

CHAPTER XIII.

COLOURING OF DOUBLE WEAVES AND REVERSIBLES.¹

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206. *Principles of Double Cloth Colouring.*—As briefly indicated in Chapter V., the general principles of colouring fabrics of a backed and double-make structure, resemble those applied to single textures. Particularly is this the case when the fabrics are the ordinary types of trousering, coating, and suiting styles. This follows from the fact that the face of these cloths largely consists of patterns of similar composition to those produced in single textiles. Still there are some builds of backed fabrics, which, owing to being coloured on both surfaces, involve the employment of two distinct schemes of colouring—one for each side of the fabric. The object to be attained in such fabrics is the development on the under side of the texture of a pattern that will, in general tone and character, correspond with that appearing on the face; but, though this species of colouring on the back is frequently necessary, inasmuch as it enhances the selling qualities of the fabric, yet the grouping of the face shades is the primary consideration, for it must be in accordance with

¹ For information on the principles of designing double-make fabrics, the reader is referred to *Woollen and Worsted Cloth Manufacture*.

the weave-compound used in the construction of the cloth, whereas the scheme of colouring applied to the back is of secondary importance, and should be made to coincide in its main outlines with the style of colouring composing the face of the texture. An example may be analyzed. Fig. 163 is a weave-combination, which it is required to back with warp and colour on such lines as to obtain a stripe style of pattern on the under surface. The face order of colouring is given on page 261, and has already been treated of. Without describing the structure of this build of backed fabric, it may be stated that the arrangement is generally one thread of face weave and one thread of backing throughout the design. It is usual to plan the backing warp according to the composition of the face design, so that the following scheme would, in this instance, be appropriate:—

30 threads of light mixture.	30 threads of light mixture.
14 „ medium mixture.	6 „ slatish blue.

This would result in the production of an effect in colouring on the back of Fig. 163 quite in keeping with the scheme applied to the face, though the exact order of the face warping is not followed. The simpler the arrangement of shades on the back the better, so long as it conforms with the order of colours producing the pattern on the face side.

Another method of duplicate colouring in double and backed cloths, consists in having any ordinary scheme on the back which comprises a number of threads that is a multiple of the number occupied by the face pattern. Thus, in the scheme of colours for the design considered, Fig. 163, there are eighty threads, hence arrangements comprising twenty, forty, and eighty threads might be utilized. These are divisible into two or four stripes, according to the style of effect required on the back of the texture. In this kind of colouring it is evident that the combination of face shades is not closely worked to—a stripe neat in colour composition being the main factor for development.

When the yarns for the face and back of the fabric are of the same size and material, it is a rule in making out the pattern of

warp to combine the two schemes of colouring, but each scheme is necessarily designed separately. In fabrics backed on the warp principle, it is feasible to have patterns of a striped character on the under surface, while if the fabric is backed with weft, colouring on the back results in striping the texture transversely; it is, therefore, only by employing the double-cloth method that all forms of colour effects may be developed on both sides of the fabric.

207. *Styles of Colour Effects obtained in Double Weaves.*—While, as is evident from the brief definitions of the principles of double-cloth colouring furnished in the preceding paragraph, the application of fancy shades to the ordinary groups of double weaves is more or less analogous to their application to single weaves and compound designs, yet there are some builds of double cloths which produce specific styles of patterns, such as are not obtainable in other descriptions of weaving and schemes of colouring. Amongst the most useful of these types are the double-plain, the double-cassimere, the double-mat, and combinations of these weaves. Patterns obtained in these makes, cover a large diversity of styles for trouserings, coatings, suitings, mantlings, shawls, rugs, curtains, and carpets. Here, however, the plan of colouring is not usually elaborate, being adapted to the structure of the design. The main characteristic of these fabrics which distinguishes them from effects obtained in single-make designs is the firmness and strength of the cloth, combined with clearness and precision of ornament or pattern. The utility of this class of design is evident in the varieties of textures, in which patterns are products of the double-weave system of cloth construction. As the structure of the weave is uniform in the fabrics mentioned, there are certain principles of colouring applicable to each class of effects. But, generally speaking, the use of a new double-weave necessitates the practice of a distinct system of colouring.

208. *Double Plains.*—For giving variety of effect and pattern, there is no class of double make more useful than the double plain. The analyses made in Chapter VIII. of the schemes of colouring used in the single weave make it evident what are the common principles of gaining effect by combining fancy shades

in double plain; and, moreover, what is the type of pattern here producible; for, as the system of interlacing is still plain—one fabric being formed above or over the other—whatever pattern is workable in the single weave may, by duplicating the plan of colouring, be also obtained in the double weave. Bearing this principle in mind, the methods of pattern development in double-weave designs of all classes will be readily understood.

The simplest type of effects developed in this structure of weave is stripe patterns. It includes fabrics of two, three, and four shades. As a rule, the shades combined are of a mellow and subdued character, being more in keeping with the build of the fabric than bright shades. Still, in fine worsted and cotton textures, somewhat brighter shades are employed than in woollen fabrics, which, being usually felted, mainly consist of patterns resulting from combining toned colours. These stripes may be of any dimensions, from line-like effects to broad bands several inches in width. Next to stripe patterns in importance are intermingled patterns. Such styles possess a peculiar diversity of minute effects, which makes them readily distinguishable from the mingled patterns obtained in other weaves and methods of colouring. Some of these effects will be analyzed. Checks, diagonals, small figured styles, and elaborately-ornamented textiles, are also developed in these weaves. All these fabrics are double plain throughout. Though the weave is apparently an unimportant factor, yet it is closely related to the pattern produced, and has moreover to be modified with every change effected in the outline and form of the design resultant. Strictly speaking, all double plain patterns are composed of at least two weaves—one of which brings the odd series of yarns on to the face, and the other the even series. It follows that if a cloth is warped and woven one-and-one—say black and white—that one make gives a black, and the other a white effect on the face of the fabric. Remembering this principle, it will be evident how, by changing these weaves in working out figured or ornamental patterns, any construction of design may be acquired.

209. *Classification of Double Plain Stripes.*—Striped designs,



Plate XXIX
REVERSIBLE KNOP-TWIST YARN PATTERN

obtainable by colouring double plain designs according to various systems, are as follows:—

- I. Patterns in two shades.
- II. Patterns in three shades.
- III. Patterns in four shades.
- IV. Patterns in two, three, or four shades, comprising double plain and other weaves.

The most elementary form of pattern obtained in the double plain is the "hairline." It resembles in appearance the effect produced by warping and wefting the single plain make thread-and-thread, only the fabric is sounder and firmer in build, as well as finer and more compact in construction. This simple style is a product of a certain method of colouring the double plain, but the same weave can be arranged and coloured to yield an endless variety of patterns.

Three-shade stripes are, on the average, richer in colouring than the first order of patterns, and include the most useful forms and builds of double plain stripes. The third class, while composed of a larger number of shades, lacks scope for diversity of arrangement. As to the patterns comprised in the fourth class, they are rarely composed of more than two shades, but owing to containing additional weave elements they are more diversified in design.

210. *Double Plain Stripes in Two Shades.*—These are of two types: I. Patterns warped and woven one-and-one; and II. Patterns coloured variously, but in strict accordance with the structure of the design used. Allusion will primarily be made to the I. type of these styles. In this form of pattern, it is a question of arranging the double plain weaves on such principles as to produce any style of stripe pattern. Take an illustration. Patterns 1 and 2 on Plate XXX. are double plain stripes obtained by this method. The colourings are as follows:—

1.	2.
1 thread of olive.	1 thread of brown.
1 „ slate.	1 „ brown and white twist.

The feature for analysis is, how the various combinations of stripes, and in Pattern 2 of twilling, are developed in these

textures, which are composed solely of double plain weaves. Pattern 1 is an assortment of small stripes of four different sizes worked out in two shades. If necessary, the design—*i.e.* the plan of weave—could be so modified as to give a pattern in which the stripes would not only run from a broad to a narrow band, but tone off on both sides. A brief analysis of the design for this texture, given in Fig. 190, will make it evident what the principles of weaving are, which determine the construction of this kind of pattern. Here two double plain makes are combined, one of which floats the odd, and the other the even threads and picks on the face. Now these weaves are so grouped in this design that they give a pattern corresponding in every detail with No. 1 on Plate XXX. The use of these two weaves, and the method of adjustment, are two elements of design to which all such styles of woven effects are due. The weave marked in grey is the reverse of that marked in dots, for it brings the even set of threads on to the face, while the weave, \square , takes them on to the back. When it is considered that the arrangement of colouring is one slate and one olive, and that each of these weaves forms two fabrics one over the other, it becomes obvious that in Sections *A* of the design (Fig. 190) a slate stripe of plain fabric will cover an olive stripe of similar dimensions; but in Sections *B* a plain olive band conceals a corresponding stripe of slate. Referring to Fig. 191, which is the weave arrangement for producing Pattern 2 of Plate XXX., it will be observed that it is a style containing, in addition to the stripe effects, a series of clear twills. Evidently these have been developed on the same system as the preceding example, which consists of the identical weaves and order of colouring as Fig. 191. Diversity of pattern has, therefore, been acquired by adopting a different method of combining the weaves. This is effected by first sketching out on point paper the exact form of the pattern required, and then adding weave *A* of Fig. 190 to the uncoloured parts, and weave *B* to the coloured sections. It will be subsequently shown that reversible double plain styles are but developments of this species of designing.

211. *Two-Shade Stripes Warped Irregularly.*—First, there are styles of this class which are compositions of two shades, and

in which variety of pattern is only producible by ingenious methods of grouping fancy yarns. By the aid of two examples (Patterns 1 and 2, Plate XXXI.) it may, however, be shown that even when thus limited to the use of two colours a considerable

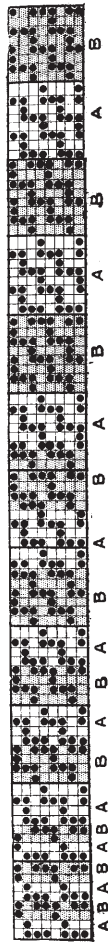


FIG. 190.

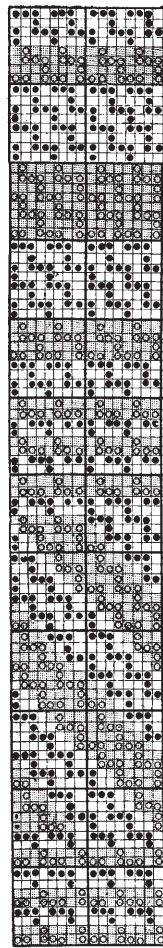


FIG. 191.

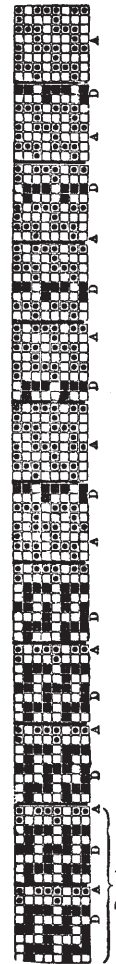


FIG. 192.

range of patterns may be acquired. The order of shades for Pattern 1—the design for which is given in Fig. 192—is:—

	<i>Warp.</i>		<i>Weft.</i>
For	{	6 threads of slate.	1 pick of slate.
54 threads.		2 " black.	1 " black.
For	{	8 threads of black.	
58 threads.		2 " slate.	

One principle that requires to be taken cognizance of in making double plain stripes is, that while only every other thread comes on to the face, every pick, to some extent, is useful in forming the pattern on the right side of the fabric. As the principal feature of such styles is the solidity of the several lines of colour, providing these do not exceed four in number, it becomes a problem of so constructing the design that each shade of weft used, shall only float or flush over that colour of warp yarn it is supposed to match. To produce a stripe in two colours is comparatively simple; but, in the example given in Pattern 2 on Plate XXXI., the difficulty of arranging the plan of weave is increased by varying the order and size of the lines of colour. Thus, there are bands of colour of eight, six, and two threads each, or, on the face, of four, three, and one thread respectively. If the design, Fig. 192, is examined, it will be observed that the odd picks only cover the face-threads in parts *D*, which are the slate threads in the fabric, while the even picks are arranged to cover the face-threads in part *A* only. Should the weave be further dissected, it will also be noticed that picks 1, 3, 5, and 7 interlace plain with the face-threads of *D*, but that picks 2, 4, 6, and 8 interlace plain with the face-threads of sections *A*. In this manner, the solidity of each stripe of colour, which is the essential feature of such styles, is kept intact, and a pattern formed possessing distinctness of parts. This example, and No. 1 of Plate XXXI., illustrate the numerous effects producible in these weaves by this method of colouring. Both parts *A* and *B* of Pattern 1 form stripe arrangements. By varying the number of bands of these respective combinations, useful species of pattern are producible. Pattern No. 2 shows how a broad band of one shade may be worked into the texture, and then a line-like stripe of a second shade formed upon it.

