.—Looming Structure—Shaded Designs.

252. *Principles of Ornament.*—There can be no attempt made in this work to analyse the Principles of Ornament. They constitute a study in themselves which the student of decorative design needs to pursue concurrently with his training in textile technology. Some of the fundamental features of the subject may, however, be outlined, especially as they obtain in historic and modern styles of figured woven manufactures, and as they relate to high-class dress fabrics.

Nature, as illustrated in plant life, is a constant and illimitable source on which textile pattern origination draws. Loomwork, in the facilities and flexible technique it offers, as understood in the practice of interlacing threads of warp and weft, lends itself to the production, in a textural result, of the multi-variety of decorative units which natural forms possess and suggest.

Historic specimens demonstrate this idea, which is alike

emphasized in ancient Egyptian, Byzantine, and Grecian textiles, the surface of which is embellished with decorative work, inspired by or derived from the stem, leaf, and flower formation of the lotus, the iris, and the vine.

The damasks, brocades, velvets, and embroideries of the Sicilian, Florentine, Venetian, and Genoese worker of the twelfth to the sixteenth centuries, are masterpieces in the selection and grouping of animal, bird, plant, and flower features. The ornamentation is conceived and drafted on conventional and traditional lines, and on such principles of looming as subsist in the specimens reproduced in Figs. 278, 279, and 280. In addition to the decorative types here exhibited, in the ogee and medallion patterns of this school of woven design, fruit forms, particularly of the pomegranate variety, freely occur.

253. *Sicilian, Florentine, and Genoese Specimens.*—Early Sicilian textures not infrequently bear the impress of Eastern influence, both in decorative structure and in style composition. Thus, in Fig. 278, Arabic lettering is inserted in the panels, and a running border of Persian extract is introduced, while the method of treating and distributing the bird and animal types are peculiar to Eastern conception. Apart from the historic significance of this twelfth century specimen, the design is suggestive of true textile craftsmanship. The framework of the "repeat" is skilfully devised; the larger figures are consistently grouped with the central flower and leaf ornamentation; and the intermediate or ground spaces of the pattern are vigorously decorated.

Fig. 279 is of a later date, and texturally of the Genoese character. Here the decorative quality is enhanced by the looming practice followed, inasmuch as the figured sections are developed in velvet pile on a smooth warp-sateen surface. The ornament is partially geometric and partially floral in structure, with the flower and leaf details proceeding naturally from a central or parent stem. The "skeleton," or basic lines on which the pattern is elaborated, is that of constructing

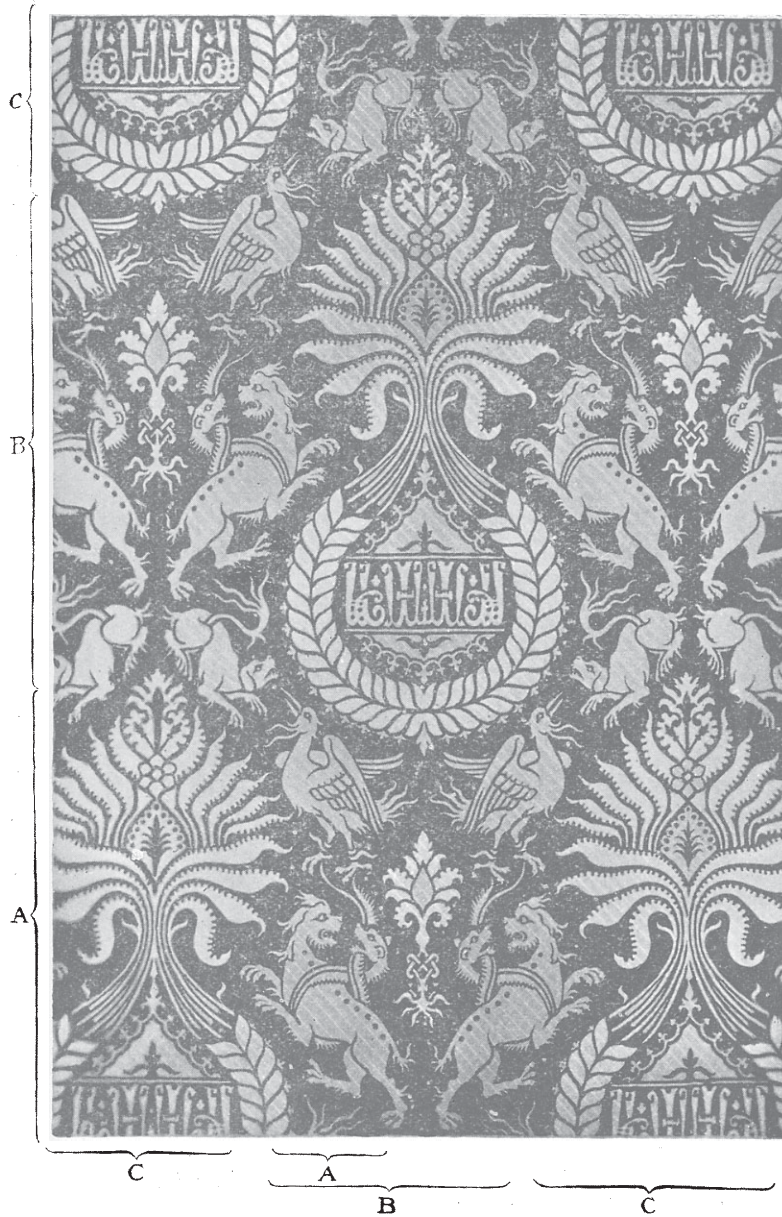


FIG. 278.—SPECIMEN OF SICILIAN TEXTILE ORNAMENT.
TWELFTH TO THE THIRTEENTH CENTURY.

certain primary decorative elements, which are inverted or turned over in one section, and then transposed in position in making the "repeat" of the style. In these technicalities it is suggestive of the variety of patternwork derivable from a comparatively small number of design units by the basic plan on which such units are combined.



FIG. 279.—SPECIMEN OF GENOESE TEXTILE ORNAMENT.

In the third example, Fig. 280 (a reproduction by one of the authors of a sixteenth century silk brocade fabric, and woven in a 1200 Jacquard machine, with 160 threads and shots per inch), diversity of woven surface exercises a lesser influence than in Fig. 279, the pattern forms being forcibly expressed in the effects due to the contrast between the warp and weft sateen weaves employed in its construction. The weft weave



FIG. 280.—SICILIAN DECORATIVE SPECIMEN—13TH TO 14TH CENTURY.

appears in the figured sections, and the warp weave in the groundwork. To produce this texture with a plain or smooth surface, and the pattern in velvet pile, would unnaturally exaggerate the decorative types of which it consists; whereas, on the sateen principle of intertexture applied, the animal, bird, leaf, and conventionalized floral forms, inclusive of the geometric figurings, are clearly delineated in the fabric.*

Italian loomwork of the *Renaissance* is generally illustrative of surface decoration as a result of ornament acquired in textures perfect in structure; that is, in the setting and in the quality and counts of the silk yarns used, but in which the range in colour and in weave is somewhat restricted. The strength and character of the designs exist in the ornamental forms, from whatever source selected, and in the principles on which these forms are modelled and unified. The design qualities are acquired without having resource to shading and profuseness in colour tinting, which are apt to distinguish the efforts of the technologist who depends, too obviously, for decorative efficiency on these adjuncts in delineating and developing the component parts of a pattern.

254. *Oriental Designing Craft—Chinese and Japanese.*—Oriental craftsmanship (Chinese, Japanese, Indian, and Persian) is, on the other hand, more diversified and richer in colour tone. In the instance of the loom productions of China and Japan—woven, or woven and embroidered—the design

* In Fischbach's comprehensive work on historic decorative textiles—gleaned from various national and other museums—the examples in Figs. 278, 279 and 281 are shown printed in colour. Professor Roberts Beaumont, in a lecture on the "Szcepanik's Inventions—A Photographic Method of Preparing Textile Designs," given at a meeting of the British Association in Bradford, exhibited a number of early decorative fabrics, the designs for which had been produced and woven by this system. For this purpose photographs had, in the first place, been taken of the originals, and, in the second place, such photographs had been enlarged and transferred on to ruled paper, with the necessary weave units added, and without the work of technical draughting. From these photographically obtained point-paper results, the designs were stamped electrically for the loom.

In view of recent inventions said to have these objects in view, it may be stated that the Szcepanik's inventions and processes of work were successfully used, in the manner described, by Professor Beaumont in the early 90's.

treatment embodies plant forms as suggested in the foliage and flower of the peony, the chrysanthemum, the poppy, and in mimosa and fruit tree blossom. It is, moreover, cognizant of the value of form in decorative style as discoverable in such phenomena as the running stream, cloud masses and formation, and in the feathered and animal species. More especially is the Japanese craft worker a close observer and student of Nature. He adapts and utilizes, but at the same time he originates, combining, in his work, geometric with floral types, and exercising technique in translating these into textile decoration. The result is a species of woven art varied in colour tinting, and in structural anatomy, with the individual or integral elements of the pattern enforced by the weave units and colour tones applied.

Neither in the ornamentative nor in the colour scheme are restrictions observed. Where mechanical practices in weaving would limit, manipulative practices take their place. These characteristic features are evident in the decorative robe specimen, Fig. 281, varied in design and tinted composition to an impracticable degree in the use of automatic machinery. Geometric, in addition to floral decorative units, are here consistently associated. The hexagonal types are separately ornamented both in the ground and in their central figures, but are rightly conceived as a secondary feature in the design style. As in Western craftsmanship, the natural forms are strictly conventionalized; hence in the colour scheme applied in the weaving of this specimen, the geometric sections are developed in two tones of brown, of fawn, and purple, with the pattern diversified by interchanging the ground colouring in the panels, though developing their ornamental elements uniformly in brown and silver grey. Richer tones and tints are combined in producing the flower and the leaf ornamentation, the flowers being successively woven in light red and gold, purple and blue, and in two tones of salmon, and the leaves in pale gold, blue and green.

The weave structures fit in with the development of each



FIG. 281.—JAPANESE DECORATIVE TEXTURE.
(From a collection of Eastern Textiles compiled by Professor Beaumont.)

class of decorative effect, the ground—in silver grey—being in a fine warp twill, and the petals of the flowers, and also the leaves, in a full weft twill. To obtain the fast, neat decorative forms on the face of the cloth, the shuttling yarns employed are regularly stitched on the underside, necessitating the use of a supplementary warp for this purpose, which is skilfully utilized in imparting clearness to the weave units, and in imparting distinctiveness to the pattern outlines and details.

255. *Indian Loomwork*.—Indian loomwork is of a different category. In a sense it lacks, as compared with other Eastern styles of design, freedom of colour expression and breadth of ornamental treatment.

The former factor is contingent on the latter, inasmuch as range in colour is, in woven art, affected and controlled by the nature and diversity of the design characteristics. Patternwork, inclusive of the different species of form gleaned from natural objects, presents possibilities in colour application of a more complex quality than patternwork composed of minute details and line effects, worked out on rigid and fixed principles of ornamentation.