There is one peculiarity about the weave-design—Fig. 193—forming the drab band in Pattern 2 of this Plate, which contains eighteen threads. The ordinary double plain used in Figs. 190, 191, and 192 is untied; it follows that if some sixteen or more threads were used, as in this instance, the woven pattern would be loose and unsatisfactory in structure. So long as no more than eight threads form a stripe, tying may not be necessary; but when

this number is exceeded, a weave must be employed that, while tied or stitched, will not interfere with the neatness, compactness, and uniformity of this type of woven colouring. The weave generally used for this purpose is given in part *A* of Fig. 193. Though somewhat irregular in construction, it produces a fabric perfectly even on both surfaces, and as smart and clear in other respects as the double plain texture. The order of colouring for this example is: *Warp*, 18 threads of drab, 2 threads of brown; and *weft*, 1 pick of brown and 3 picks of drab. The drab picks never float over the face-ends of brown, and, on the other hand, the brown picks always float under the drab face-ends—this being the principle of intertexture to which the solidity of the respective lines of colour is due.

212. *Styles in Three or more Colours.*—Some extremely

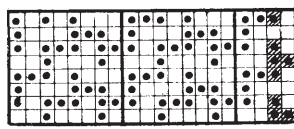


FIG. 193.

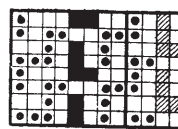


FIG. 194.

interesting and effective stripes are got in double plain weaves by employing three and four colours. Two examples—Patterns 3 and 4 on Plate XXXI.—are furnished in styles composed of three shades. The weave for producing the former (Fig. 194) is simple, being so constructed as to form lines of lavender, claret brown, lavender and white. By comparing the order of colouring—which is given below—with the weave, the principles of design in which the pattern is obtained are obvious:—

<i>Warp.</i>	<i>Weft.</i>
4 threads of lavender.	1 pick of lavender.
2 " claret brown.	1 " stained white.
4 " lavender.	1 " lavender.
2 " stained white.	1 " claret brown.

It will be noticed that the first pick is lavender; the reason for this is, that in the design the face-thread of lavender is down, and if it were covered by any other colour but its match in

shade, the solidity of the lavender line would be interrupted. Pattern 4 of this Plate contains the same number of colour elements, but is quite different in arrangement. The design for this style—Fig. 195—is so planned as to yield an effect, on the face of the fabric, as follows: a stripe of four threads of claret brown and white twist, a fine line of lavender, a stripe of four

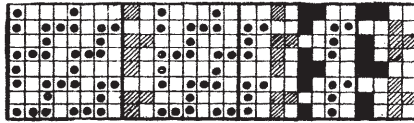


FIG. 195.

threads of claret brown and white twist, a fine line of lavender, a stripe of four threads of claret brown and white twist, a fine line of lavender, a fine line of claret brown, a fine line of twist, a fine line of claret, and a fine line of lavender; in other words, it forms a compound of eight separate bands of colour. The plans of warping and wefting are appended:—

Warp.

8 threads of claret brown and white twist.
 2 „ lavender.
 8 „ claret brown and white twist.
 2 „ lavender.
 2 „ claret.
 2 „ claret brown and white twist.
 2 „ claret.
 2 „ lavender.

Weft.

1 pick of claret brown and white twist.
 1 „ lavender.
 1 „ claret brown and white twist.
 1 „ claret.

The effects in four shades are somewhat limited in variety, the respective stripes being of a single-thread character on the face. They are constructed on the same lines as the three-coloured patterns just described.

213. *Double Plains combined with Other Weaves.*—Patterns of this class are made in worsted, woollen and cotton yarns. Certain weaves of a warp flush character, including types of corkscrews, combine satisfactorily with this double plain. The twills or makes used should be capable of forming neat patterns

when coloured on the one-and-one system, which is the invariable method of wefting such designs. Referring to Fig. 196, which is a weave compound of this description, stripes of double plain are united with a stripe of corkscrew, resulting in the construction of the style given in Pattern 3 on Plate XXX. The colours are maroon and dark green, and are grouped on the end-and-end system in both warp and weft; hence the solid lines of these shades in the double plain parts, and the oblique twills of maroon and green in the corkscrew sections of the fabric. Practically there are two points to consider in the selection of weaves for combining with double plain crossings, namely, the wefting capacity of the crossing, *i.e.*, its power to weave regularly with the plain; and, second, its structure in regard to the scheme of shade-assortment practised in these designs. Respecting the first point, if another double make should be used, such as

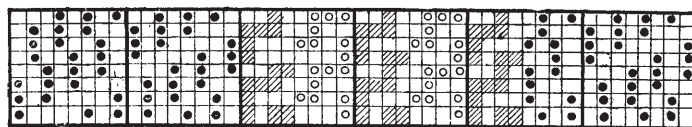


FIG. 196.

cassimere or mat for face, and plain for back, there would not be much liability to form a fabric lacking regularity of construction and hence evenness of surface; but, should the additional weaves be single in construction, they must be exactly of such structure as to work uniformly with the double plain. One point that may be noted in designing for these combinations, is to frequently divide the pattern, and so avoid the formation of broad bands of the several weaves. Then, as to the structure of the crossings in respect to colouring. Warp twills and warp weaves are most suitable, because they do not exhibit the weft colouring to any marked degree, and hence they allow of quite a distinct method of tinting being introduced in the warp of the sections of the design in which they occur.

Styles of this description are neat in form and colouring. Being characterized by smartness of composition and richness of textural effects, they are developed to a large extent.

214. *Intermingled Double Plain Compounds.*—The most

uncommon effects producible in double plain crossings are possibly those resulting from employing schemes of colouring containing an odd number of threads, such as 2, 1, 1 and 1, and

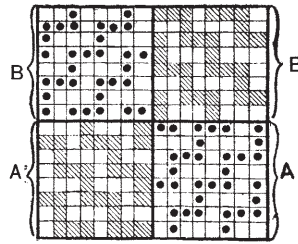


FIG. 197.

the 4, 1, 1 and 1 groupings. The weave used in such schemes of combining shades is given in Fig. 197.

In larger styles, sections *A* and *B* are increased to sixteen threads and picks each. By the aid of an example the principles underlying this form of pattern construction may be expounded. Pattern 5, Plate XXXI.,

results from the following arrangement of colours and the weave, Fig. 197:--

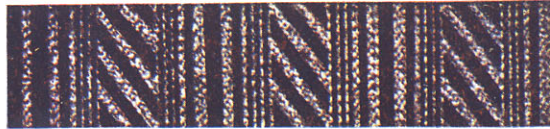
Warp and Weft.

For	{	4 threads of brown.
42 threads.		1 thread of black and white twist.
		1 " brown.
		1 " white.
For	{	4 threads of brown.
14 threads.		1 thread of black and white twist.
		1 " brown.
		1 " orange silk.

The pattern is weavable on eight shafts, one repeat containing 112 threads, so that it possesses the leading characteristics of a Jacquard design. The dimensions of each repeat of the pattern are due to the order of grouping the colours, combined with the weave. Thus, as there are fifty-six threads in each repeat of the colourings before the plan of weaving coincides with the order of the shades, the pattern of warp must run through two, and the weave through sixteen repetitions. The cause of the construction of this pattern consists in the appropriation of a system of colouring, containing a number of threads not a multiple of the number of ends and picks in the weave. This scheme of colouring is practised in fine worsteds and woollens for mantlings, in medium counts of yarns for suitings, and also in linen and cotton textures for vestings.



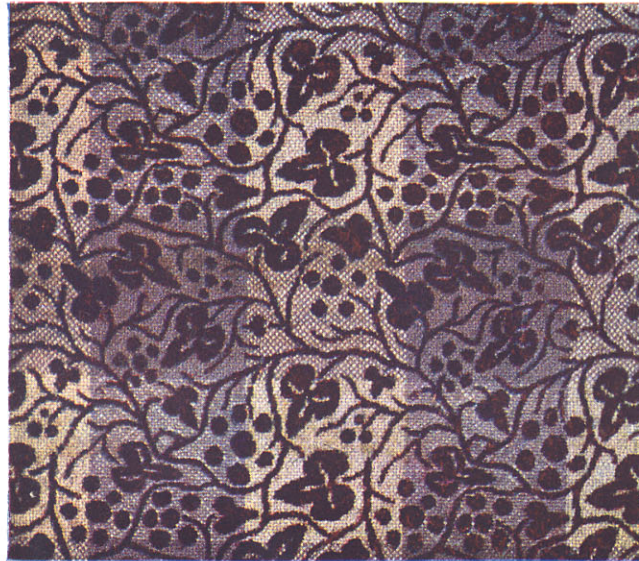
1



2



3



4

Plate XXX
DOUBLE-PLAIN STYLES
1. 2. 3. Stripe Patterns
4. Figured Shawl

There is practically no limit to the variety of effects obtained on this system of colouring double plain designs. On the diamond base, forming Pattern 5 of Plate XXXI., an indistinct check in orange silk is distinguishable; and in this plan of weave and by irregular orders of colouring, many varieties of spotting, intermingled checkings, and other effects in minute and in clear, bold patterns, are produced in various counts of both woollen and worsted yarns. The 2 black, 1 twist, 1 grey, and 1 twist, method of colouring is also useful for this purpose, yielding a form of pattern that can be diversified by modifications in colouring.

215. *Reversibles*.—Double and treble weaves are employed in the construction of these effects. Amongst the compound weaves used for this purpose, the double plain is one of the most important. It gives a species of figuring as clearly developed on one side of the texture as on the other. The system of colouring is mainly one-and-one, with some slight modification, such as a stripe or check effect in addition to the ornamental details worked out in colour. This principle of weaving is practised in the decoration of woollen and worsted shawls and rugs, tapestries, curtains, and Kidder and Scotch and other carpets. In the examples given in No. 4, Plate XXX., and Nos. 1 and 2, Plate XXXII., two builds of fabrics are represented, namely, the double plain and the double twill. An important element of all such figuring, distinguishing it from that obtained by other schemes of weaving, is the clearness with which the details and component parts of the design are developed. This characteristic is a product of the double-weave arrangement. Taking, for instance, the shades of a texture thus constructed to be black and white, it follows that from any double-make combination in which the figuring is produced by changing the positions of the weaves, that is, by transferring that weave on to the back which has appeared on the face, and *vice versa*, there must result a pattern clear in outline and general composition. No other principle of weaving is capable of giving effects so well pronounced in these features: other figured styles are more or less wanting in precision and regularity of outline. Reversibles are made in double weaves arranged on the one-and-one, the two-and-one, and the three-and-one principles. The first method is the most frequently

practised. When the second and third schemes are adopted, the yarns used are of two sizes—that forming the figure being considerably thicker than that employed for the ground of the texture.

216. *Methods of Colouring Double Plain Reversibles.*—Generally these are not very intricate, the main work in ornamenting such fabrics consisting in the adoption of a well-arranged design, with the various sections of the figuring correctly represented on point paper. A few illustrations may be described.

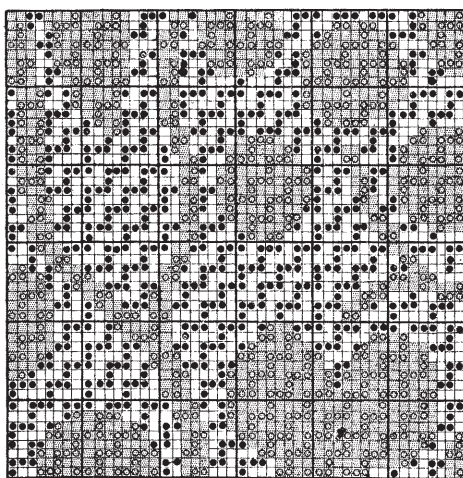


FIG. 198.

On Plate XXX., Pattern 4, and on Plate XXXII., are textures for dressing-gowns and shawls. Sections of each design are given in Figs. 198, 199, and 201. It should be observed that in executing these styles the first work relates to sketching the pattern on point paper, the weaves being subsequently added. The ground sections are occupied by the opposite

weave to that applied to the figured parts. There should not be figure outlines requiring less than two threads and picks to develop, or the effect in the woven fabric will not be satisfactory. It should be considered in preparing these designs that practically every other thread and pick are duplicate yarns—both the odd and even threads not being utilized simultaneously in the construction of the pattern on the face of the cloth. Providing the figure has been correctly worked out on point paper, an appropriate scheme of colouring has then to be applied. Here various technical details and other points have to be considered, such as the structure of the design, whether bold or subdued colouring is the most suitable, and the scheme of grouping shades necessary to develop the ornamental forms of the style. First, the shades of yarn are arranged, one-and-one, throughout, in order to

meet the structure of the double plain weaves. Second, it may be useful to consider types in which the designs are clearly pronounced in every detail, and others in which the figuring is more or less subdued. Take, for example, the worsted shawl pattern, No. 4 on Plate XXX. By warping and wefting thus:—

$$96 \left\{ \begin{array}{l} 1 \text{ thread dark shade,} \\ 1 \text{ ,, blue,} \end{array} \right. \quad 96 \left\{ \begin{array}{l} 1 \text{ thread dark shade,} \\ 1 \text{ ,, white,} \end{array} \right.$$

the figuring on the face of the fabric is developed in the dark shade, and the ground in the white and blue, the effects on the under side being exactly the reverse of those on the face. For shawls few principles of design are more useful than this, for it gives a texture in every particular as neatly ornamented and constructed on one surface as the other. The border of these goods generally consists of a different pattern from the centre or groundwork of the shawl, and is also differently coloured. Take the following as an example:—

1 thread of dark brown.	}	For	}	192 threads—the edge
1 ,, blue.	}	96		
1 thread of dark brown.	}	For	}	of the shawl.
1 ,, white.	}	96		
1 thread of blue.	}	24	}	Border — repeat; 768 threads in border.
1 ,, white.	}	24		
1 thread of scarlet.	}	24		
1 ,, white.	}	24		
1 thread of blue.	}	24		
1 ,, white.	}	24		
1 thread of orange.	}	24		
1 ,, white.	}	24		
1 thread of blue.	}	192		
1 ,, white.	}	192		
1 thread of orange.	}	24		
1 ,, white.	}	24		
1 thread of blue.	}	24		
1 ,, white.	}	24		
1 thread of scarlet.	}	24		
1 ,, white.	}	24		
1 thread of blue.	}	24		
1 ,, white.	}	24		

1 thread of dark brown.	}	For	}	3648 threads—centre
1 „ blue.	}	96		
1 thread of dark brown.	}	For		
1 „ white.	}	96		

Repeat the border.
„ edge.

The above arrangement is for a fine worsted shawl made of about twofold fifty's yarns and set in twenty's reed four's. The

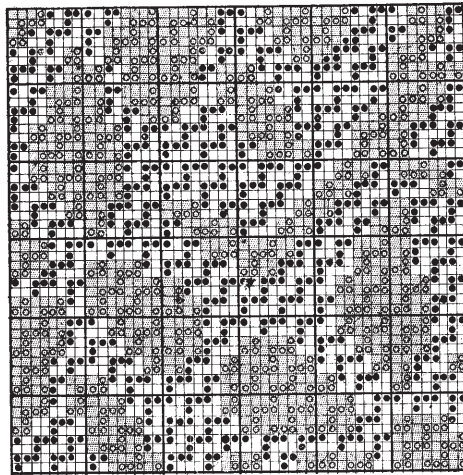


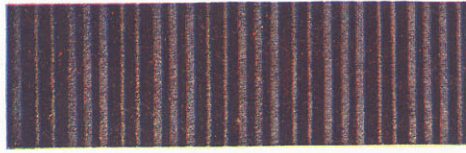
FIG. 199.
(Section only.)

centre and edges of the shawl are simple in colouring, but the border consists of checks of blue, scarlet, and orange on a white groundwork. As the white yarns alternate with each of these colours, the figuring on one side of the shawl in the border is solid white on the checks named, but on the reverse side the figuring is developed in the

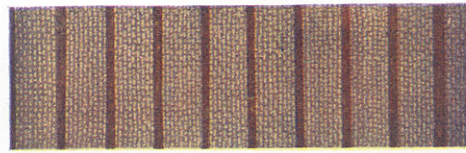
various colours, while the ground is white. Other and simpler forms of colouring besides this are adopted; for instance, another appropriate method of colouring the border and the centre of the shawl, Pattern 4 of Plate XXX., using a double-plain diagonal weave for the edges, is thus:—

1 end of white.	}	96
1 „ light grey.	}	
1 end of white.	}	96
1 „ dark grey.	}	

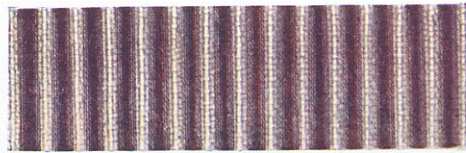
When this class of designing and colouring is executed in woollen yarns for rugs, the fabrics are covered with pile on both surfaces, causing the colourings to possess a very mellow aspect. Pattern 1 on Plate XXXII. is an example of this kind. The



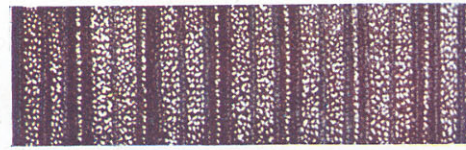
1



2



3



4



5

Plate XXXI

VARIOUS DOUBLE PLAIN DESIGNS

1. Warped and Wefted one-and-one
2. 3. 4. System of Warp Colouring Coinciding with the Weave Construction
5. Irregular Warp and Weft Colouring

design (Fig. 199) is made on the same system as that for the preceding style. The arrangement of shades is as follows:—

Warp.

1 thread of dark grey.	}	For
1 „ white.	}	48 threads.
1 thread of light grey.	}	For
1 „ white.	}	48 threads.

Weft.

1 pick of dark grey.	}	For
1 „ white.	}	48 picks.
1 pick of brown.	}	For
1 „ white.	}	48 picks.

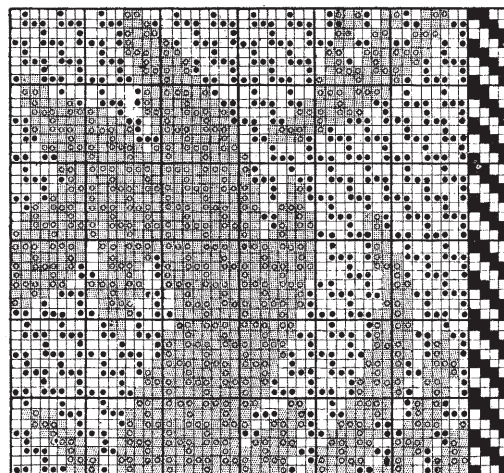


FIG. 200.

217. *Colouring of Figured Designs containing Double Plain and other Weaves.*—One illustration in this type of fabric will show the principles of colouring and weaving which have now to be considered. The object is to obtain three or more effects in figured fabrics mainly composed of double plain crossings, and at the same time to develop with special emphasis the ornamental forms combined. A feature to be avoided in the construction of these designs is the employment of such quantities of the single weaves as will result in the production of a fabric irregular in build. Fig. 200 shows the manner of combining the different

crossings to obtain such effects. Intricate orders of colouring are feasible here, providing the thread-and-thread scheme is retained: the more ingenious the system of grouping the shades, the more valuable the results.

218. *Reversibles arranged Two-and-One.*—This type of textiles is produced in various kinds of yarns, such as worsted, woollen, fancy cottons, and mohair. It is a useful build of fabric, being

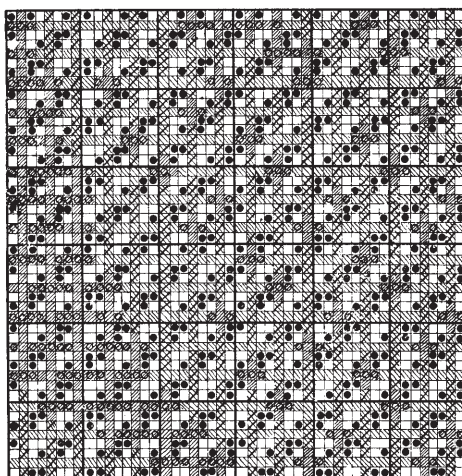


FIG. 201.

□ = Weft in ground. □ = Warp in ground.
 ⊗ = Weft figure. ⊗ = Warp figure.

developed in dresses, suitings, mantlings, vestings, and quiltings. An example in cottons is given on Plate XXIX. A section of the design used in producing this fabric is Fig. 201, from which it is evident there are two ends and picks of ground weave to one end and pick of figure. The weave applied to the ground may be plain, twill, mat, or any other simple crossing, but that applied to the figuring threads is invariably plain in order to secure a texture quite fast in build throughout. The following is the method of colouring practised here :—

- 1 thread of fine white cotton.
- 1 „ thick white cotton twisted with scarlet (knop).
- 2 threads of fine white cotton.
- 1 thread of thick white cotton twisted with lavender (knop).
- 2 threads of fine white cotton.
- 1 thread of thick white cotton twisted with tan (knop).
- 1 „ fine white cotton.

When the following scheme of shades is adopted, the aspect of the design is completely changed :—

developed in dresses, suitings, mantlings, vestings, and quiltings. An example in cottons is given on Plate XXIX. A section of the design used in producing this fabric is Fig. 201, from which it is evident there are two ends and picks of ground weave to one end and pick of figure. The weave applied to the ground may be plain, twill, mat, or any other simple crossing,

1 thread of fine medium blue cotton.
 1 „ thick white „
 1 „ fine medium blue „

This latter order gives a solid blue ground with a clear figure.

There are several distinct methods of colouring these designs. First, the figuring threads, as in the first of these examples, are coloured variously, while the ground threads are of one shade. This affords a clear development of the design, particularly when the ground and figuring yarns are of contrasting shades. The production by such arrangements of a monotonous groundwork is obviated by spotting here and there with the figuring yarns, as in the patterns on Plates VII. and XXIX. A second system admits of the ground being composed of stripes or checks of any dimensions over which the figuring in bright colourings is distributed. Third, for woollen vestings, to which this type of design in simple twill and spotted effects may be applied, such orders of colouring as are given below being practised:—

I.

1 thread of black.
 1 „ black and blue twist.
 2 threads of brown.
 1 thread of black and light olive twist.
 2 threads of blue.
 1 thread of black and scarlet twist.
 1 „ black.

II.

1 thread of light grey.	}	For
1 „ black and white twist.		
1 „ light grey.	}	9 threads.
1 thread of dark grey.		
1 „ black and white twist.	}	For
1 „ dark grey.		
		9 threads.

The ground shades in the first method should be of similar depths of hue, while the twists must not only harmonize with them but also with each other. The checks of light and dark

grey in the second example may, in practice, be of different sizes. One feature of this system is that the groundwork may be varied in colour composition, but the twist yarns making the small ornamental effects suitable for fancy coatings, are of the same shade in both sections of the pattern.

219. *Figured Compound Weave Patterns.*—In general colouring these are treated on similar principles to reversible double plains—such duplicate schemes of shades as are workable in the single weaves being employed. Double cassimeres are coloured on such various methods as to be used in the manufacture of

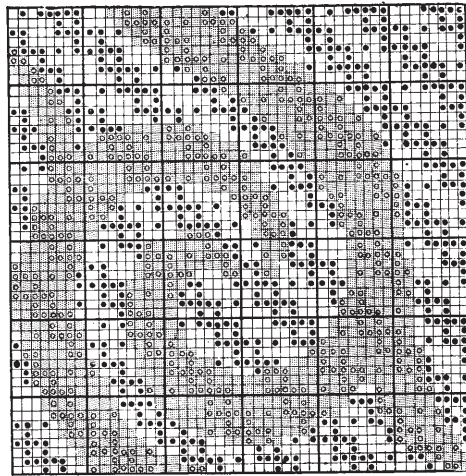


FIG. 202.

plain and figured textures. From Fig. 202, which is a plan of the weaves for the curve effect seen in Pattern 2, Plate XXXII, it will be apparent how the designs are constructed. It is the same weave which is run on to the ground as on to the figure, only in the former the odd threads appear on the face, and in the latter they appear on the back, while the even threads come on to the face. The order of warping and wetting is one thread of blue and one thread of stained white, so that the structure of the weave-design produces the ground of the texture in blue, and the figure is stained white. The opposite effect obtains on the reverse side of the fabric from that represented in the illustration, the colours which form the ground on one side composing the figure on the other.