Indian textiles of the Cashmere shawl description, are illustrative of a kind of trellis or fretwork design wrought in threads—a tracery or outlining of form rather than distinct figure production. The application of subdued hues and tints to this branch of woven design would render the details indistinct and blurred. Tone upon tone colouring, observed in Japanese styles, would be inappropriate in loomwork in which minuteness in the design features demands strong, pronounced colour contrasts; otherwise the beauty of the whole pattern would suffer. Colouring proceeds on lines and by methods adapted to the character of the ornamental factors. On this ground, Japanese textiles are alike typical of both toned and decided contrasts, and Indian textiles of the combination of positive and vivid colours.

Indian decorative textiles resemble hieroglyphic effects

woven in colour. Successive sections of the pattern are transcribed in brilliantly-dyed yarns, each section being in similar colours, but differently grouped or arranged. This enhances the diversity of colour blending, without adding to the number of distinct hues combined. Taking the historic pine form of figure, and producing it in black, white, red, blue, and green in the ground, and developing the design lines in red and blue, a diversified scheme of tinting is formed in three colours and white and black.

In the textile ornament of which the Indian shawl is typical, pattern is the result of a process of stitching or of colour insertion; for the yarns employed in producing the design structure are crossed in directions, agreeing with the form of the figuring, and not, as in weaving, at right angles with the warp threads. By adopting this system of textural colouring, the repetitions of corresponding parts of the style are definable in distinct varieties of colour arrangement. A modernized example of this design basis is given at Fig. 295, and treated of in Paragraph 268.

256. *Design Skeleton or Structural Base*.*—Whatever the style of decorative design being originated, the particular form of "skeleton" employed is a fundamental and controlling feature. The term is used in defining the structural lines of the pattern, and those on which the decorative units—foliage, flowers, etc.—are built up and organized. It also determines the "repeat" of the design. Moreover, this basic plan, which may be geometric or partially so, or, as in a number of the Japanese and Chinese examples, a replica of the possible ornamental lines in the width of the fabric.

The geometric base demands that the decorative forms should be conventional in character; for a set, stereotyped "draft" is favourable to flatness of tone in the ornament, whether this be a composition of flower, plant, bird, and

* For studies in modern decorative design, see the admirable work, printed in colour, *La Flore Décorative*, by Henry Lambert; also Friling's *Modernflachornamente*.

animal types, or simply of plant forms. Similarly, a naturalistic design scheme necessitates a basis of construction which provides for a free and graceful grouping and disposition of the decorative lines and features. These distinctions in the



FIG. 282.—DESIGN CONSTRUCTED ON A GEOMETRIC "SKELETON."

"skeleton" selected for different styles of design are characteristic of the dress-fabric examples in the Figs. 282, 283, and 284, as well as of the historic specimens described. With geometric decoration, a mathematical formula should be followed, though it may be suggested by plant and floral details as in Fig. 282, a pattern comprising a central element



FIG. 283.—CONVENTIONALIZED FOLIAGE AND FLORAL DESIGN.



FIG. 284.—FOLIAGE AND FLORAL DESIGN—NATURALISTIC TREATMENT.

out of which the lines symmetrically develop, with four leading ornamental types—printed in grey tone—placed at equal distances from each other, and arranged on a diamond base. The more natural flower and leaf composition—Fig. 283—is developed on the “drop” and “turn-over” base, with suitable foliage filling in the ground area of the pattern. This is also the skeleton type applied in the origination of Fig. 284, consisting of delicate floral features, delineated in lines of a free and slender character.

The scheme of construction having been planned, the integral parts of the ornamentation, that is the flowers in Fig. 283 and the large leaves in Fig. 284, are outlined, and then the supplementary lines of the design added in a manner that links up the stems, leaf, petal, and other floral elements, into a compact decorative style.

The imaginative or creative skill exercised in this class of patternwork, differs in kind, but not in principle, from that observed in decorative textiles of the Renaissance period. The latter, as pointed out, are formulated on a fractional ornamental factor, complete in itself, which, by transposition in the width, and in some specimens in the length, acquires decorative force and unity. The initial or created ornament in Figs. 278, 279, and 280 is comprised in the features bracketed B. The method of casting or framing develops a pattern “repeat.” First, the form units in section A are transposed on the dice or honeycomb principle of weave origination—Fig. 91—and second, the compound decorative type thus drafted—included in bracket B—is centrally placed in the area of the pattern, or the two compound units are so arranged that the lower portion of the ornament in C fits in with the upper portion of the ornament in D, Fig. 279. Balance of figure distribution is dependent on the character of the grouping of the ornamentative types so classified—as in the mosaic weave designs in Figs. 258, 261, 262 and 263—and also on the intermediate scheme of decoration which fashions these types into a complete design.

257. *Textural Dimensions of Antique Decorative Patterns.*—Technically, the constructive plan in the early Italian examples is reducible to the simple principle of double-point “drafting,” which multiplies the harness capacity, quadrupling its range. Thus, if the harness should be tied up on this system, and 200 tail cords (draw loom, pressure-healds mounting) should be employed in the weaving of section A—Figs. 278, 279 and 280—and each mail in the harness should actuate five threads (drawn in one mail and separately healded in the shafts), this section would contain 1,000 threads. Hence, by inverting the detail of which it is composed, and without adding to the cords (equal wires in the Jacquard machine), the compound section B would contain 2,000 threads. For section C, a further complement of 200 tail cords would be necessary, so that a full repeat of the pattern would contain 4,000 threads, or, with 160 ends per inch, it would be twenty-five inches in width.

258. *Material and Texture.*—The class of material applied, the fineness of the warp and weft threads, and the weave structure of the fabric, are obviously technicalities which restrict or expand the possibilities in the delineation of decorative ornament in the loom. The sketches in Figs. 282, 283, and 284 may be considered in illustration of these weaving essentials. Differing in quality and in decorative style, to reproduce them in one build of fabric would be an unsatisfactory process. The severer geometric pattern—Fig. 282—is producible in ordinary setting and weave units, but the involved interlacing leaf forms, as well as the practice in drafting the flowers in Fig. 283, necessitate fine setting, and the use of fine counts of yarn, with the use of weave units strongly in contrast. Further, to interpret correctly the delicate outlines and formation of the flowers and foliage in Fig. 284, the build of the fabric needs to be two-ply, or diversified in the types of weave applied to each species of ornament. The methods of looming described below, are suggestive of the principles of work to be observed in

transferring the sketches on to point paper, and in producing the designs in the woven fabric—

*FIG. 282.—UNION DRESS TEXTURE

Warp.
2/60's cotton, 40's reed 2's.

Weft.
176 denier artificial silk, 80 picks per inch.

Weave Units.
Ground section = plain.
Features in grey = $\frac{1}{2}$ twill.
,, ,, black = 5-end weft sateen, and weft twills,
varying in intersections from three to seven.

FIG. 283.—SPUN SILK OR MERCERIZED COTTON TEXTURE

Warp.
2/80's counts, 120 ends per inch.

Weft.
40's counts, 120 picks per inch.

Weave Units.
Ground section = 5-end warp sateen.
Figured section = 5-end weft ,,

FIG. 284.—COTTON AND SILK UNION

Warp.
1 thread of 60's 2-fold silk.
1 ,, ,, 2/40's cotton.
1 ,, ,, 60's 2-fold silk.
144 ends per inch.

Weft.
1 pick of 30's silk tint (a).
1 ,, ,, ,, (b).
140 picks per inch.

Weave Units.
Ground Section = repp in silk warp.
Figured Section : Stems = solid weft floats in tint (a).
Outlines of leaves and
flowers and also veins
in the flowers = solid weft floats in tint (b).
Leaf and flower veins = weft sateen and weft twill in
tint (a).
Veins of large flowers = warp repp like ground sections.

* Figs. 282, 283 and 284 are reproductions of original designs by Messrs. F. Pemberton, W. Clough, and Julius Job, late students of Professor Beaumont.

In these looming practices, it will be observed that the simpler variety of design—Fig. 282—is producible in an elementary warp and weft setting and in common plans of weave. The difference in effect between the cotton warp effects—plain intersected in the ground—and of the silk weft effects—in twill and sateen in the figuring—develops this variety of pattern satisfactorily. With the decorative features in a flat tone, as in Fig. 283, the warp and weft yarns may be of similar counts, but one yarn two-fold and the other single, or one yarn firmer and less diffusive in quality than the other, and with the weaves, combined for ground and figure respectively, the reverse in warp and weft intersections respectively. In the instance of the ornament being composed of fine lines and details, as in Fig. 284, the textural build requires to be modified accordingly, employing two kinds of yarn in the warp, and one or two sorts of yarn in the weft. This style of figuring is not adapted for reproduction in the kind of looming principles indicated for Fig. 281. A distinctive ground weave, is, in the first place, essential, and in the second, the decorative elements require to be woven in two tints of weft yarn, with, if the sketch is to be faithfully followed, the veins in the larger leaves developed in a similar ribbed crossing to that forming the ground of the texture.

259. *Setting and Pattern Scale.*—Pattern clearness, fineness, and definition, are determined by fabric setting as by fabric structure. The setting practice also fixes the dimensions of the pattern in the fabric. In the settings for these examples, the pattern in Fig. 282 would be $4\frac{1}{5}$ in., and in Figs. 283 and 284, 5 in. in width, in Jacquard machines of 384 wires for the first, and of 600 wires for the latter. Increasing the fineness of the set without adding to the capacity of the Jacquard, would reduce the size of the pattern in the fabric, and would cause the detail to be less distinctive; and in Figs. 283 and 284 the ornament would suffer in textural delineation. On the other hand, practising more open setting in such harness mountings, would enlarge the dimensions of

the pattern, and have the effect of rendering the ornamentation coarser in quality.

It should, however, be explained, that finer settings may be practised in higher counts of yarns, and in a proportionately larger Jacquard machine, and the scale of the patterns retained



FIG. 285.—SILK-FIGURED TEXTURE—REPP GROUND.

Other schemes of warping and wefting, and of weave combination than those indicated, are also applicable. Thus, Fig. 282 is suitable for textural development in the build of fabric illustrated in Fig. 285 by applying the Ottoman rib in this specimen to the groundwork of Fig. 282, the fine rib to the sections in grey, and the weft interlacings to the sections in



FIG. 286. FIGURED SILK—GROUND DEVELOPED IN WARP SATEEN,
WITH FIGURED FEATURES IN WARP REPP, FLOATED
WEFT AND SHADED TWILLED MAT.

black. The loom setting would, in this adaptation, be altered to accord with the weave structures, arranging the warp two threads of 120's two-fold silk, and one thread of two-fold 60's cotton, and the weft two picks of 60's silk, and one pick of 30's cotton. Fig. 284 is likewise weavable in other systems of looming than that specified, as, for example, in the textural types illustrated in Fig. 286, by substituting—

- (1) The warp sateen in Fig. 286 for the repp in Fig. 284.
- (2) The repp in Fig. 286 for the weft sateen in Fig. 284.
- (3) The shaded effect in Fig. 286 for the weave in the veins of the leaves in Fig. 284 ; but retaining the outlines and surface markings in the petals and flowers, in floats of weft.

260. *Transference of Sketch on to Point Paper.*—In transferring the original sketch on to point paper, the set and build of the fabric, and the capacity of the Jacquard have to be taken into account. Assuming the sketch to be that in Fig. 287, it is required to produce the design—first, in a dress fabric, with a cotton warp and silk weft, and with 80 threads and picks per inch in the loom ; and second, in a double-weave worsted costume with 96 threads and picks per inch, and with 288 working wires in the Jacquard machine. This would give in the first texture a pattern of $\frac{288}{80}$, or of $3\frac{3}{5}$ inches.

For the accurate drafting of the sketch, it is usually divided into a number of rectangular sections divisible into the number of large squares in the looming plan. The width of the design in this case being limited to 288 threads, the point paper would contain 36×48 demarcation squares. The convenient number into which to divide the sketch is, therefore, 12×16 , which gives each section equal to 24 threads and picks on the point paper, so that the portion bracketed A in Fig. 287, when transferred on to point paper, occupies 96 threads and picks. In working out this part, the ■'s in Fig. 287A correspond to the figuring in black, and the sections marked in □'s to the figuring in grey in Fig. 287. Thus prepared, the design simply represents the correct enlargement and transference of the sketch on to the ruled paper.

To develop the design in the two textures specified, after thus outlining the pattern, the weaves would be applied.



FIG. 287.—DESIGN SKETCH PREPARED FOR POINT-PAPER DEVELOPMENT.

For the union dress, the ground would be plain, the details in □'s in sateen, and those in ■'s in weft twill. For production in the double-plain cloth, one weave would be applied to the rosette figuring, and the reverse weave to the leaf features.

Colouring one thread of shade (1) and one thread of shade (2) in both warp and weft, would therefore give the grey forms in Fig. 287 in shade (1) and the other decorative forms in shade (2). In order to differentiate between these two figured types, the ground of the fabric would require to be in an intermingled

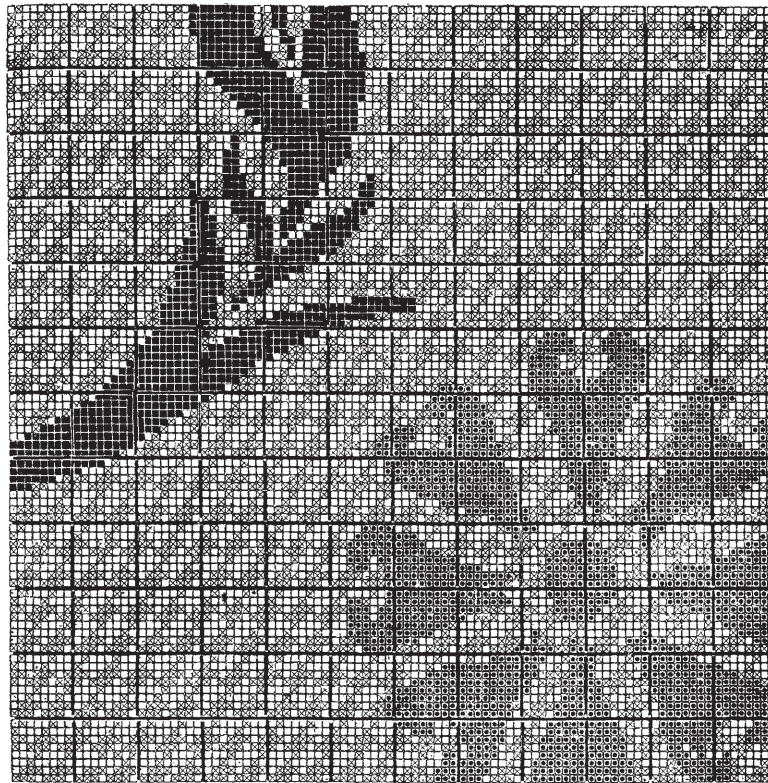


FIG. 287A.—SECTION OF LOOMING DESIGN FOR FIG. 287.

shade, so that a weave would have to be used in the ground-work of Fig. 287A, of a similar type to that marked in \boxtimes 's.

The designing practice described is pursued in preparing and transferring the sketch of each class of decorative style on to point paper, as may be further shown by reference to the drafted harness pattern in Fig. 288. Here each repetition of

the pattern in the width of the fabric would comprise the features in sections B and B', grouped on either side of the ornamentation in sections A and C, for the system of drafting the harness in a 384 wire machine, would cause—

Neckbands	Nos.	1 to 192 to correspond to Threads 1 to 192 in the looming design or to Section A in Fig. 288.
„	„	193 to 288 to correspond to Threads 193 to 288 in the looming design or to Section B in Fig. 288.
„	„	289 to 384 to correspond to Threads 289 to 384 in the looming design or to Section C in Fig. 288.
„	„	293 to 288 to correspond to Threads 385 to 480 in the looming design or to Section B' of Fig. 288.

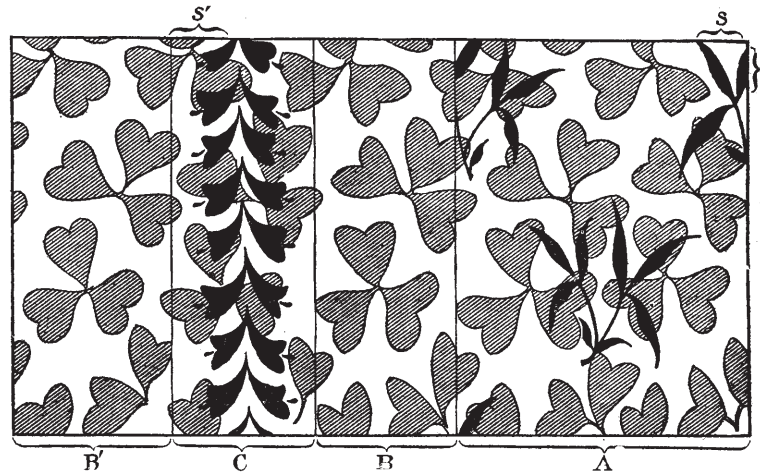


FIG. 288.—DESIGN SKETCH FOR DRAFTED HARNESS-MOUNTING.

This principle of harness mounting repeats certain decorative sections in specified order in framing the complete style, so that in a sense it both restricts and expands pattern origination. It fixes the constructive lines or basis of the design, and also inserts, in two or more positions, certain units of effect—Section B, Fig. 288—into each repeat of the style. The first provision renders it impracticable in designs occupying the full Jacquard capacity to modify the form of the style, which must be of a striped or rectangular structure, and the second enlarges the design as drafted for the loom.

The “tie-up” illustrated in this sketch demonstrates these

technicalities. It increases the size of the repeat of the pattern, but it also limits the field in pattern invention to striped surface decoration. Yet in rendering parts B common to each section of the style the decorative scheme is clearly elaborated. For subduing or neutralizing the line definition, which tends to divide up patterns thus constituted,

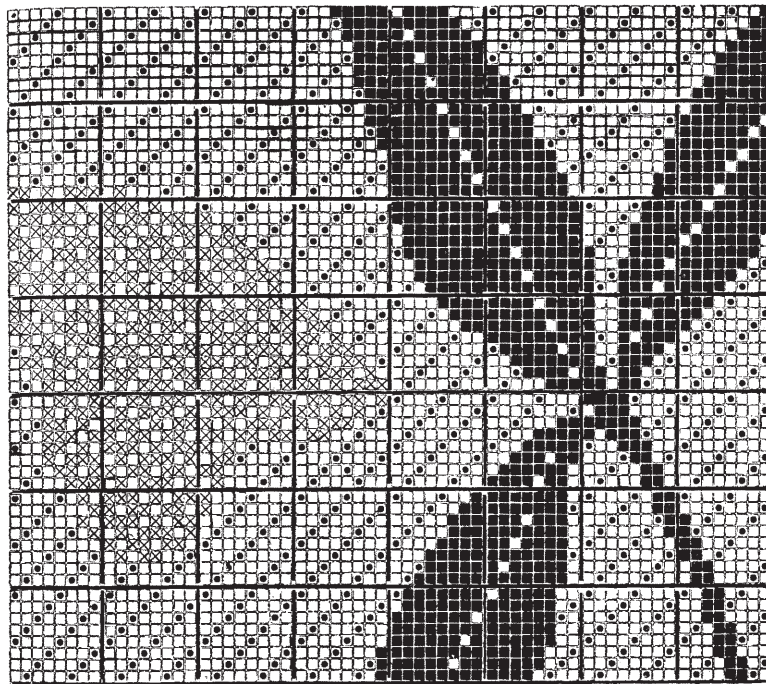


FIG. 288A.

it is a useful plan—as in Fig. 288—to run one description of figuring uniformly through each section. By this practice, an “all-over” form of decoration is combined with pattern types of a special character, and arranged on a drop, rectangular, or “turn-over” principle.

To work out the sketch for card stamping, it is only necessary to transfer parts A, B, and C on to point paper, sub-dividing these into equal squares—parts A into 12, and parts B and

C into 6 in the width—so that each square would be equivalent to 16 threads and picks in the looming plan. Providing it should be intended to differentiate the pattern forms in A from those in B and C, then the ground weave in the respective stripings would be varied, and also the weaves applied to the figured effects printed in dark tones. Two methods of preparing the sketch may be suggested: first, the development of the leaf details in warp intersections, with the surface figuring, in parts A and C, in weft intersections, in which case

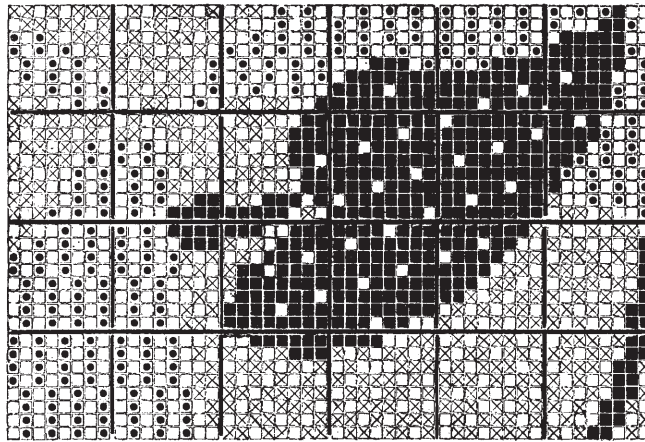


FIG. 288B.

the ground weave would require to flush the warp and weft equally on each side of the cloth. Second, the method illustrated in the sectional plans—Figs. 288A and 288B—in which the ornamental types are produced in weft, and the groundwork in warp-face weaves.

Only the portions S and S' of Fig. 288 have been treated. In order to emphasize the common relation of the shamrock pattern to the supplementary design features in sections A and C, it is developed in one type of crossing, namely, the diamond weave marked in \boxtimes 's. In Fig. 288A the ground weave is $\frac{1}{1}^3$ twill, with the surface pattern in pronounced weft floats, but in Fig. 288B the ground weave is $\frac{1}{4}^4$ warp

cord, with the surface figuring in a 10-shaft weft sateen. This practice in looming would result in each kind of pattern-work being similar in tone and definition in the fabric as in the sketch.