220. *Compound Colourings in Compound Weaves.*—This is a good principle of colouring for vesting styles, either in woollen or worsted yarns. Some diversity of yarn structure is used, that is to say, woollen combined with worsted, or with worsted

and silk, in order to obtain a difference in brightness of surface in the texture. No. 1, Plate XXXIII., is an example. The ground colouring is one-and-one in a double cassimere twill; and by reversing, the square spots in the illustration are developed in other methods of colourings which harmonize with the thread-and-thread order. A section of the design is given in Fig. 203, showing how the reversing is effected. This brings on to the face in one portion of the design the two-and-two colouring, and

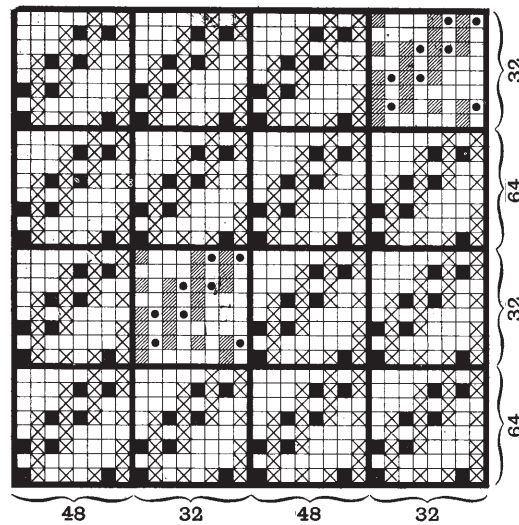


FIG. 203.

} Sections in which the colours are reversed from
 } back to face of the texture.

in another part of the design the four-and-four colouring. Other compound arrangements may be used.

The method of designing consists in arranging, first, the face warp and weft, usually in some simple order of colouring; and, second, a compound scheme for the back, of two or more simple orders of colouring, which, by combining reversible double weaves, may interchange with the face to give the style required. In addition, it is usual in such patterns to colour the face to form either a stripe or a check, irrespective of the special design or pattern due to reversing the backing scheme of colourings to the face, as shown in No. 1, Plate XXXIII. In this pattern, for example, the face colouring is as follows:—

Face Warp.

- For 24. { 1 thread of white woollen.
1 „ dark grey woollen.
- For 16. { 1 thread of white silk.
1 „ dark grey woollen.
- For 24. { 1 thread of white woollen.
1 „ dark grey woollen.
- For 16. { 1 thread of white silk.
1 „ green worsted.

Face Weft.

- For 32. { 1 thread of medium grey woollen.
1 „ white woollen.
- For 16. { 1 thread of medium grey woollen.
1 „ white silk.
- For 32. { 1 thread of medium grey woollen.
1 „ white woollen.
- For 16. { 1 thread of white silk.
1 „ olive brown worsted.

One colour thus alternates with the white woollen and white silk, and, in the last portion, the white silk alternates with the green worsted warp and olive brown weft.

The backing warp and weft are:—

Warp.

- For 24. { 1 thread of white woollen.
1 „ dark grey woollen.
- For 16. { 2 threads of white woollen.
2 „ dark grey woollen.
- For 24. { 1 thread of white woollen.
1 „ dark grey woollen.
- For 16. { 4 threads of white woollen.
4 „ dark grey woollen.

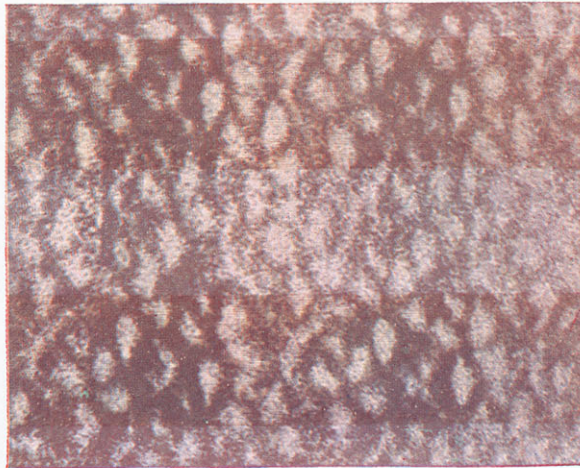


Plate XXXII

REVERSIBLE DOUBLE-WEAVE FABRICS

1. Double-plain; Velvet Finish
2. Double-twill

Weft.

- For 32. { 1 thread of medium grey woollen.
1 „ white woollen.
- For 16. { 2 threads of medium grey woollen.
2 „ white woollen.
- For 32. { 1 thread of medium grey woollen.
1 „ white woollen.
- For 16. { 4 threads of medium grey woollen.
4 „ white woollen.

Or three simple orders of colouring, either the two-and-two or four-and-four being brought on to the face to form the squares.

221. *Colouring of Double Cloths, such as Golf Cloakings and Rugs.*—These are compound in structure, so that a different scheme of colour may be employed for the face from the back of the fabric. It is not, as in the preceding example, a question of reversing the position of the colours, but of confining one scheme of colour arrangement to each side of the fabric. In Pattern 2, Plate XXXIII., the face side is one colour, khaki, and the under-side a tartan check; but, as seen from Fig. 205 (weave 205A), both sides of the fabric may be coloured variously. This applies both to the ordinary golf cloaking or wrap, and to double-weave rugs, where the material, as well as the colouring, may be different on the face and the back of the texture: but in the example on Plate XXXIII., the weave, Fig. 204, is of a special structure in order to produce on the face side a sateen warp effect, in which the colouring for the back does not penetrate on to the face, nor the face colouring penetrate on to the back. The weave for the under-side is $\frac{2}{2}$ twill, suitable to the development of such colouring. The scheme of colouring for the backing warp and weft is as follows:—

Backing Warp.

Red	60	—	60	—	—	—	—	—	—
Black	8	8	60	4	4	—	4	4	60
Blue	12	—	—	—	—	—	—	—	—
Blue green	—	—	12	12	48	48	12	12	—
Yellow	—	—	—	—	12	—	—	—	—

Backing Weft.

Red	56	-	56	-	-	-	-	-	-
Black	8	8	64	4	4	-	4	4	64
Blue	12	-	-	-	-	-	-	-	-
Blue green	-	-	12	12	42	42	12	12	-
Yellow	-	-	-	-	12	-	-	-	-

The weft is similar in colouring but the number of picks is not the same as the threads of warp. The colour compound forming the check consists of red, black, blue, blue green, and yellow, the method of finishing the fabric having toned the colours into each other, and softened or mellowed the style of the check. The difference between the effect on the face

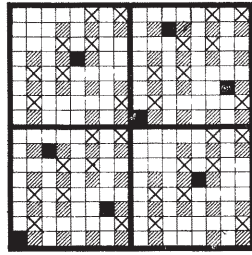


FIG. 204.

■ = Face weave.
 ⊗ = Backing weave.

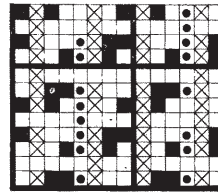


FIG. 205A.

■ = Face weave.
 ⊗ = Backing weave.
 ⊙ = Centre warp stitching.

and on the back is here extreme, but it serves to illustrate how distinct in colour quality each side of such a fabric may be, by employing a suitable weave and counts of yarn.

The method of colouring Fig. 205, produced in Fig. 205A, is as follows:—

Face Warp.

3 threads of heliotrope and white twist.

6 „ „ brown and white twist.

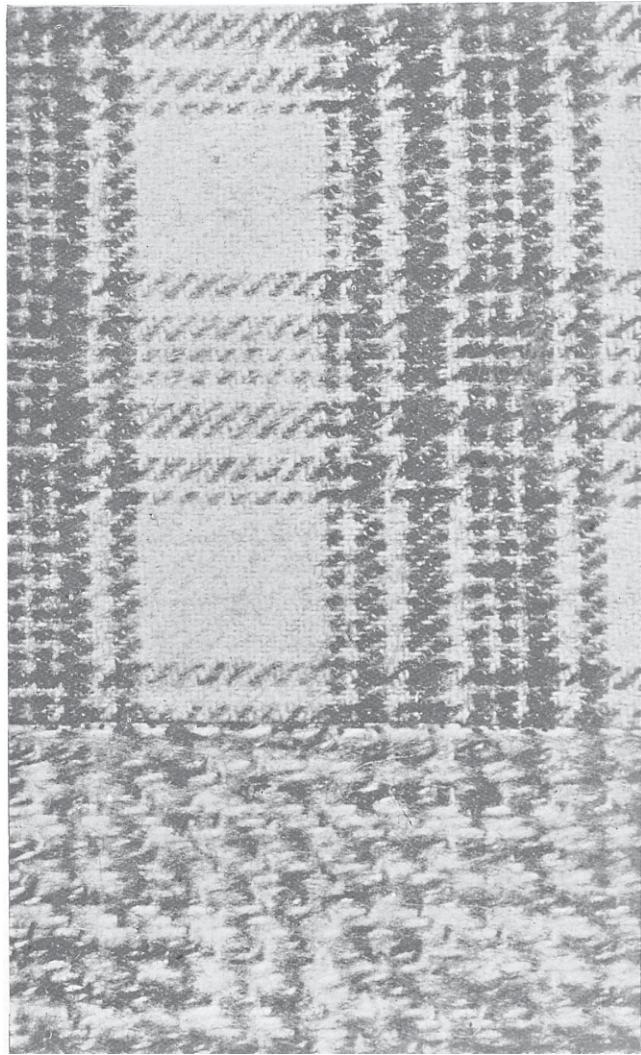
Face Weft.

3 threads of brown and white twist.

2 „ „ fawn „

2 „ „ white „

2 „ „ fawn „



Back.

FIG. 205.

Face.

Backing Warp and Weft.

30 threads of white woollen.		
2	„	brown and white twist.
2	„	white woollen.
2	„	brown and white twist.
2	„	dark olive and white twist.
4	„	white woollen.
4	„	brown and white twist.
2	„	dark olive and white twist.
4	„	white woollen.
2	„	dark olive and white twist.
2	„	white woollen.
2	„	dark olive and white twist.
2	„	white woollen.
4	„	dark olive and white twist.
4	„	white woollen.
4	„	brown and white twist.

Contrasts in form of pattern—on the face and back of the cloth respectively—as in this example, are applied to golf cloakings and rugs, in stripe and check combinations.

CHAPTER XIV.

FIGURED TEXTILES COLOURED IN THE WARP.

222. Methods of Colouring Figured Fabrics—223. Special Elements of Ornamental Woven Design—224. Art and Technique—225. Styles of Figured Fabrics Coloured in the Warp—226. Cotton Quilting Fabrics—227. Ornamental Characteristics of Quilting Designs—228. Attributes of Plush Fabrics—229. Origin of Velvet Weaving—230. Velvets, Compound in Structure—231. Two Classes of Plush Fabrics—232. Warp Plushes—233. Methods of securing the Pile—234. Analysis of the Process of Velvet or Warp Plush Weaving—235. Colouring of Warp Plushes and Figured Velvets—236. Brussels and Tapestry Carpets compared—237. How the Pattern is developed in Brussels—238. Structure of Pile Carpets.

222. *Methods of Colouring Figured Fabrics.*—There are three distinct systems of colouring figured textiles—namely, colouring in the warp, colouring in the weft, and colouring in both warp and weft. According to the first method, the fancy shades are introduced into the warp only—the weft being of one colour throughout the texture. This scheme of colouring is practised in various types of mantlings and dress fabrics, also pile textures of a figured velvet and plush class, and Brussels, tapestry, and velvet pile carpets. Each additional colour in these styles of woven productions may involve the use of a separate set of warp yarns, which, as will be indicated, materially increases the complications of manufacture. Turning to the second system of colouring named, which also obtains in certain descriptions of dress textiles, and in vestings, rugs, and mattresses, it necessitates the employment of several groups of weft threads of different colours. On comparing these two distinct schemes, it may be observed that while the former relates to the utilization of various warp shades—which multiplies the difficulties of weaving in two ways, first, by requiring a Jacquard

of large figuring capacity; and, second, by increasing the diversity of the warp colouring—the latter relates to the employment of various groups of weft yarns, which add to the complexity of production by increasing the number of cards necessary in the construction of the design, and by making the use of a number of shuttles a necessity. Lastly, the third method is a combination of the arrangements just considered, and is applicable to similar fabrics. It is, for obvious reasons, the most complex system of colouring, and is only feasible in looms specially constructed and mounted for the weaving of figured fabrics, comprising both warp and weft colouring in a considerable diversity of shades.