261. *Structural Types of Figured Patterns.*—With a view of illustrating the practices in developing figured styles, the textural principles, applied in drafting the patterns on point paper and defined in Table XVI, will be dissected—

TABLE XVI
FIGURED FABRICS—STRUCTURAL TYPES

<i>Fabric Type.</i>	<i>Fabric Build.</i>	<i>Examples.</i>
1. Fabrics with Weft Pattern Features on a Common Weave Ground.	Single in Warp and Weft	Figs. 213, 214A, 262, and 289
2. Weft Figured Fabrics with a Warp Sateen Ground.	ditto	Figs. 290 and 290A
3. Sateen Figured Textures.	ditto	Figs. 266 and 280
4. Sateen Make of Figured Fabrics—Fine Structures.	Single in the Warp and 2-ply in the Weft.	Figs. 3, 291, 291A, and 292
5. Extra Warp, Weft, or Warp-and-Weft Figured Textures.	Two or 3-ply in either Warp or Weft.	Fig. 294
6. Figured Double-weave Textures.	Compound in Warp and Weft.	Fig. 297
7. Reversible Figured Fabrics.	ditto	Figs. 298, 298A, 299, and 299A
8. Multi-Weft Figured Structures.	Single in the Warp and Multi-fold in Weft.	Figs. 295, 295A, 296, and 296A
9. Compound Figured Structures.	Multi-ply in both Warp and Weft.	Figs. 300, 300A, and 301.
10. Warp Figured Matelasses.	Compound in the Warp and Single or Two-ply in the Weft.	Figs. 302, 302A, 303, 304, 304A, and 305
11. Fabrics with Shaded Figuring in Weave and Colour.	Single or Compound in Build.	Figs. 306, 307, and 308A

Efficient practice in figure designing is closely allied with the mastery of the principles of pattern origination as exemplified in “Weave Compounds,” and in “Spotted and Mosaic Structures.” Thus, the dress design in Fig. 213 is illustrative of the weaving technique applicable in producing

pattern units of a diamond character in a plain-woven texture, with the integral sections of the simple decorative scheme expressed in weaves differing in the dimensions of their weft intersections. Or, to take Fig. 220, it is suggestive of line and form definition obtainable in weft cord weaves, while in such examples as Figs. 215, 218, 222, and 223, it is clearly evident that "weave" structures may be utilized in acquiring different types of pattern development.

In the mosaic group of styles, similar principles of weaving obtain, but in designs further elaborated in line structure, and constructed on rectangular, transposition, and curvilinear bases. Such pattern types as those in Figs. 253, 258, 262, 263, and 266 denote that different varieties of line and form grouping may be suitably defined on point paper, and, therefore, in the woven fabric. But correct drafting is essential, which involves weave units being selected and combined which distinctly bring out each species of effect of which the style is composed. Moreover, it was shown that in spotted and mosaic figuring, certain features are producible in extra warp or weft yarns—Figs. 270, 271, and 273—or in double weaves, as in Figs. 275 and 276. It is these fundamental and varied systems of looming, and of fabric structure, which, in a modified and elaborated form, are employed in originating styles of a figured or decorative category.

262. *Weft Figuring on a Common Weave Ground.*—Many styles of figured patterns are woven on this principle. The pattern elements are constructed in compact floats of weft yarn, twilled, or regularly stitched; or they are produced in different classes of weave. Fig. 289 is a typical structure applicable, first, to silk fabrics; second, to union textures having a cotton warp and lustre weft yarn; and, third, with the broader figured details woven in sateen, to worsted textures. The scroll work is suggestive of the running form of simple ornament, which is frequently introduced into this variety of design, and woven in a firmer and faster plan of intersection than the more prominent parts of the pattern.

In working out the style in a silk or artificial weft texture, the figuring, formed in twill and in floated shots, might be chintzed in the shuttling. Applying it to a worsted costume, and retaining the plain make in the ground, the prunelle twill in the scroll, and developing the leaf decoration in a 4-end



FIG. 289.—WEFT-YARN FIGURING ON A PLAIN GROUND.

sateen—the design would be adapted to 2-and-1 colouring in the warp and weft. The use of light and medium shaded yarns so arranged, would give the groundwork in the light shade, with minute line details in a medium shade, the scroll in hair-line effects in the two shades, and the stem and leaf forms in mixture tones.

263. *Sateen Pattern Production.*—Sateen weaves—warp and weft structures—have been treated of in originating designs on checked, mosaic, and waved bases, and their application to decorative textures has also been analysed. When the styles of ornamentation consist of simple lines and fine detail features, they are weavable in flushed shots of weft. A specimen of this description of patternwork is sketched in Fig. 290, for which a looming section is given in Fig. 290A. This practice is followed in the production of light blouse textures and fabrics of a Japanese character. It is not,



FIG. 290.—LEAF PATTERN FOR WEFT-YARN FIGURING.

in all points, technically satisfactory. It emphasizes the pattern types distinctly, but, as the warp yarns float loosely underneath the weft figuring, the fabric build is not perfect. Moreover, the bolder the development of the decorative details, the less suitable becomes the reverse side of the texture. By the insertion of stitching points as seen in certain of the fuller leaf forms in Fig. 290A, this defective feature is eliminated in some degree, but the frequency of the ties so inserted is liable to detract from the smartness and precise definition of the surface pattern. Still, without close setting in the reed, such ties, in this example, would require to be

increased. For designs composed of minute elements producible in light dress and blouse stuffs, this principle of construction is useful, and especially should crêpe or fast weaves be substituted for the warp sateen used in the ground of Fig. 290A.

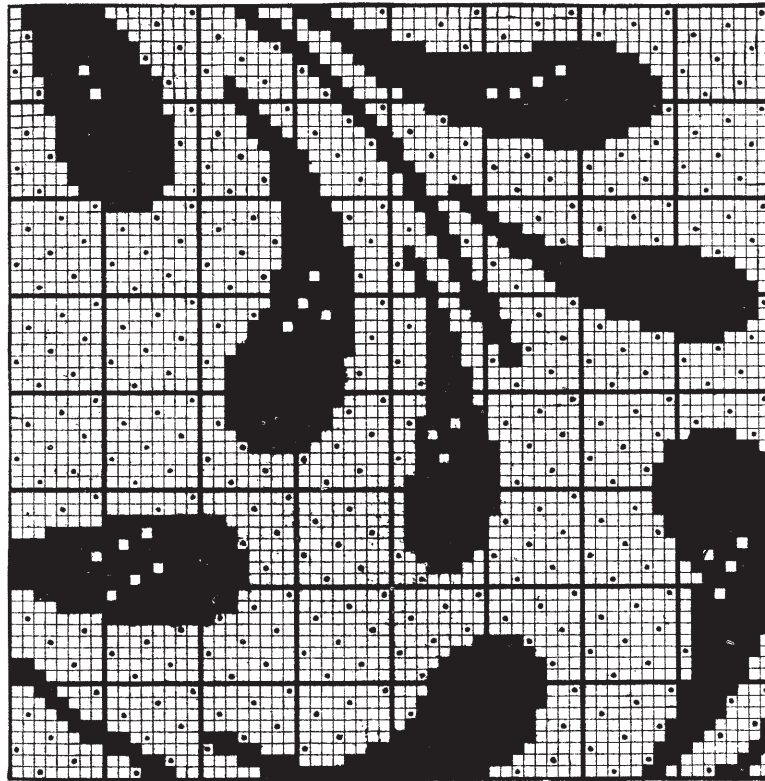


FIG. 290A.—(Sectional design for Fig. 290.)

A further build of sateen fabric is obtained by the methods of looming, illustrated in Figs. 291A and 292—sections of the point paper designs for the sketch in Fig. 291, and the silk satin in Fig. 3. Referring to Fig. 291A, the figuring shots are shown as distinct from the ground shuttling yarns. The latter, by interlacing sateen in the ground and plain under

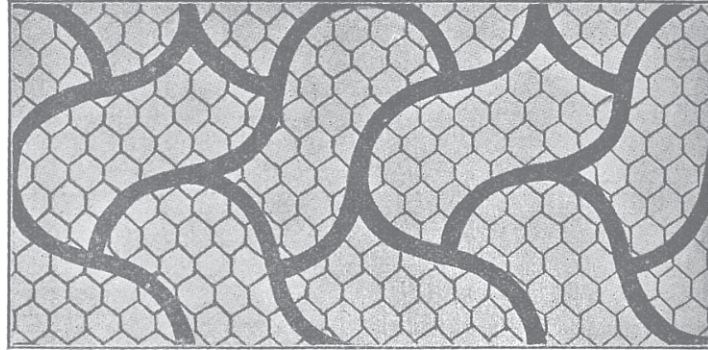


FIG. 291.—WAVED-FORM OF PATTERN WITH TRELLIS
GROUNDWORK.

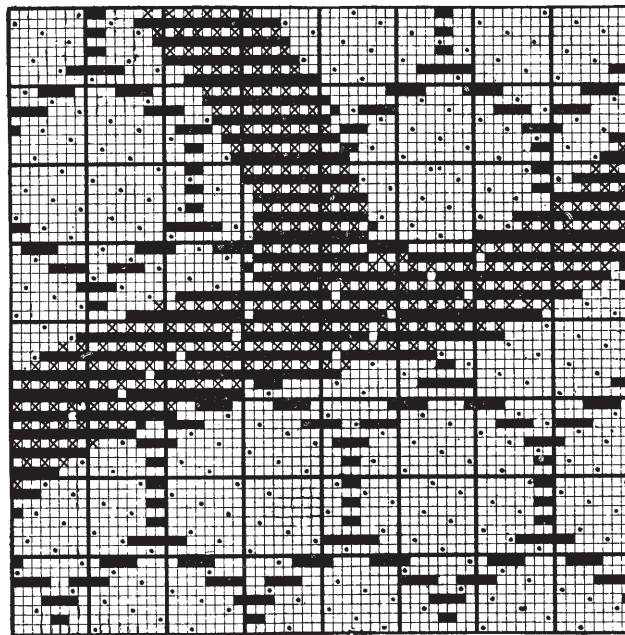


FIG. 291A.—(Sectional design for Fig. 291.)

the pattern lines, make the fabric structure. This is strictly a variety of semi-backed cloth, for on the reverse side of the effects marked in \blacksquare 's, a plain foundation is formed marked in \boxtimes 's, but this does not in any way impair the fulness and

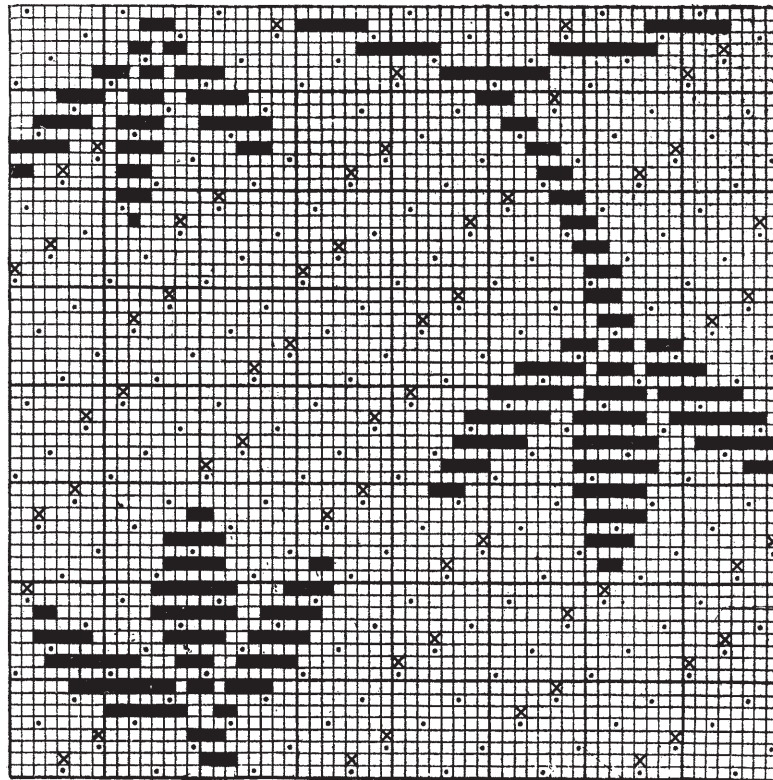


FIG. 292.—SILK SATIN STRUCTURE—WEFT ORNAMENTATION.

solidity of either the smaller or broader lines in the pattern. There is thus produced a fast-woven under surface in all parts of the figuring, adding to the wearable efficiency of the texture. The sateen runs regularly on both the ground and figuring picks throughout the whole design scheme. The result is a weft developed pattern on a warp sateen, but with

the addition of plain intersections under the pattern. Several practices in looming are feasible, two of which are as follows—

PIECE-DYED GOODS

Warp.