223. *Special Elements of Ornamental Woven Design.*—Woven design requires distinct treatment from other species of decoration; it is not simply surface ornamentation, for it also relates to the production of a suitable fabric for developing the details of the pattern. Every description of textile designing has, in a word, a two-fold relation, for it is both utilitarian and ornamental. Primarily, it relates to the construction of a texture uniform in surface and of the requisite quality and strength; and, secondly, it relates to the decoration of the fabric. Ornament in woven structures is inseparable from the weave which produces it. Consequently, it cannot be applied with the same facility to a textile surface as to paper-hangings, porcelain, etc. In these instances, the designer's work consists in the embellishment of an article obtained by a distinct process of manufacture; whereas, in textiles, warp and weft are the elements out of which both the pattern and the fabric are evolved. Design or ornament and texture have by these agents to be developed simultaneously. Instead of manipulating straight and curved lines in the formation of the pattern, threads of warp and weft have to be interlaced on such methods as to constitute the design required. In order to develop the integral parts of woven design, by imparting appropriate prominence to certain sections and subordinating others, a knowledge of the structure of textile fabrics in general is indispensable. Elaborate textile designing is only perfect so far as the various figures and details of the ornament are clearly defined in weaving.

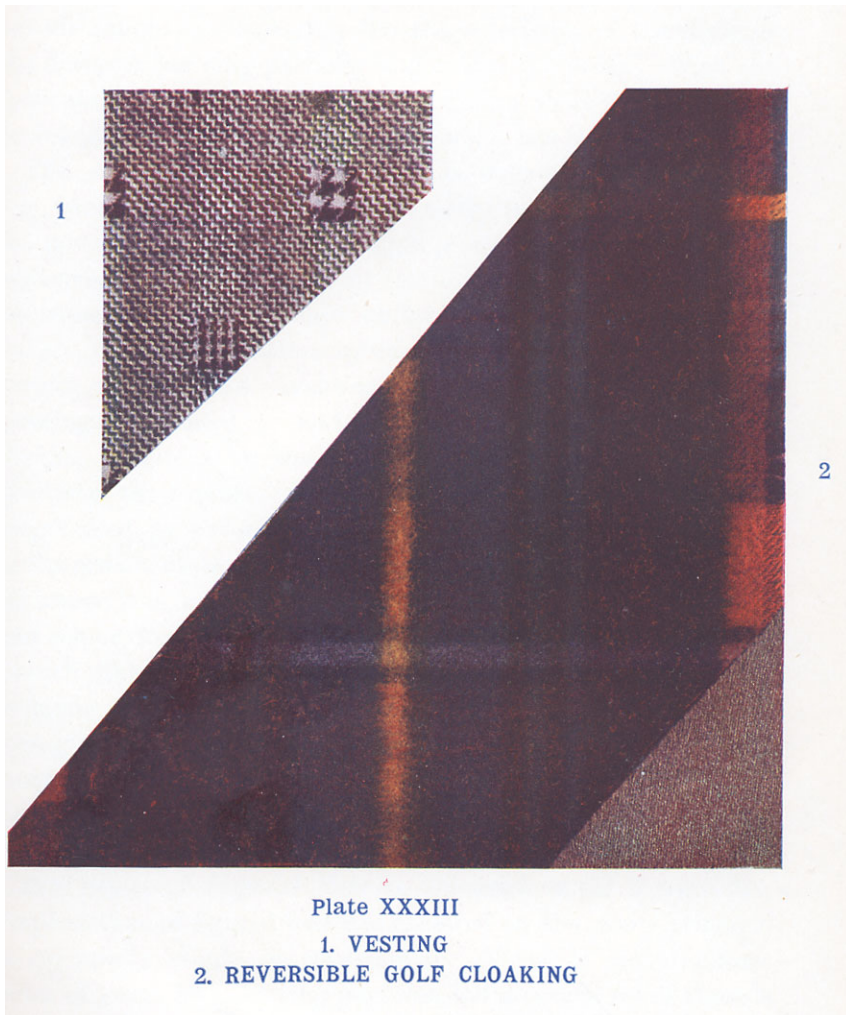


Plate XXXIII

1. VESTING

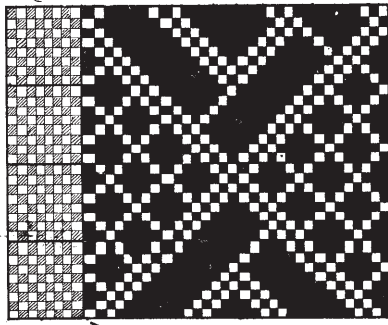
2. REVERSIBLE GOLF CLOAKING

The correct delineation of the objects, and evenly-balanced grouping and distribution of figure, chiefly affect the artistic phases of the subject. Textile pattern is too frequently marred by defective and faulty development. Either the materials used are unsuitable for displaying the characteristics of the style, or the designer has only partially understood the work. With the form and general conception of the design there is no fault to be found, but with the manner in which it has been executed.

224. *Art and Technique.*—It will be obvious from the preceding paragraph that technical dexterity in textile designing is the power of developing, with appropriate emphasis, all types of ornamental effects, whether in relation to form or colour, with the construction of a fabric uniform in texture and soundly built. Technology relates primarily to weaving, but in an ampler sense to the invention and combination of schemes of crossings calculated to add novelty and uniqueness to woven design. Technical or weave patterns provide, however, infinite diversity of texture. It may be ribbed, furrowed, twilled, diagonalled, or covered with pile. Weave design is the feature of the ornamentation of some types of silk patterns (see Fig. 232). Of course it is materially enhanced by artistic elements of form and colour, for technique and art are, in these fabrics, essential to each other. In all woven decoration, art is the natural and requisite associate of technique. Technique determines the strength and fineness of the fabric; art determines its ornamental force and symmetry of the design. Technique regulates the distribution of materials; art appoints the forms, groups the figures, and blends the colours.

225. *Styles of Figured Fabrics Coloured in the Warp.*—The simplest type of figured textures coloured on the warp principle is essentially single in construction. There is no duplicate series of yarns for colouring purposes, but a special set of threads used in certain sections of the ground warp of the fabric. Pattern 1 on Plate XXXIV. illustrates this scheme of colouring. From this example and the section supplied of the design in its production—Fig. 206—it is apparent that the texture is constructed on the single-weave principle, the only irregularity consisting in a number of threads—white in the pattern—being

flushed or floated on the surface of the fabric to form the figure in stripes *A*, *B*, *C*, and *D*. The weft effect is therefore concealed in these sections of the texture. In warp matelasses, the same principles of weaving and colouring obtain—the weft yarns acting as binding agents, and not appearing on the face in the figuring, unless a special set of weft yarns is employed, as in some styles of matelasse vestings, spotted with bright colours. This description of warp effect is, however, a compound fabric,



Part 4 of Pattern 1, Plate XXXIV.



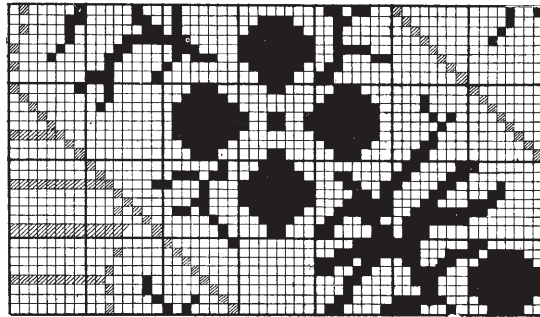
 } = warp.
 }

FIG. 206.

possessing two warps and two wefts, and may be arranged two threads of figuring to one thread of ground in the warp, but one-and-one in the weft. The ground warp is invariably cotton, but the figuring warp is worsted, silk, or mohair. One weft is thick cotton or wool, and is used for wadding or for giving fulness and clearness to the design, and the other is fine cotton, worsted, or silk, according to the quality of fabric produced. Not infrequently, an additional woollen weft is employed for backing.

Quite a distinct scheme of warp colouring is practised in some classes of dress and plush textures from that just alluded to. These fabrics are, in those sections in which several colours run in the same line of the design, two-, three-, and fourfold in structure, according to the number of colours used. In Pattern 2 on Plate XXXIV. a fabric coloured on this principle is given. It is a vesting style of the quilting character, but is illustrative of the common methods of colouring by extra series of warp yarns. On analysis, it is found to be composed of three tints—a white ground, and brown and tan figuring. These are introduced in the warp. Now in such textures there is invariably a ground warp or chain which runs through the fabric, and forms, conjointly with the weft, a firm fabric to which the figuring yarns are secured. This ground warp, usually of one colour, is drawn

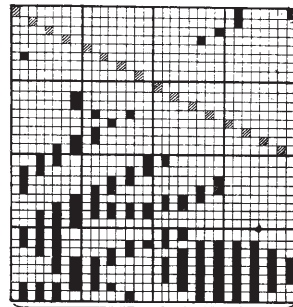
on to a set of shafts, and is worked plain, twill, mat, and other simple crossings. The method of combining the figuring yarns is shown in Figs. 207 and 207A. In the former, the effects are arranged as they are seen in the texture, the blank spaces representing the ground of the fabric, the greys the tan spotting,



Marks = warp.

FIG. 207.

and the solid blacks the brown figuring. Fig. 207A shows how the figuring threads succeed each other in the harness. Between each two threads of figuring there is one ground end. When three or four colours are employed in figuring, there is one ground end for each group of threads. The different series of fancy yarns, working on distinct systems with the weft, have to be run on to separate beams—an arrangement which adds to the cost of manufacture. Moreover, the principle of construction minimizes the weaving capacity of the machine.



First 16 threads of Fig. 207.

FIG. 207A.

If a design, for example, requiring a 192 Jacquard to produce it when developed in one colour, had to be modified to be woven in three colours, each of which formed some part of the figure, it could not be produced in a machine possessing a less capacity than 576 wires. In addition to this machine, the ground of the texture would be obtained by shafts or heddles. The same design, if coloured in the weft, would be weavable in a 192 Jacquard, but would

require 576 cards for developing the figure and 192 cards for producing the ground of the fabric. Hence, while the warp method of colouring is the most economical in respect of cards, weaving, and card stamping, the weft method does not necessitate the employment of a Jacquard of such large figuring capacity.

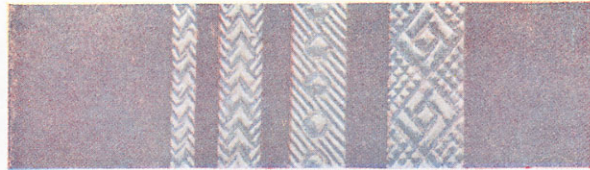
Amongst the ornamental styles of woven goods coloured in the warp that may be analyzed, are cotton quiltings, velvets, and various classes of pile fabrics.

226. *Cotton Quilting Fabrics.*—Quiltings being one of the most interesting and important of warp-coloured figured textures, may be primarily examined.

In texture and ornament, they constitute a specific type of woven fabrics. One essential in which they differ from other textures of a vesting character consists in the figure or ornamentation being produced by several colours, or rather series, of warp threads. Belonging to that class of fabrics figured by the warp and not by the weft yarns, the designs are arranged to elevate or depress any particular set of threads, according to the section of the pattern being formed. The threads which constitute the ground of the texture, compose what is termed the ground warp, while other series of yarns are "extras." A similar arrangement of warps is employed in some classes of plush, tapestry, and carpet weaving, but in no fabric is an identical effect obtained to that which characterizes this kind of vesting.

The warps which produce the figured pattern in quiltings do not flush or float loosely on the surface, but are regularly secured to the foundation texture, making a "fast" figure, that is, a pattern which, though marked and well pronounced, is even on the surface and firm in construction.