60's two-fold spun silk.

Weft.

30's spun or artificial silk.

110 threads and shots per inch.

COLOURED STYLES

Warp.

150 denier organzine silk shade (1).

(1) *Weft.*

1 pick of 215 denier tram silk shade (1).

1 „ 215 „ „ „ „ (2).

1 „ 210 „ „ „ „ „ (2).

(2) *Weft.*

1 pick of 210 denier tram silk shade (2).

140 threads and 130 shots per inch.

The first of these arrangements is for a silk production dyed in the piece; the second, in Weft I, for styles with the figuring in a different colour from the ground; and, in Weft II, for textures in which the pattern is acquired in quite a distinct colour from the effects in the warp yarns. Designs on the basis of Fig. 291, in which the field of the pattern is divided into geometrical forms, may be varied in weave structure, for such crossings as warp twill, diamond, and twilled mat may be applied to the units of effect in the ground. The weaves require, however, to be of the warp-face category, and to fit evenly with the sateen, otherwise they interfere with the distinctiveness of the decorative elements in the style.

264. *Pattern Diversification in Sateen Figuring.*—Providing these manufactures are not piece-dyed, diversity of style is obtainable in weaving in three ways, namely: (1) by a distinction in the colour tone of the warp and weft yarns; (2) by the formation of line stripes in the warping; and

(3) by chintzing in two or three colours in the weft. Considering the application of scheme (1) to Figs. 290 and 291, in originating a texture of a medium depth of colour, the warp should be in a lighter and the weft in a deeper tone. The sateen ground would thus be developed in the light colour, and the pattern features in a corresponding but deeper colour. For the second looming practice, the warp should be in two tints or tones, and the weft in a lighter or in a fuller hue for emphasizing the decorative features of the design. In the third practice, for giving effect to the chintzing, colours dissimilar in hue and also in tone should be selected. One of these should, however, link up with the colouring in the warp. Assuming, for example, the warp to be a rose tint, the wefts might be pale maroon and greenish lavender; or, if the warp should be light fawn, suitable wefts would be tinted brown and turquoise blue, shuttling in such orders as 1-and-1, 2-and-1, 2-and-2, 4-and-2, and 4-and-4. The rule to be observed is, that with the colour units in too close a relation with each other in the chromatic scale, the characteristics, due to the chintzing, suffer; whereas if the tone contrasts should be super-pronounced, the quality and style of both the design and fabric would be deteriorated.

265. *Fine Sateen Structures*.—To these, when made in silk, the term of “Figured Satins” is applied. In such manufactures it is essential to acquire a sound textile structure, and also to develop clearly the outlines and small effects of which the decorative style consists. Even the minutest details need to be smartly and distinctly brought out in the fabric, necessitating close setting in the loom, and the selection of weave units for the ground and the figuring in strong contrast with each other, such as a warp-face plan for the first, and a weft-face plan for the second factor.

Considering Fig. 3—page 11—in this relation, it is a simple line pattern composed of sprig, leaf, and floral forms in which, as seen from the sectional design, Fig. 292, an 8-end warp sateen is employed in the ground, and a special silk weft,

floated solid, in the weaving of the slender and delicate design features. Textural durability and firmness are attained by (1) the employment of two wefts—ground and figuring; (2) full setting in the sley, 340 ends and 160 picks per inch; and (3) the scheme of fabric construction. The ground picks are marked in □'s, and the figuring picks in ■'s. First the foundation weft and warp threads make a fine fabric with a warp satin face, and weft satin back; and, second, the coloured weft produces (a) the pattern, and (b) a sub-tissue, or a regular twilled under-surface by interlacing with the warp in the order indicated in the intersections marked in ⊠'s. Structurally, it will be observed that this principle of design differs from that in Fig. 291A, for the figuring picks in the latter assist in weaving the 8-end sateen ground, but in this plan—Fig. 292—they give a different type of weave, and one which is formed on the sateen base. Here and in all classes of “satins,” textural quality is the consequence of the fine setting, and of the types of weaves combined.

266. *Sateen Weave Figuring in Combination with other Weave Principles of Design.*—One example of this class—Fig. 293—will be described. It consists of two styles of figuring, that in section B, and that in section D, divided from each other by bands of warp twill, sections A and C. The decorative effects in B are woven in weft sateen on a warp-face ground, and those in D in floats of weft agreeing with the formation of the figuring lines. The surface ornament in D would be rendered a more prominent part of the design if it should be turned over and repeated, enlarging it to 96 threads. The design elements in B would, in this example, be flatter and more subdued in tone than those in D. Hence, in working out such designs for the loom, the textural value to be imparted to each grade of figuring is the factor which determines the kind of weave unit to employ. In assorting two or more decorative principles, if these are made into a striped style, they may—as in Fig. 293—be separated from each other by lines of effect in simple twills, or other weaves which fit

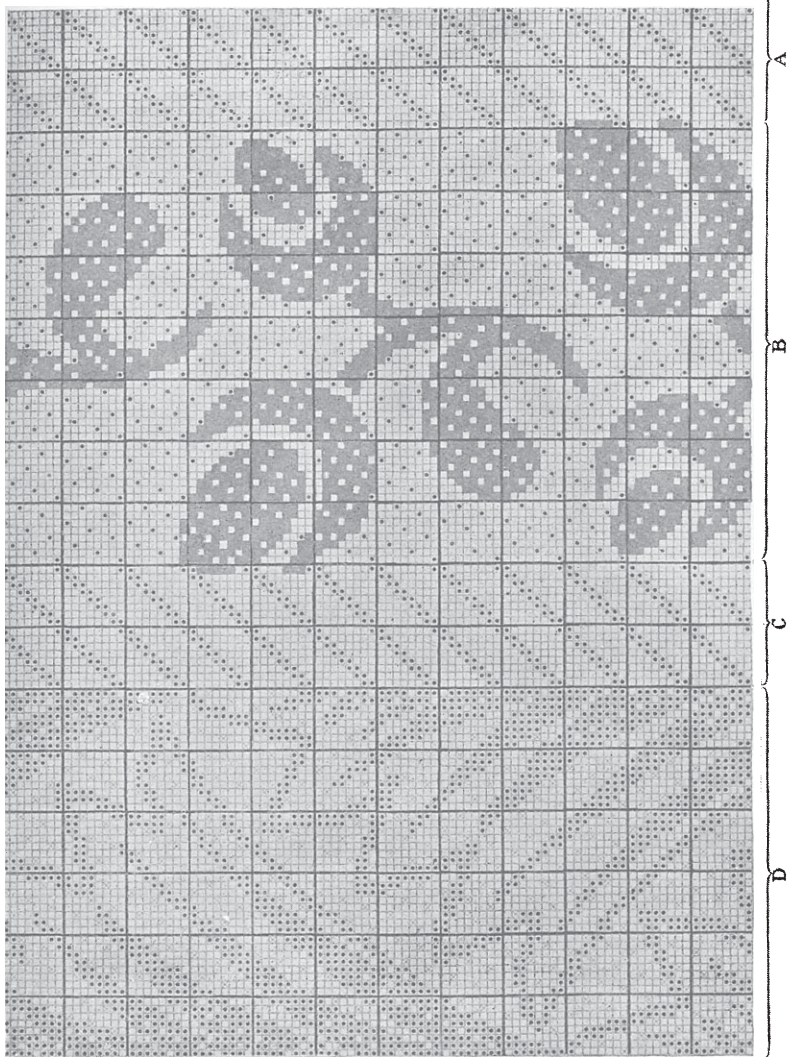


FIG. 293.—SATEEN AND TWILL FIGURING.

correctly with the sateen but also differ from it in structural effect.

267. *Form Definition in Extra Yarn Figuring.*—The use of extra warp or weft yarns in developing the decorative units enables the pattern outlines and forms to be forcibly emphasized and clearly delineated in the fabric. Such features being woven on this principle, in a special colour of yarn, they may be developed in solid floats or in distinct weave plans. This will be understood by assuming, in the first instance, that the decorative types in Fig. 294 are made in a fabric having one colour of warp yarn and crossed with a second colour of weft yarn, and single in build. This would be practicable by applying a plain or common weave to the ground, a weft sateen to the sections in dark tones, and a warp sateen to the sections in grey tones, when each would be distinct in effect, though somewhat indefinite in character. Substituting, in a second instance, a warp cord, two picks in a shed, for the plain, and producing the grey and black sections in two colours of weft, would, on the other hand, give the surface area of the texture in warp repp, and the figuring in different colours of weft yarn floated solidly or in twilled order. On this system, each pick in the design would be taken as equivalent to two shots of weft, so that, in card stamping, for the effects in ■'s, the grey would be lifted with the cord interlacings in the ground sections, and, for the effects in grey, the black intersections would be lifted, with also the cord in the ground—the two shots, black and grey, forming one line of the design, and one repp in the cord. Third, by warping one thread of grey and one thread of black, or in two selected shades, the design would be produced in extra warp, if opened out on the system of the examples in Figs. 268 and 270A. It is evident that, by either of the two latter systems of design construction, the leaf and other pattern elements would be more effectively developed than by the first principle, in which their delineation is the result of a difference in the weave units applied. The

extra warp or extra weft practice provides for this form of differentiation, plus that due to each species of figuring being woven in special coloured yarns.

268. *Figuring by Colour Insertion in the Shuttling.*—

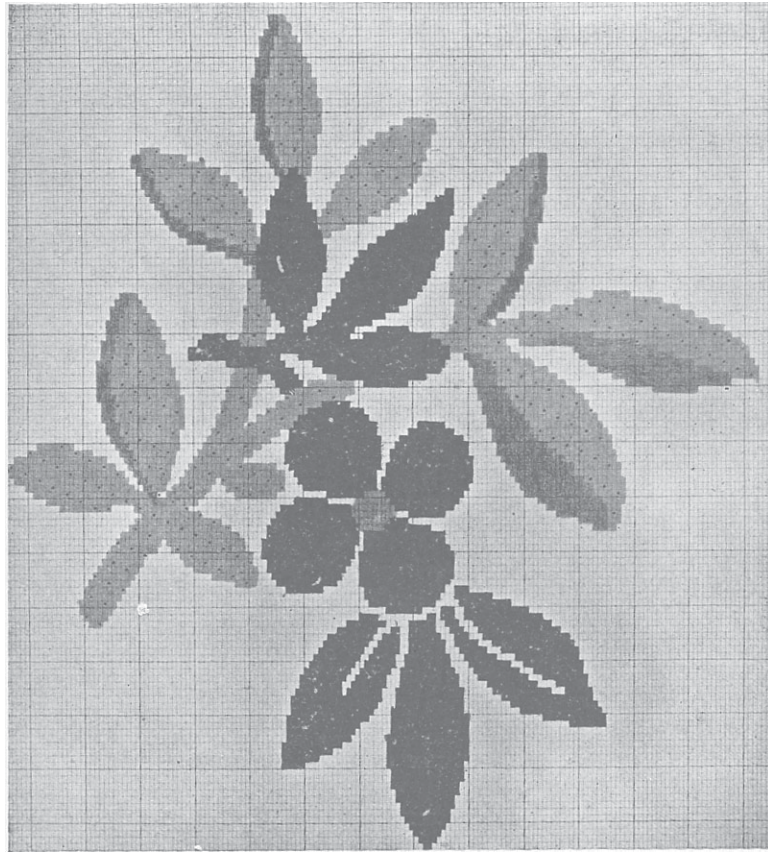


FIG. 294.—FIGURING BY EXTRA-WEFT COLOUR INSERTION.