Generally, quiltings have a light or white groundwork, which is neatly ornamented with small lozenge, diaper, or other figured effects. The plan of the design (No. 2, Plate XXXIV.) is geometrical, yet there is an absence, due to the floral details, of that rigid appearance which is frequently associated with patterns constructed on this base. Weave, or the system of interlacing adopted, is the factor which imparts a variety of tone and effect to the style. The texture is woven in three



1

A B C D



2

Plate XXXIV
EXTRA-WARP COLOURING
1. Stripe Design
2. Quilting Texture

colours—brown, tan, and white. The floral and sprig combinations are formed of the first colour, the raised or diamond portions of white, and the indentions of tan. The quantity of white or tan in any particular part of the fabric is due to the structure of the design employed. The groundwork of the fabric is neat and effective. It consists of a fine texture of white, slightly raised above the indented border surrounding the figures. The small diamond effects are produced by the lifting of the figuring warp, which imparts an indented appearance to the cloth. On this groundwork, two rectangular objects are placed in such a way that the inverted figures they contain oppose each other. Treating of the rectangular objects first, they are separated by the diamond groundwork, and also by the narrow border of dotted effect, in which, in the fabric, the tan colour is the most prominent. The space between this edging and the central figures on which the floral and sprig work are delineated, consists of rib or rep. Here the white and tan are equally balanced. The sprig ornamentation is characteristic of this style of vestings. It has not been produced, nor can it be applied with such facility, to other types of woven fabrics. The fineness of the texture, and smallness of the threads employed, make it possible to develop the most minute figuring quite distinctly. A neat and interesting contrast is obtained by having the sprig effect in one figure faintly marked, while in the other the floral work is both bolder in form and more compact in arrangement.

227. *Ornamental Characteristics of Quilting Designs.*—The ornament applied to this make of fabric is so unique that it deserves to be briefly noted. It is typical of the texture in which it is developed, being, so to speak, part of its construction. No other build of fabric admits of the production of such fine, line-like, and detailed figured effects as are obtainable by this principle of weaving. The most minute decoration is here delineated with a precision that it would be difficult to surpass with the pencil. All the figures employed are graceful and delicate in appearance, due mainly to the absence of floats of warp or weft from their composition. Elaborate designs, crowded with combinations of form, are thus produced by a neat,

tasteful method. Some patterns which would appear coarse in other makes of fabric, possess in these textures clearness, combined with an effective arrangement. The examples supplied in Pattern 2 on Plate XXXIV., and Pattern 1, Plate XXXV., are illustrations of the minute character of the ornamental forms developed in these fabrics. Whatever the class of figuring practised, it is full of small twig and floral effects and clear and precise details.

228. *Attributes of Plush Fabrics.*—Another description of woven production coloured in the warp is plushes, including imitation astrakhans, the figured velvet, and several classes of carpets, for example, Eastern, tufted, and Axminster. The distinguishing quality of all plush fabrics is the soft shag or pile with which they are so covered that one of the essential features of a woven texture—namely, the crossing of warp and weft threads—is entirely concealed. The pile is of two kinds: in some fabrics it consists of a uniform mass of cut short filaments, while in others it is in the form of minute curls or loops compactly clustered together; but in both cases, it projects from the surface of an ordinary texture. The fineness of the fibre and density of the plush both combine to conceal the foundation on which it is produced. The characteristic appearance of velvet, as well as its quality of softness, which distinguishes it from all other loom products, are due to the pile alone. The beauty of the fabric is dependent upon the compactness and uniform evenness of the pile, any inequality in the length of the fibres of which it is composed producing an irregular and defective appearance in the texture. In plush weaving, one series of threads forms a species of curl or loop on the ground of the fabric; or such threads, after having been secured to the foundation of the texture, are cut into short filaments, causing them to be erect on the surface of the texture: hence a plush or velvet fabric is an ordinary texture overspread with a compact, dense pile.

229. *Origin of Velvet Weaving.*—Velvets are said to have been originally produced in Asia. The Chinese claim to have been the makers of a fabric of this description at a comparatively early date. Velvet manufacture, for a considerable period after

its introduction into Europe, was confined to Italy, where, in the weaving establishments of Venice, Milan, Florence, and Genoa, it was extensively carried on with marked success. Two Genoese manufacturers, Etienne Turquetti and Barthélemy Narri, under the patronage of Francis I., in 1536, are reported to have commenced velvet weaving in Lyons, at which place it has down to the present day remained an important industry. The productions of the French looms speedily surpassed those of Italy, both in fineness of texture and in soft, lustrous appearance. Rather more than a century after velvet manufacture had been established in France, it was introduced into England by the refugees of that nation when compelled, by the Revocation of the Edict of Nantes, in 1685, to leave their country, who, coming over to England, settled in Spitalfields, the ancient seat of the English silk industry, and there domesticated this important textile art.

230. *Velvets, Compound in Structure.*—All velvets are what may be termed compound in construction—that is to say, one series of threads is appropriated to the production of the *ground* of the texture, while a second series is employed in the formation of the *pile*; in other words, there are distinct warps or wefts necessary to produce the plush and foundation of the fabric respectively. As to the ground, it may be formed of the plain make or of a fine twill. The threads used in the production of the pile may be of various colours, and treated in such a manner as to yield a shag or plush of several lengths. When the pile is obtained in the warp it may be either cut or uncut; that is, the plush may be formed of small, curl-like loops, or of merely the ends of threads projecting from the body of the cloth. In figured plushes, the various parts of the pattern are developed by resorting to these two modes of producing effects, some sections of the pile being cut, and others remaining uncut, while to further enhance the character of the design an ottoman rib effect may also ornament specific portions of the fabric.

231. *Two Classes of Plush Fabrics.*—Technically, plushes are divisible into two great classes: (1) Weft plushes, or fabrics in which the pile is formed of flushes of extra weft yarns distinct from those producing the ground of the fabric. (2) Warp plushes,

or fabrics in which the pile results from the use of extra warp yarns distinct from and independent of the warp utilized in forming the foundation of the texture proper.

The richest effects are producible on the latter principle, which is probably the original method of plush weaving. Weft plushes comprise, however, a considerable variety of textures, including velveteens, corded velveteens, corduroys, astrakhans, and feather trimmings.

232. *Warp Plushes.*—In the first place, let it be understood that for whatever purpose the fabric is intended, at least two warps are essential in its production. Though wound on to separate beams and subjected to different tensions, yet they are so combined by the weft yarn, that they both, when amalgamated, become important factors in the same texture. The weave used in the construction of a warp plush is essentially of a two-fold character, consisting of a ground crossing, and of a flush arrangement for producing the pile effect. Plain, mat, rib, and twill weaves are applied to the ground, according to the fineness and characteristics of the required texture. As to the pile, it may be either cut or uncut, of one or several colours, and also of such variable lengths as are requisite to the development of the forms contained in the pattern. Whatever the character of the plush, it is due to the employment of wires which are inserted between the threads of the pile warp. Thus the wires are introduced when the series of threads in the ground warp is depressed, and such threads elevated in the pile warp as are in accordance with the formation of the design. In some velvets the whole of the pile warp is lifted for the insertion of each wire. Fig. 208 illustrates the system on which the wires are employed, as well as the manner in which they produce the pile. Only nine warp threads, six picks of weft, and three wires are represented. The threads lettered *A* form the pile, and those lettered *G* the ground warp. In this diagram the wires are shown entering the warp when threads *G* are depressed and threads *A* elevated.

233. *Methods of securing the Pile.*—Fastening the pile is an important feature of the weaving process. Unless a sufficient number of ground picks is inserted between the wires, and un-

less they form such interlacings with the pile warp as to secure the threads it contains to the ground of the texture, whether the plush is looped or cut, it will draw out, and the result will be a defective fabric. A point, therefore, that should have careful attention is that of securing the pile in such a manner that it will remain erect after the withdrawal of the wires. The usual method of effecting this consists in arranging for the ground picks to float over the pile threads, both immediately before and after the insertion of the wires, as illustrated in Fig. 208. This plan is adopted, because it has not only a tendency

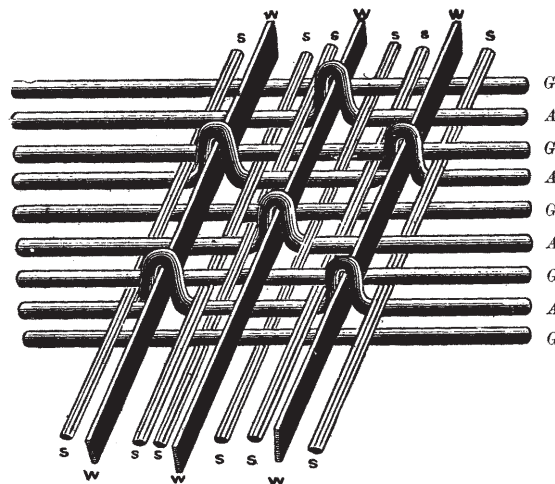
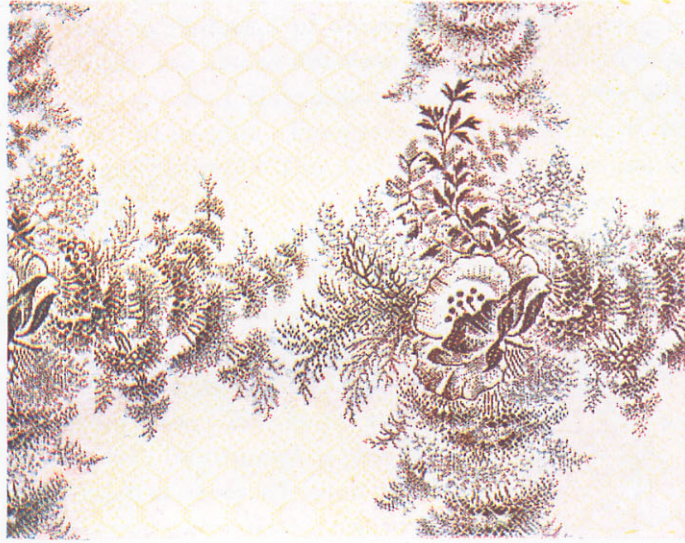


FIG. 208.

to force the wires into position, but to keep them there. It is not, however, the only system; in fact, there are two other useful methods of forming a "bed" or foundation for the wires. One feature of this arrangement is common to all systems, namely, the pile warp is depressed after the insertion of each wire; consequently any difference existing between this and other modes of fastening the plush will be found in the plan of interlacing the picks *preceding* the wire. For example, in making tapestry carpets, the pile warp is not down, but up, in the shed before that formed for the wire; while in a third system, the pile threads float over two ground picks and the wire in succession. Both these systems are better adapted for

the insertion of a large number of wires to the inch of the fabric than the first method described.

234. *Analysis of the Process of Velvet or Warp Plush Weaving.*—The weaver, having interlaced the requisite series of ground shoots between the threads of the combined warps, proceeds to form a division in the threads, by depressing the whole of the ground warp, and in some cases the half of the pile warp, for the admission of the wire. This shed remains formed until the wire has been passed from side to side of the warp and with the grooved edge towards the sley of the going part. On the wire having thus been fixed, the reed is brought against the texture already woven, carrying the wire along with it, which it causes to rest on its lower edge. In this upright position it is maintained by keeping the going part in contact with it, till a new division of the threads (obtained by depressing all the threads covering the wire and elevating a portion of those floating under it) is secured, when the sley or reed is removed from the fell of the cloth and a ground pick introduced to be driven into contact with the ground shoot which preceded the wire. On this principle the wires are bound to the ground of the fabric, for the threads covering them are not only securely woven into the texture by the shoots preceding, but also by those following their insertion. After the proper complement of ground picks has been added, the process of inserting the wires is repeated, several wires always being retained in the fabric. The necessity for this is obvious; thus, if the weaver, before he has introduced a sufficient number of wires, passes his knife within the groove of the first wire, and so cuts the loops covering it, the pile ends would, when tension was put on the warp in the formation of the next shed, draw out, and thus the plush would be destroyed. This is descriptive of the hand method, by which some of the finest decorative silk pile fabrics are produced. In ordinary velvets and carpet weaving, whether Brussels (loop pile) or Axminster (cut pile), the wires are inserted and withdrawn by automatic mechanism. In cut pile carpet weaving, at the end of each wire is a short blade tapering to the end of the wire, so that, when the wire is withdrawn, the threads of pile warp covering its upper edge are cut.



1



2

Plate XXXV

COLOURING OF FIGURED FABRICS IN THE WARP

1. Old Vesting Style (Quilting)
2. Cut and uncut Pile Pattern

235. *Colouring of Warp Plushes and Figured Velvets.*— Plushes made in imitation of animal skins may be composed of several colours, and also of different lengths of pile. Fig. 209 is a weave for a plush of this order. Threads *B* are grey pile, and threads *T* are white pile. The ground of the texture is formed by threads and picks *G*. The two sets of pile yarns are wound on to separate beams. As the marks in this case indicate threads lifted, it will be noticed that on the first wire only one pile thread is up, namely, B^1 , both the white and the ground ends being depressed. The second wire elevates T^1 , the third wire B^2 , and the fourth wire T^2 ; so that in each repeat of the design all the pile yarns are up once. This is one method of colouring plush fabrics, and is practised in the production of fancy effects in which no figure or ornamental design is required. When colour is introduced into styles of a figured class for robes and mantlings, it is accomplished on other systems. Pattern 2, Plate XXXV., and Pattern 1, Plate XXXVI., are illustrations of two types of plush or velvet colouring.