Patternwork, by the insertion of coloured yarns, in the shuttling order of the fabric, is illustrated in Figs. 295 and 296. Both are modernized styles of woven ornament based on the pine figure, and also on the pine scheme of design formation. They suggest the principles of weaving and

colouring utilized in the manufacture of dress fabrics in which the warp yarns are chiefly employed in forming the groundwork of the texture, and in which the pattern lines and features are chiefly a product of the shots of weft. It is in this sense that the sectional plans, Figs. 295A, 296A and 296B, will be considered.



FIG. 295.—STUDY IN PINE FIGURING.

The conventional leaf forms add to the decorative effect in the former, and the diversity of weave units combined add to the textural quality in the latter. Fig. 295 is woven in one colour of warp yarn, and two colours of weft yarn picked 1-and-1. This arrangement simplifies the shuttling, and is made effective in developing the figuring by the system on which the colours are assorted in the looming design. The odd picks in Fig. 295A define the figuring when floated either

in weft cord or in weft sateen, as in section B. The even picks appear on the face in the cord sections, but on the back—stitched sateen—in the portions of the figuring formed by the odd picks. Both the odd and even picks produce a warp-sateen effect in the ground of the texture.

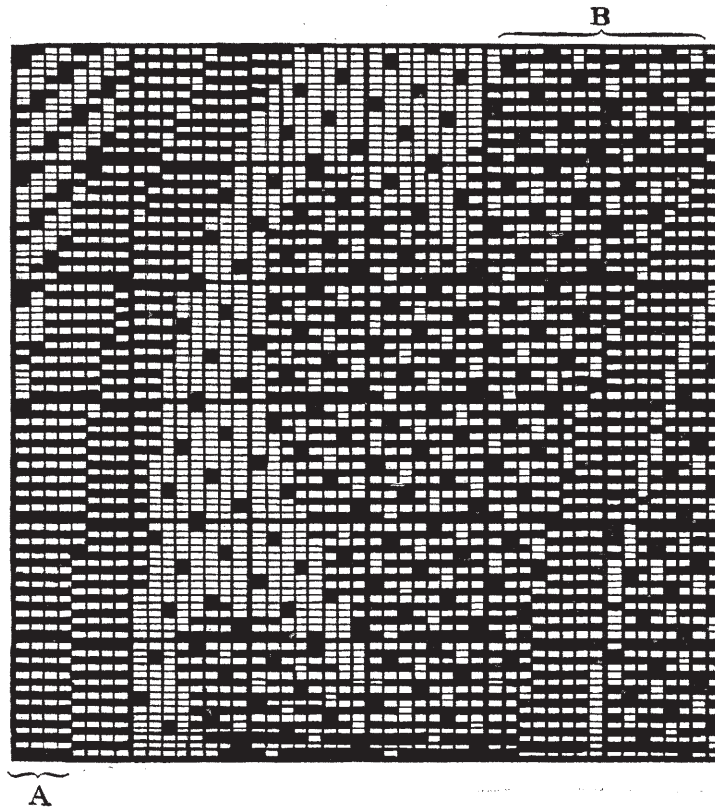


FIG. 295A.

In Fig. 296A both series of picks are shown, as arranged in the weaving of the fabric, but in the case of Fig. 295A, each type of effect is produced on the point paper as it would be developed in the loom. This pattern—Fig. 296—is illustrative of the richness of the decorative detail, developable in this class of designing and scheme of intertexture. Like Fig. 295, it is woven with two wefts, each intersecting

regularly with the warp yarns, one method of construction being—

Warp.

Blue or green 50 denier organzine silk
40's reed 3's.

Weft.

1 pick of brown 60 denier tram silk and
1 „ „ white.
240 picks per inch.

The weave elements in the design diversify the surface features of the fabric, producing this in successive sections in a sateen, twilled mat, etc. As the fabric is two-fold weft ways, each pick on the point paper represents two shots in the weaving. Thus, in stamping the cards, the picks would be arranged as seen in Fig. 296B, which is an extension of the first four picks of Fig. 296A. Where necessary, the ties (*a*) and (*c*) would be inserted in cutting the cards. These are introduced in a similar manner as in weft-backed cloths. As each weft is used freely on the face of the fabric, there being no large masses of either colour, very few ties or stitches are needed. In the sectional plans, the ■'s represent the white, and the □'s the brown weft. As indicated, various crossings have been combined, including sateen, fancy mats, small spotted effects, diamond makes, and warp and weft twills running at various angles, adapted to the floral and other ornamental features of the style. The pattern consists of three principal pine figures decoratively interlaced. The spaces intervening the principal figures are filled in with minute spots and waved, ribbon-like lines. The specimen demonstrates first, the principle of acquiring pattern features in extra weft yarns; and, second, that of developing the ground features in weave units, contrasting in effect and fitting correctly one with the other.

269. *Double-Weave Figuring.*—While the double-weave class of fabric is, in some branches of textile manufacture, confined to the heavier descriptions of cloth, in the dress trade it is adapted to the production of light and even flimsy textures.



FIG. 296.—PINE PATTERN WITH DETAIL
ORNAMENT IN THE GROUND.

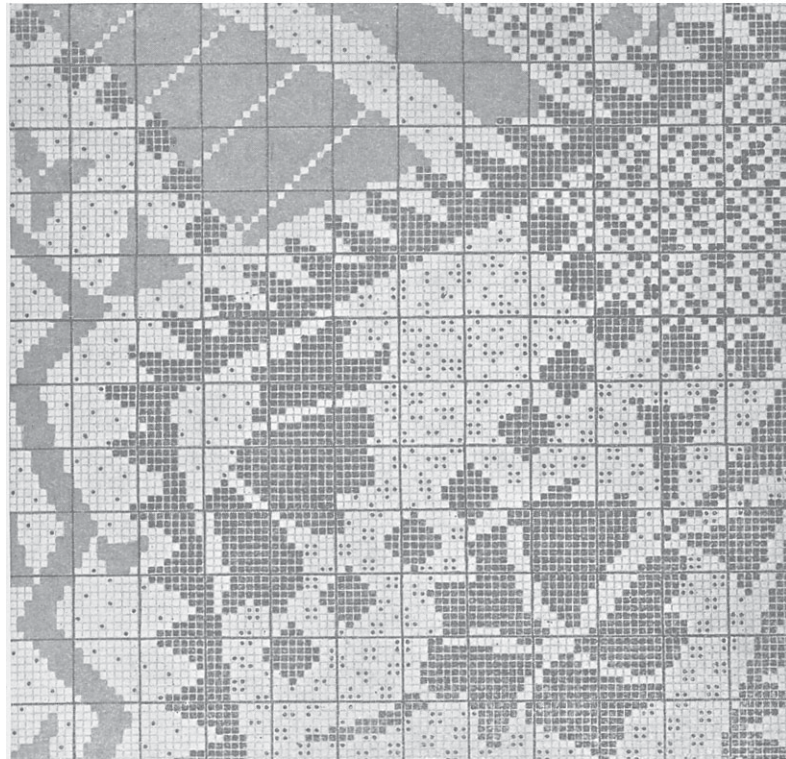


FIG. 296A.

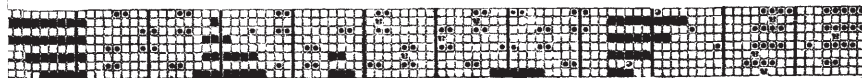


FIG. 296B.

The quality and counts of the yarn used, and the systems of setting practised, make it possible to employ compound weave structures in these goods without acquiring fabrics too firm in the handle or too thick in construction. As explained (Paragraph 248), these weave units give two or more layers of texture one over the other, but interchangeable in position. With the possibility of developing each single texture of which the compound weave is formed in different colours and qualities of yarn, it becomes practicable to use each type of single texture, as desired, in the ground or in the figured portions on the face of the cloth. This method of weaving is, therefore, applied first, to compound fabrics made of one sort of yarn and in one weave structure; second, to compound fabrics in which each unit texture is composed of different sorts of yarn, and formed in different weaves; and, third, in which the textures combined are dissimilar in colour, yarn quality, and in weave composition.

Three examples, illustrative of the designing scheme, are shown in Figs. 297, 298, and 299, made respectively in worsted yarn, worsted and mohair, and in silk and worsted. Fig. 297 is an ordinary double-plain structure. To produce the loom design for this specimen in a 192 Jacquard machine, the pattern would be sketched in colour on point paper, and weave (1) in plan A—Fig. 274—applied to the figured sections, and weave (2) to the ground. The specimen has been produced in 2/64's worsted, arranged, in the warp, one thread of light yarn and one thread of dark yarn; and, in the weft, one pick of light yarn same as the warp, and one pick of medium-shade yarn, with 84 threads and picks per inch. Had the same yarns been used in the weft as in the warp, the pattern details would have been more pronounced, with the figure in a darker shade. The pattern forms might be further toned or subdued by weaving with one colour of weft intermediate in tone depth between the two shades of yarn in the warp.

It should be observed that the double-plain make is the

best adapted compound weave structure for acquiring clearness in the design features, and it is for this reason employed in the production of "reversibles" in cotton, worsted, and silk goods.

The weaves are not necessarily constructed one thread and



FIG. 297.—DOUBLE-PLAIN WOVEN SPECIMEN.

one pick for the upper and lower textures alternately, but they may also be arranged 2-and-1, 3-and-1, etc. When combined on the latter systems, they are suitable for fabrics in which two thicknesses of yarn are used, one in the production of a fine, and the other in the production of a coarser texture, as illustrated in Fig. 298. The two textures are

again interchangeable from the face to the underside of the fabric in forming the figure and the ground respectively. The weaving data for this specimen are—

Warp.

- 1 thread of 2/72's worsted.
- 1 " " 2/50's mohair.
- 1 " " 2/72's worsted.

Weft.

- 1 pick of 2/72's worsted.
- 1 " " 18's mohair.

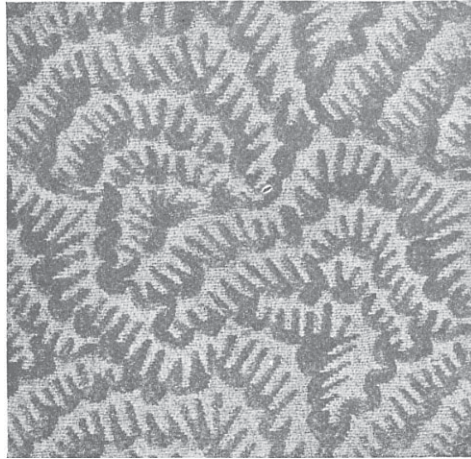


FIG. 298.—REVERSIBLE FIGURED TYPE—WORSTED AND MOHAIR YARNS.

The difference in the two materials employed in the weaving of this example, causes the effects in the mohair to protrude on the surface of the cloth. In some fabrics this filament quality is utilized in developing pattern work in a kind of looped, buckled, or curl effect. When this is done, the cloths are set sufficiently wide in the loom to allow of 15 per cent. to 20 per cent. of contraction in width in the scouring and milling processes.

Referring to the sectional plan—Fig. 298A—in which a part of the figure is sketched in grey, the mohair weft yarn

floats 5-and-1, or interlaces plain with every third thread in the design, the intervening threads making a plain structure through the cloth. When the mohair weft is producing the figure, the fine mohair threads in the warp are also floated on the face, whereas, when the ground is being produced, such mohair threads and picks float on the back. This build of fabric gives a compact solid figure in mohair weft—and one more pronounced in tone than would result if the texture were warped and wefted in the same order.

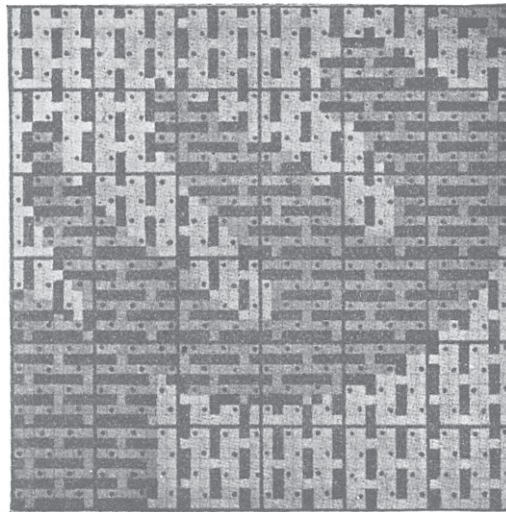


FIG. 298A.

In contrast with the comparatively firm grades of cloth in Figs. 297 and 298, the specimen in Fig. 299, composed of silk and fine worsted yarns, may be examined. Again the fabric is double in the weave, being formed of two perfectly plain structures, one made of silk and the other made of worsted warp and weft arranged thus in the loom—

- 1 thread or pick of 20 denier organzine in the warp and tram in the weft ;
- 1 thread or pick of 2/40's worsted ; and
- 2 threads or picks of 20 denier organzine in the warp and tram in the weft ; set in a 25's reed with 4 threads in each dent.

The plan of construction will be understood by a reference to Fig. 299A. Here the grey threads and picks lettered (a) represent the worsted portion of the pattern, which, being woven plain, make a foundation for the figuring. The silk threads also interlace in plain order, and the design effects are obtained by bringing the silk texture on to the face, which



FIG. 299.—REVERSIBLE FIGURED TYPE—SILK AND COTTON YARNS.

conceals the texture made of the thicker yarn in the ground. In the figured portions of the design there are two separate or unstitched fabrics, and the looseness thus caused gives the silk a crinkled effect. Where no figuring is visible on the surface of the fabric, the plain silk structure is on the back, but here it is stitched regularly to the worsted yarn structure, and gives the delicate surface quality seen in the specimen. The tying or stitching in the ground is effected by allowing

one silk pick in every three to weave plain with the foundation threads. The picks selected for this purpose immediately follow the ground picks, and weave in exactly the same order. Though this is a union fabric (silk and wool) it only weighs a few ozs. per yard, 27 in. in width. In making designs for goods

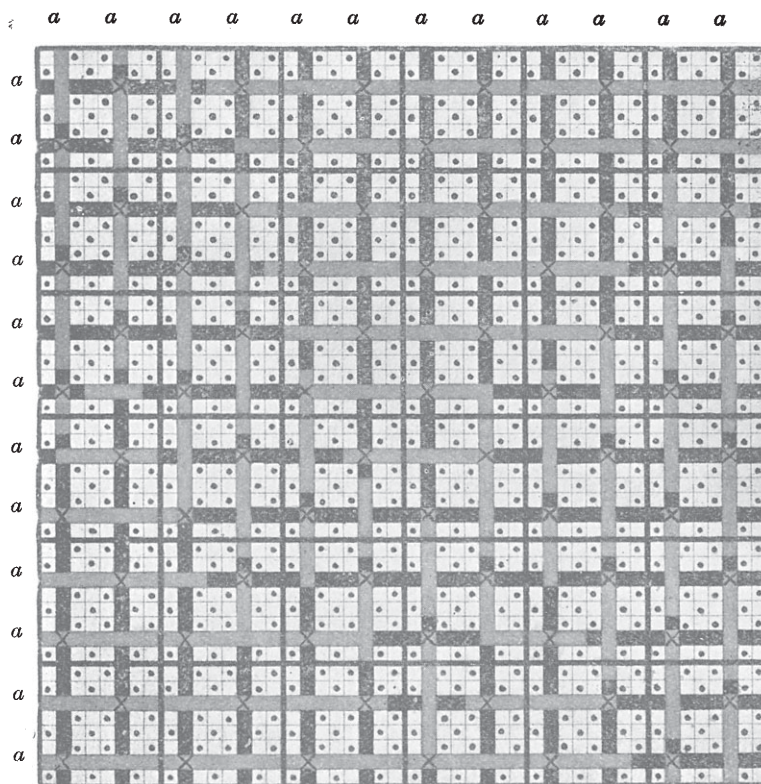


FIG. 299A.

of this class, it has to be borne in mind that the ornamental details require to be broad in character, inasmuch as patterns composed of fine lines and minute ornamentation are unsuitable for development on this principle of manufacture.

270. *Reversible Figured Goods.*—In producing the pattern features in double or compound weaves, the fabrics are reversible in colour and in surface features in both the ground

and the figured sections ; for the different species of textural detail, whether due to tinting or to weave elements, are exactly transposed in position on the two sides of the cloth. Examining Figs. 297, 298, and 299, each specimen has precisely the same design and ground characteristics on the face and on the back, but with the yarns and colour units interchanged. In Fig. 297 the ground on the under side of the fabric is in the darker, and the figuring in the lighter shade ; in Fig. 298, the ground is changed to the mohair, and the figuring to the worsted, texture ; and in Fig. 299, the ground is changed to silk, and the pattern types to the more open texture formed in the worsted yarn, over which the fine silk texture is visible as in the groundwork on the right side of the cloth.

It should be noted that for making-up purposes this build and variety of fabric offers certain advantages. Both sides are usable, the one constituting the face, in the process of weaving, for the garment proper, and that constituting the under side for trimmings as in the collar, cuffs, etc. Particularly are these goods so applicable when produced in pleasing colour contrasts and tones in the ground and figured sections, as, for example, in Figs. 298 and 299. When the cloths—as in structures similar to Fig. 297—are differently treated in the finishing or dressing routine on the face and on the back, such as a “clear finish” on the former, and a soft “raised finish” on the latter, they are further enhanced in value for this method of garment making.

271. *Compound Figured Structures.*—Silk and fancy figured designs are variable in the types of compound weaves in which they are producible, and also in the sorts of yarn used in the warping and in the wefting. The reversible principle is formulated on the employment of two or several double or treble weave structures, each producing a like build of texture. The two textures so formed into one cloth may be light and dark in tone, as in Fig. 297 ; composed of two sorts of yarn as mohair and worsted in Fig. 298 ; or they may be produced in fine and thicker yarns as in Fig. 299.

Each separate texture in these specimens is plain woven. But it was shown in Paragraphs 248 and 249 that the weave units of such textures, in multi-ply cloths, may be different, and it is this structural principle in designing which enters into the



FIG. 300.—FINE-SET SILK STYLE.

build and ornamentation of certain figured and decorative fabrics of the variety produced at Figs. 300 and 301, and at Fig. 47. The weave units selected in the construction of the specimen in Fig. 47 are given at Fig. 47A, and comprise plan (*a'*) weft surface and plain back ; (*b'*) and (*d'*) broken sateen

surface and plain back; and (e') and (f') backed irregular cord, warp decorated. The textural surfaces resulting from such weave units are illustrated in the micro-photographic specimens in Figs. 48 to 51, and have been treated of. The practice here exemplified in combining compound weave units, is also characteristic of the examples in Figs. 300 and 301. It enables a fast-woven texture to be acquired, rich in decorative style, and developed in special types of inter-

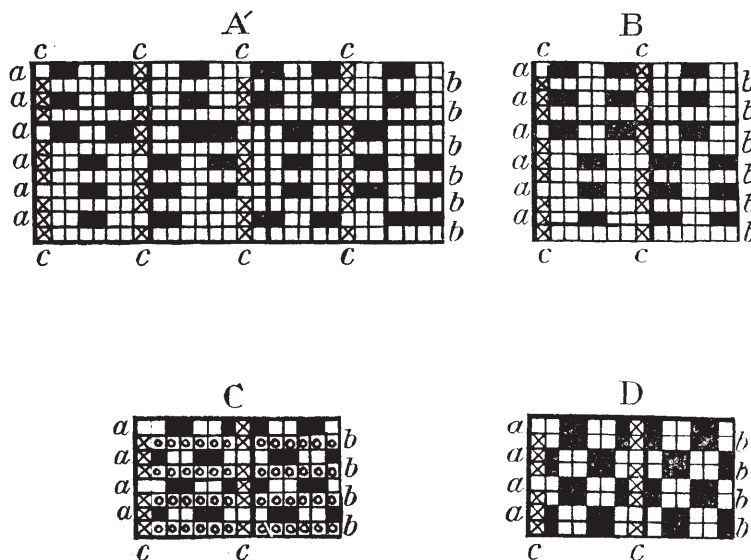


FIG. 300A.

texture. For example, in the "all-over" floral specimen in Fig. 300, the leaves and portions of the flowers are produced in warp repp effects, with the black outlines displayed on an evenly formed texture in silver grey. The warp threads (white, 450 per inch) work in pairs, every third pair being separated by threads interlacing singly, as indicated on the point paper plans by the lines in \boxtimes 's. The figuring in white is produced in the two weaves at A' and B, Fig. 300A. It will be seen that the first and every seventh thread form a plain structure on the back, as also in weaves C and D. The

warp for threads (c) is, therefore, drawn on to shafts, which produce the foundation part of the cloth. Further, in each weave two threads work together, and would be drawn in one mail of the harness. Picks (a) are black and picks (b) white. Plan A' gives a waved repp and plan B a striped