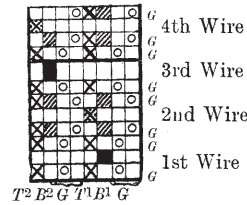


FIG. 209.

Pattern 2 on Plate XXXV. is a velvet pile colouring. Several warps have been employed in its construction, white silk for ground, pale sage green for the principal figure, and variously coloured warps for the minor parts of the pattern. To produce elaborate textiles of this description a complicated form of loom mounting is necessary. First, the ground warp, which is run off a special beam, is passed through a set of shafts hung before the harness and worked by the Jacquard or a dobbie machine. Second, one section of the harness receives the green warp, and other sections the various hues composing the remaining warps. These figuring warps are also mounted on separate beams or run off bobbins or miniature beams, each thread being tensioned separately. The designs have to be so prepared that all the effects which are intended to be of one colour will fall exactly in the same line or occupy the same threads in design.

This is also illustrated in Plate XXXVI., a pattern with silk sateen ground, and with the figuring developed as follows:—

Green leaves and stems in loop and cut pile.

Tinted-rose flowers in loop and cut pile.

Underneath or subdued design in terry or loop pile.

An effective contrast, which is characteristic of pile colouring, is seen in the tone of the cut and loop pile in the green and tinted rose. The difference is so marked as to appear the result of colours of dissimilar qualities. The cut pile imparts a soft, full colour, and the terry, an apparently lighter colour, but of the same hue. This technicality relates specially to pile-fabric colouring. By using the same colour of yarn, *e.g.* green or salmon pink, two tones of green and two tones of pink are acquired. This design element is used in the development of ornamental details; shading in either leaves or flowers being rendered feasible with one colour of yarn.

Another contrast to be noted is that between the sateen ground and the terry pile figuring. The terry is deeper in quality, and, if produced in cut pile, would be still fuller in depth of tone. In construction or loom mounting, the sateen warp would be on one beam, the ground or foundation warp on a second beam, and the pale green, dark green, and salmon-pink warps on bobbins, being individually tensioned, as in Axminster or Brussels carpet weaving.

236. *Brussels and Tapestry Carpets compared.*—Brussels and tapestry carpets are so similar in appearance that they might be regarded as fabrics of the same structure. But, when the principles on which the pattern is obtained in the respective carpets are examined, it is at once evident that in the Brussels the design is purely a woven effect, in the tapestry it is a print. The technical differences between these manufactures being understood, there are causes apparent for the superior wearing qualities of the Brussels. First, in point of colouring it possesses a distinct advantage over the tapestry, for all the shades used in its composition are supposed to be “fast,” the yarns being hank dyed and not coloured in the warp. Second, the pile is fuller and made of better materials, while the thickness and substance of the fabric are not due to strengthening threads, like the “body” of the tapestry, but to the worsted yarns used in the formation of the pile. Third, the pattern is more smartly

defined, its various parts being clearly and distinctly developed; whereas the figure in tapestry carpets is more or less indistinct, arising from the system on which the pattern is produced.

237. *How the Pattern is developed in Brussels Carpets.*—The weaving of this carpet possesses some characteristic features. The pile warp, for instance, instead of running off ordinary yarn beams, is wound, as stated, on bobbins, or miniature beams, fixed in frames, or a large creel, placed behind the loom. Each colour requires what is technically called a separate frame. A five-frame Brussels is a carpet with this number of colours succeeding each other in the same line of the fabric. The manner in which the various colours are controlled—in other words, in which they are concealed from, or brought into, view—is an important factor in the manufacture of this article. On examining a Brussels carpet, it will be observed that the individual threads forming the pile seem either to be composed of several colours, or to be substituted by yarns of other shades, according to the section of the pattern being formed. For instance, in the same line of the design, looking at the fabric lengthways, apparently in the same thread, as many as from three to five colours, such as brown, green, fawn, scarlet, and blue, form the pile in succession. If these effects are not due to a printed yarn, they result from the employment of five distinct threads, each of which is so controlled that it only appears in the pile when assisting to develop the design. The question occurs, How are the threads concealed when not appearing on the face of the fabric? An important principle of weaving is implied in the production of results of this character. Whatever the colour of the warp yarn in a single cloth, the pattern is, throughout the piece, continuously tinged with that shade, excepting in such positions as it is crossed with the weft thread. In a double cloth two colours of warp yarns may be applied to one line of the fabric; that is to say, supposing the shades selected were black and white, the pattern produced might be composed of these colours alternately, while in a triple-make fabric three shades could be brought on to the surface of the texture in succession. Effects of this order are due to changing the positions of the threads of the respective warps by reversing the weaves. The several shades of

a Brussels carpet are manipulated on this compound-weave principle of intertexture. To obtain a three-frame pattern composed, say, of green, scarlet, and olive, at least three separate weaves are necessary—one for each shade. Thus the weave used in forming the shed in the warp for the green pile is so arranged as to depress the scarlet and olive, while that for giving the scarlet pile conceals the green and olive threads, and lastly, that for producing the olive pile conceals the green and scarlet ends; so that, by an appropriate application of these respective weaves to the design, the colours are brought up in the figure where required.

238. *Structure of Pile Carpets.*—Fig. 210 is a sketch of the

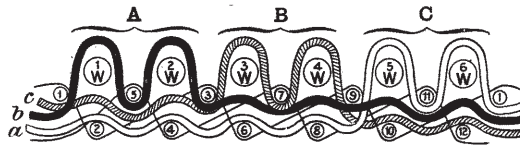


FIG. 210.

interlacing of the threads in a section of this class of carpet, and is a three-frame structure. The positions the threads occupy when not covering the wires, will be evident on examining the illustration. Thus it is clear that when a thread of pile yarn is not active in the formation of the figure, it is covered or concealed by the wire and ground shoots of weft. Take thread *b*, for instance, which, having covered the first two wires shown, floats underneath the succeeding wires; a similar arrangement obtains in the interlacings of thread *c*, which floats under wires 1 and 2, and over wires 3 and 4, while thread *a* is covered by the first four, but flushes over the last two wires; hence each class of pile threads interweaves with the ground weft on the same system, producing a carpet of uniform strength, and one in which every species of pile is equally permanent.



Plate XXXVI

FIGURED PILE SPECIMEN, SATEEN GROUND

CHAPTER XV

WEFT-COLOURED FIGURED FABRICS—CURL TEXTURES.

239. Warp and Weft Colouring compared—240. Classes of Designs Coloured in the Weft—241. Designs in which the Pattern is a Product of the Ground Weft—242. Extra-Weft Styles—243. Vestings—244. Vestings with one Extra Weft—245. Two-Cover Vestings—246. Four-Cover Styles—247. Honeycomb Vestings—248. Two-Cover Designing—249. Four-Cover Pine Design—250. Paisley Shawl Colouring—251. Compound-Weft Reversibles—252. Warp and Weft Coloured Figuring—253. Curls, Textiles of the Astrakhan Group—254. Four Types of Curled Effects—255. Curls obtained by Wires—256. Process of Weaving Curls produced by Wires—257. Curls formed by the Weft in which the Warp is Cotton—258. The Weave of Weft Curls—259. Structure of Weft-Curl Fabrics—260. Operation of Cutting after Weaving—261. Curls developed by Milling—262. Points of dissimilarity in the various Builds of Curled Textures—263. Two kinds of Curls developed by Milling—264. Spiral Threads used for Warp—265. Variety of Pattern in Spiral-Warp Curls due to Colour—266. Twist-Yarn Cotton Warp Curls—267. Backed Weaves for Curled Cloths—268. Essential Characteristics of Cotton Warp Curls due to Milling—269. Examples in Designs for Cotton Warp Curls.

239. *Warp and Weft Colouring compared.*—This class of figured styles is the most comprehensive. It includes vestings, robes, ribbons, and an endless diversity of ornamental textures. Richer combinations of tints are more feasible by this than the warp method of colouring. A comparison of these two important systems of introducing colours into figured fabrics, shows that the actual weaving process is less intricate so far as shuttling is concerned—not more than one or two shades of weft being employed—in warp-tinted textiles; but, as explained in Chapter XIV., each additional colour in the same line of the design requires a special warp beam. These arrangements are just reversed in the weft system, for here there may be from two to six shades of weft running in the same line of the fabric, but only one warp is utilized. These conditions make the production

of such fabrics a laborious operation, inasmuch as the number of picks inserted to the inch in four- or five-colour styles may be very large. Thus, in a pattern composed of the latter number of colours throughout, two or more hundred picks to the inch is not uncommon.

Whatever number of shades occur in succession across the pattern it is exactly so many fold in the weft, whereas if the colours are introduced in the warp the texture is several fold lengthways. The different kinds of weft or warp form layers of threads in the woven product. When they are composing the ornamental details of the design they appear on the face of the fabric, but when not thus used they float loosely on the back, only being stitched at intervals, and in patterns of several shades they are frequently not stitched at all. The loose yarns flushing on the under surface of the texture may be cut off. One other detail in the two systems affecting economic production is, that in the weft system, a somewhat inferior or rather less costly yarn may be used than when colouring by the warp scheme. There is a minimum degree of tension put on weft yarns and a maximum degree applied to warp yarns in weaving. In coarse fabrics and cotton textiles this condition does not materially alter the cost of manufacture, but in fine productions it is an item that has to be considered. Summarizing these points of dissimilarity, the warp method of colouring affords the most scope for the development of ornament in pile or plush goods; does not multiply the intricacies of shuttling, but tends to diminish the figuring power of the Jacquard, and requires yarns of a better quality than may be adopted for wefting; on the other hand, the weft method practically allows of more latitude for diversity of colouring and ornamentation of all types of fabrics excepting the plush and leno, and it is, moreover, in fine textiles, less costly, in so far as it makes it feasible to employ an inferior fancy thread with satisfactory results; and lastly, it utilizes the utmost capacity of the Jacquard in the construction of a figured design.

240. *Classes of Designs Coloured in the Weft.*—Fabrics figured and coloured by the weft yarns are of various kinds, but to

facilitate analysis they may be considered under the following distinguishing types:—

- I.—Designs in which the figure is a product of the ground weft.
- II.—Designs requiring one extra weft.
- III.—Designs requiring two extra wefts.
- IV.—Designs requiring three extra wefts.
- V.—Designs requiring four or five extra wefts.
- VI.—Designs composed of two or more wefts and reversible.

As in warp colouring, a ground warp is an essential element of the fabric, in textiles coloured in the weft—Classes I. to V. inclusive—there must also be a ground weft, which forms a suitable texture on which the more elaborate ornamentation due to the fancy shades may be produced. By extras are meant the shades of weft in addition to the ground picks. A design with two extra wefts is called two-cover; with three extras, three-cover, and so on—the ground weft always being added. The word “cover” is therefore synonymous in this sense with “extra,” and has probably been adopted because it partially describes the texture to which it relates, which consists of so many layers or covers of weft threads in thickness.

241. *Designs in which the Pattern is a Product of the Ground Weft.*—In this build of fabric there is comparatively little complication of fabric-structure, of weaving, and of colouring. Thus the weft, which interlaces with the warp to form the ground of the fabric, is also used in the construction of the design. Some types of dress fabrics, particularly those of a lustre character, and mantlings for summer wear, are coloured and ornamented on this principle. It may be regarded as the most elementary type of figured fabric. An example is given in Pattern 1 on Plate XXXVII., which will show the scheme of colouring generally practised in this style of textures. A section of the weave-design is that in Fig. 211. It will be observed that the small figures are composed of solid weft floats, and are arranged on a fine sateen twill groundwork. The warp is composed of lavender cotton, and is mainly useful in constituting the foundation of the fabric, and in concealing the weft picks when they

are not forming the figured effects. The small objects are chintzed with weft colouring, the order of picking being four of dark blue and four of white. This gives the pattern the aspect of a cloth composed of extra wefts. It should be noted that such a contrast in weft colouring, as obtains in this specimen, is only satisfactory in this build of texture when the warp is closely set, and flushes well in the ground sections. If these conditions were not complied with, the pattern produced would be chintzed by the weft in not only the figure, but

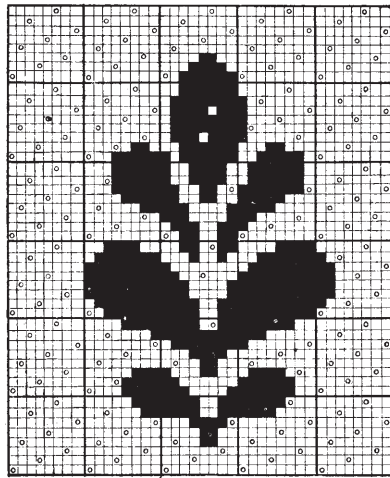


FIG. 211.