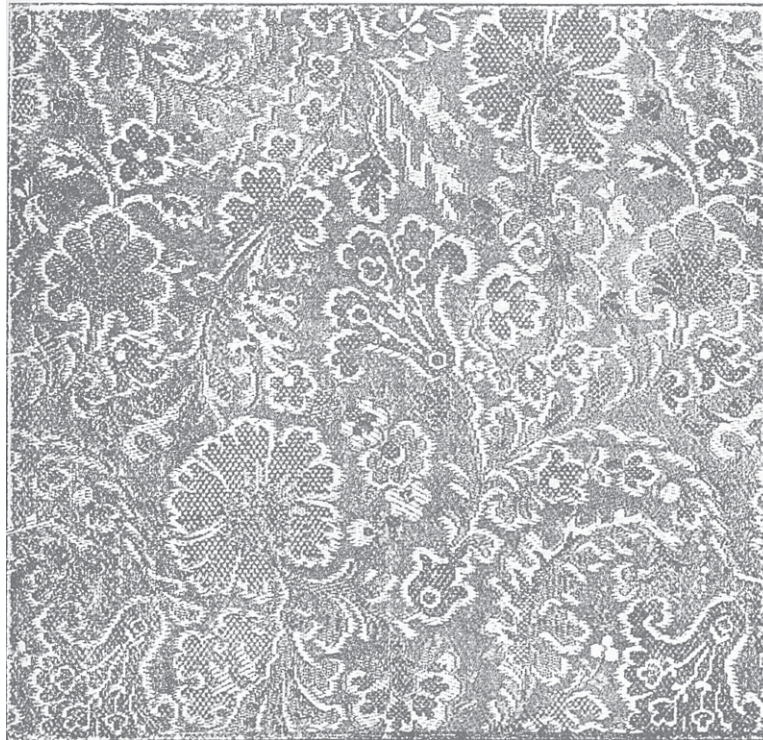


FIG. 301.—FIGURED SILK DEVELOPED IN COMPOUND WEAVE UNITS.

warp cord. The dark tones in the fabric are due to picks (b) floating on the surface, as shown in plan C. The effect in the ground of the texture is obtained by weave D, which by healding, as indicated, two threads in a mail, produces a warp cord. The fine-set fabric in Fig. 301 (600 ends and 250 picks per inch) contains other structural features. This specimen

is composed of the five weaves, A', B, C, D, and E in Fig. 301A, and is coloured as below—

Warp.

900	{	2 threads of fawn silk, 1½-dram organzine.
threads.		2 ,, ,, light olive green silk, 1½-dram organzine.
700	{	2 threads of old gold 1½-dram organzine.
threads.		2 ,, ,, light olive green 1½-dram organzine.

Weft.

1	pick of dark olive green silk, 7-dram tram.
1	,, ,, ecru silk, 7-dram tram.

Though the warp is thus arranged, decisive coloured lines are not noticeable in the fabric, for the flower and other details in the figuring are so distributed as to conceal the junctions of the stripings. The weaves are more of a weft-surface structure than in Fig. 300. In the ground of the texture—Plan A', Fig. 301A—the green warp interlaces with both wefts to form the face, and the back of the cloth is made firm by the remainder of the warp threads intersecting with the ecru weft yarn. When either of the colours in the warp is used for the middle portions of the figuring, the weave plan applied is that shown at B, which, in most instances in the design, is edged by floats of either the green or ecru weft. When the former is floating, plan C is employed, but when the latter, plan D. For the inside parts of certain of the floral forms in which the ground weft floats solid, plan E is used, in which, as in A', C, and D, the even picks interlace 4-and-4 on the underside of the fabric.

272. *Matelassé Principle.*—The matelassé principle of fabric structure forms one of the most useful varieties of figure designing. It obtains in both dress and decorative fabrics in light and medium weight goods. The textures, being fine-set in the warp, and open-set in the weft, may be economically woven. The pattern forms and lines—Fig. 302—are so clearly marked as to resemble carved work. This

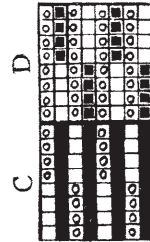
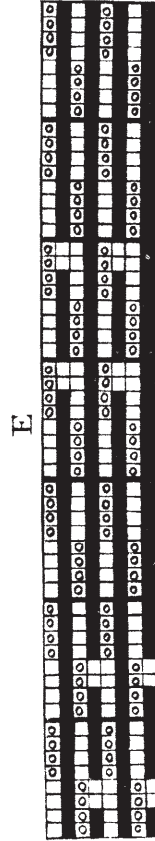
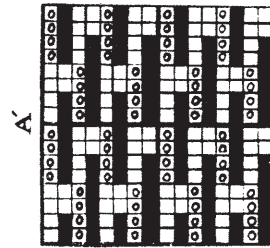
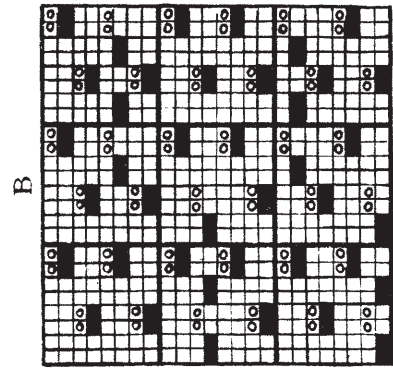


FIG. 301A.

distinctive quality of the surface ornamentation is accentuated by the relative counts of the warp and weft yarns, by close setting in the warp and loose setting in the weft, and by one series of picks acting as "binders," and a second series as "fillers." The "fillers" or wadding shots impart the raised or relief tone to the figuring, and the "binders" knit the outlines of the design into the foundation of the cloth. The specimen is typical of the manner in which the pattern features



FIG. 302.—WARP MATELASSÉ—
RIBBED GROUND.

are produced in clear floats of warp, with the ground formed in fast repp or cord. It will be observed on referring to the sectional plan—Fig. 302A—that the design results from the use of two series of warp yarns *g* and *f*—ground and figuring—and of three series of picks, *g'*, *b*, and *b'*. The picks marked in ☒'s, are only inserted into matelassé fabrics in which weft as well as warp figuring is developed. For the ground repp, the threads *f* are depressed on every third pick, but, for the warp figuring, they float over picks *g'* and *b*. In such figured

portions of the pattern, the ground ends *g* interlace plain on picks *b*. The practice in weaving in plans so constructed is—

- 1 pick of fine cotton foundation.
- 1 ,, ,, silk for supplementary weft figuring, or the effects marked in ☒'s; and
- 1 ,, ,, binding.

With the warp arranged—

- 1 thread of two-fold cotton; and
- 2 threads of organzine silk, drawn one end in a mail.

On picks *g'* the cotton warp threads (healded on shafts in front of the harness) are depressed, and the silk warp threads lifted. On picks *b*—extra figuring weft yarn—all the silk and

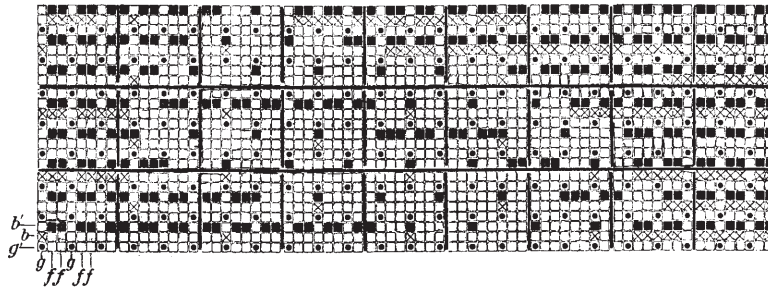


FIG. 302A.

cotton threads are lifted in all parts of the design, excepting where these shots are used in decorating the surface of the fabric and where they are stitched on the back; and on picks *b'*, the silk threads are depressed in the repp ground, but lifted in the figured portions, where they stitch plain with the cotton warp. This principle of designing, without the extra weft yarn, is shown in Figs. 303 and 303A. The method of looming for this example is—

- 1 thread figuring;
- 1 ,, ground; and
- 1 ,, figuring.

The form of the effect in the texture is traceable in the looming plan, which is a compound of small repp and of broader cord effects. The foundation threads are again



FIG. 303.
FANCY WARP MATELASSÉ CORD.

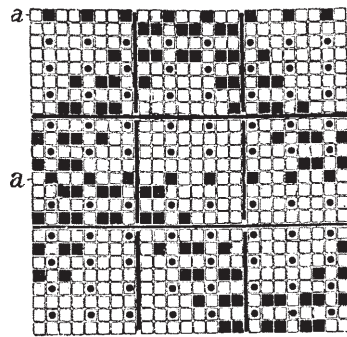


FIG. 303A.

marked in □'s, and the figuring or repp threads in ■'s, the specimen having been woven thus—

- Warp.*
- 1 thread of 60's two-fold silk.
 - 1 " " 2/60's cotton.
 - 1 " " 60's two-fold silk.
 - 20's reed 6's.
- Weft.*
- 11 picks of 2/60's cotton.
 - 1 pick of 10's cotton (4 threads counted as 1).
 - 96 picks per inch.

The picks *a* are wadding, or those on which the silk warp threads are lifted and the cotton warp threads depressed.

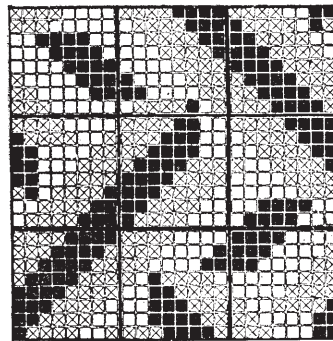


FIG. 304.

The technique of this fabric build and of this style of pattern is further illustrated in Figs. 304 and 304A, one the effects as outlined on point paper, and the other the actual plan of the texture, as produced in the loom ; with, however, the sections lettered *a* in Fig. 304A corresponding to those in □'s, in Fig. 304.

The sections marked in ■'s would, in the fabric, be floats of weft, those lettered *a* solid floats of warp, and those marked in □'s, ottoman rib. How these several effects are acquired is apparent on a closer analysis of the design. For example, the ground or repp effect is due to the odd picks depressing the face warp, and to the even picks floating under the face

warp in such sections of the pattern as the repp is formed. This implies that the face warp is down and up alternately, every thread working alike in all the unfigured parts of the fabric, an arrangement insufficient to make a warp rib or cord. The ground or foundation warp threads, by interlacing one up and one down, or just the reverse of the face warp,

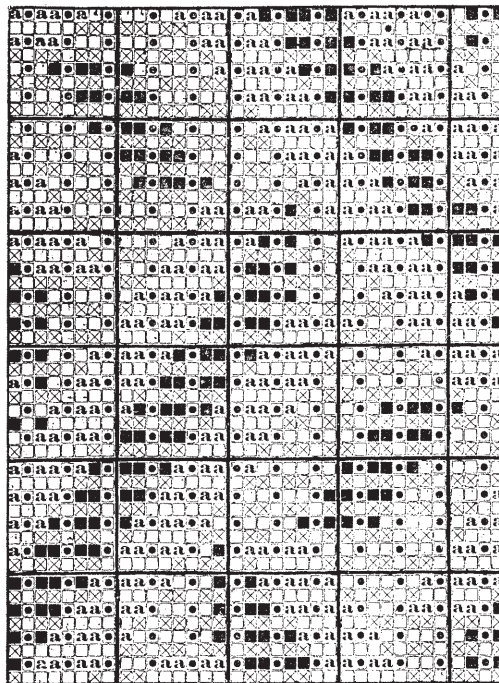


FIG. 304A.

are necessary to develop the repp characteristic. To make an ottoman repp or soliel, two warps are required, the face warp being closer set than the backing warp, and not so well tensioned as the latter. In weaving, the face warp is lifted and the ground warp depressed, and a thick pick introduced into the shed thus framed. Next, the ground warp is lifted, and the face warp depressed, and a small-yarn pick interwoven. These are the weaving conditions in Fig. 304A, and also in Figs.