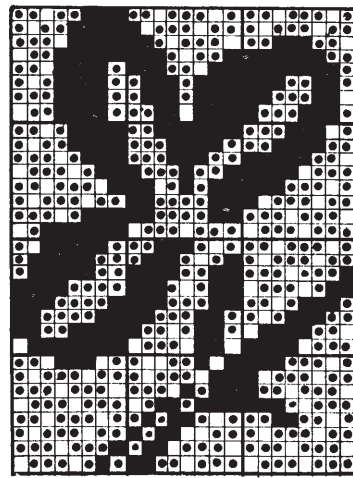


FIG. 212.

also in other parts of the texture. A plain or twill weave, for example, would expose the blue and white shades right across the sample.

Respecting the construction of this style of fabric: it is based on the single-make principle of design. The figure is purely a product of floats of the weft yarn, which are determined by the form of the figure being developed. In some patterns the ornamental sections are composed of twill and other fancy weaves to increase the diversity of effects obtained.

242. *Extra Weft Styles.*—Fabrics of this description are practically two-fold in the weft. An illustration will make the scheme of colouring and design arrangement evident. Pattern 3, Plate XXXVII., is compound in the weft and single in the warp;

for the wefting consists of deep lavender-blue wool, and of white silk, and the warping entirely of lavender cotton. The warp threads are concealed, but this is not an invariable rule, for they may be a different shade from the wefts, and be flushed on the surface of the texture. When this is the case, a buckskin weave is generally used for the ground of the cloth. Should, however, the wefts be worsted and silk, or woollen and silk, and the warp cotton, it is customary to conceal the latter by employing a weave which flushes the ground weft on the face. For vesting and mantling fabrics, this is the common arrangement, but in dresses and cottons, the warp is also used for enhancing the colouring of the fabric. This latter type of design is a compound form of the system illustrated in Fig. 211, two wefts being used instead of one, and each being utilized in the construction of the figured effects, and also in forming a fine warp twill in the ground of the fabric. Different principles of designing are practised from these, in the construction of such styles as are typified by Pattern 3 of Plate XXXVII. Figs. 212 and 213

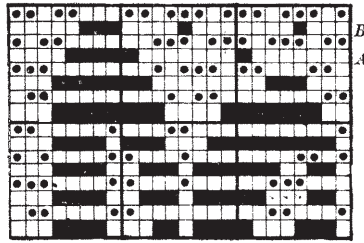


FIG. 213.

are the weave designs to Section A of this pattern. The former illustrates the method of preparing designs of this class on point paper for the loom, and the latter the method by which the two series of picks are amalgamated during weaving. Fig. 213 is the last eight picks of Fig. 212, the ■'s of which form the odd and the □'s the even picks. This is the structure of the fabric; for in stamping the cards each pick of the design as given in Fig. 212 is treated twice: I., the □'s and the □'s are cut; II., the ■'s and □'s are cut. The stitches for the silk or figuring picks are added during stamping, and occupy similar positions in the design to those on picks A and B of Fig. 213. The principle of stitching here corresponds to that of stitching cloths backed with weft—so that the ties are, as far as feasible, introduced in such positions in the picks, that the threads on which they occur are depressed both before and after their insertion. Thus

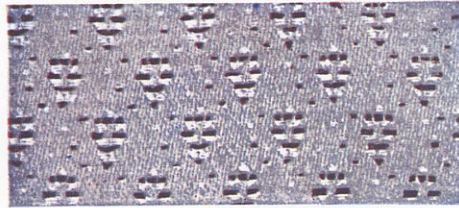
thread seventeen, on which the tie on pick *A* occurs, is depressed on picks twelve and fourteen—resulting in the concealment of this tie.

Whatever the number of colours used in the construction of this style of figured fabrics, the designs are simply drawn out as in Fig. 212, which shows the relation of the colours to each other in the woven structure.

The manner in which the different effects seen in Pattern 3 of Plate XXXVII. have been produced may be explained by referring to Fig. 213. The first pick of this sectional design—marked in solid squares—is a figure pick, being white in the texture, and corresponding to pick 25 of Fig. 212. The second pick is ground, and also corresponds to the twenty-fifth pick. Now it will be observed that the figuring picks in Fig. 213 float under the threads occupied by the ground picks *succeeding* them; and also that the ground picks float under the threads occupied by the figuring picks *preceding* them. In this way the effects due to the two series of picks—lavender and white, or ground and figure—are kept separate and distinct, and a clear pattern is developed on an equally clear and regular groundwork.

The figured sections here, as in Pattern 1 of the same plate, may be chintzed, as this process does not increase the number of “extras” required. As to the ground of these styles, it is generally a solid colour.

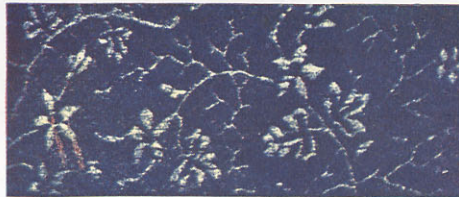
243. *Vestings*.—One of the most important species of woven design to which this scheme of colouring relates is vestings. These fabrics are composed of various materials, and constructed on different principles of design, and may be figured in the warp, weft, or both, but in this example only coloured and figured by the weft yarns. It necessarily follows that the most elementary type of this class of patterns only possesses one extra weft, as the example just considered. This extra colour does not, however, always run through the texture, but merely spots it at intervals. Some of these fabrics are composed of cotton and linen in the ground, with these materials or silk for spotting; others possess a worsted or woollen warp, with worsted or woollen ground weft and silk extras; a third class has a cotton warp, with woollen ground and silk figuring;



1



2



3



4

Plate XXXVII
FIGURED AND SPOTTED FABRICS.
WEFT COLOURING

- 1. Chintzed
- 3. Extra weft
- 2. 4. Extra weft Spotting

while a fourth class has silk warp and weft for face, and cotton warp and weft for foundation. The first group is mainly produced in light shades for summer wear; the second series has either light or dark grounds; the third series is invariably developed in dark shades, and the fourth in dark and light colours. In the cotton and linen vesting the compound principle of intertexture is utilized; but whatever the weave-construction of the fabric, the scheme of colouring is uniform. Moreover, in the woollen and cotton ground textures, but little diversity of weave is practised in producing the groundwork of these styles; whereas, in the worsted and silk types, various crossings and combinations of weaves are used for this purpose. The construction of the worsted warp vesting affords scope for weave ornamentation in the foundation of the fabric as well as for elaborate figuring by variety of colouring. The two worsted vestings given in No. 2 and No. 4, Plate XXXVII., are, for example, very different from each other in groundwork. The former has a broad diagonal foundation (Fig. 216) composed of several thirteen-shaft weaves; but the latter a fine corkscrew twill in the ground. Fig. 214 also illustrates another system of ornamenting the ground of these textures with weaves. If the spots developed in \square 's were removed, this design would be a rib pattern composed of fine twill and weft cord. With the addition of the spots it forms a neat vesting. In colouring, the rib consists of a distinct shade from either the twilled parts or the spotting. This is obtained by wefting as follows:—

$$\begin{array}{l} \text{For} \\ 12 \text{ picks.} \end{array} \left\{ \begin{array}{l} 1 \text{ pick of black worsted.} \\ 1 \text{ ,, dark blue worsted.} \\ 1 \text{ pick of silk.} \\ 1 \text{ ,, black worsted.} \\ 1 \text{ ,, silk.} \\ 1 \text{ ,, dark blue worsted.} \end{array} \right.$$

This grouping of shades gives a silk spot in the twill parts on a black ground, and a rib effect in dark blue.

In the designing of the ground sections of worsted vestings, it is important to obtain an effect which combines neatness with novelty and richness of colouring.

244. *Vestings with one Extra Weft.*—Only one specimen in this type of vesting is furnished. It is given in Pattern 4 on Plate XXXVII., and, as stated in the previous paragraph, has a corkscrew ground. The weaving plan for this pattern is supplied in Fig. 215. The spots of which it is composed are arranged on the six-end sateen base. The silk picks used in forming the spotted effects are tied regularly, as indicated by the small line marks in the design; hence, in preparing for the loom, the first pick would be stamped twice thus: I., cut all but the marks \boxtimes and —; II., cut all but the marks \square .

It will be observed that the spots in the fabric (Pattern 4,

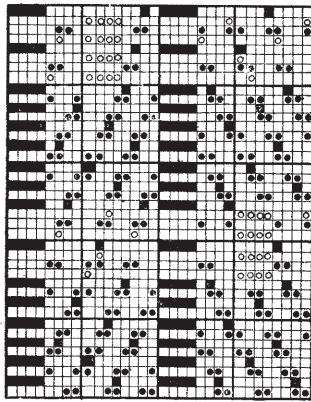


FIG. 214.

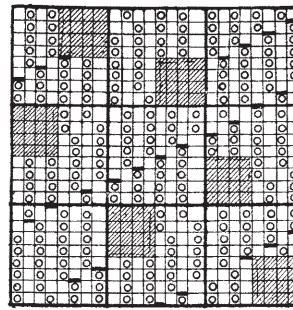


FIG. 215.

Plate XXXVII.) are composed of green, blue, and crimson. This is due to the system of weft colouring practised, which is as appended:—

For	{	1 pick of black worsted.
8 picks.	{	1 „ crimson silk
For	{	1 pick of black worsted.
8 picks.	{	1 „ blue silk.
For	{	1 pick of black worsted.
8 picks.	{	1 „ green silk.

Of course it is feasible to colour a design of this arrangement on other systems. Thus the spots could all be developed in the same colour, or they might each have been composed of two tints, such as crimson and white, claret and lavender, and blue and

olive. The base on which the design is constructed causes the respective spots of blue, green, and crimson in the pattern to be neatly distributed over the corkscrew twill surface forming the groundwork of the fabric.

245. *Two-Cover Vestings*.—Vestings of this class possess one ground weft and two “extras” for figuring. Loud patterns only being occasionally required in these textures, a scheme of figuring is practised which reduces the cost of production. Thus the spots or figures are only produced here and there in the fabric, a considerable number of ground picks intervening. In this way, the quantity of silk used is considerably diminished. An example may be considered in which two extras are necessary in developing the spotted effects. It is the diagonal pattern given in No. 2 on Plate XXXVII., and referred to in the previous paragraph. The ground design here is composed of four weaves — fine corkscrew, weft sateen, twilled mat, and an upright twill— and, apart from the small

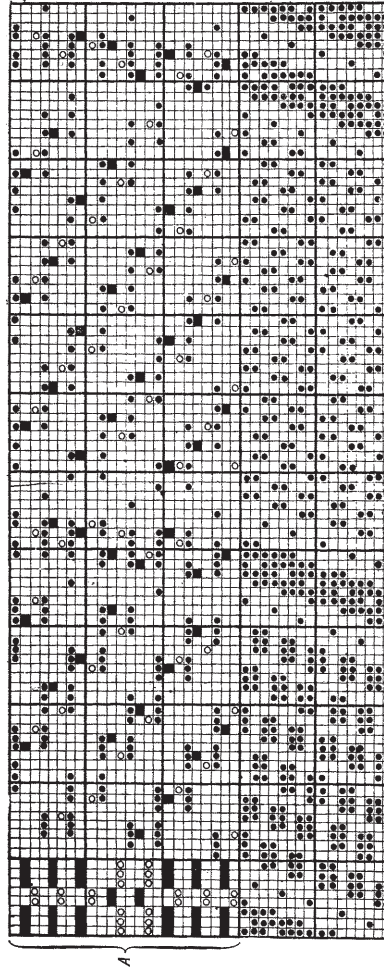


FIG. 216.

figures, occupies 288 picks. The spots are developed in two hues, and are arranged on this diagonal base on a sateen method, six occurring in each repeat of the pattern. Those sections of the design—Fig. 216—in which the spots occur are three-fold in composition, the ground, crimson, and green wefts being combined.

Picks lettered *A*, for example, comprise one spot, and include the ground, crimson, and green picks. The ties for the extra wefts are on the principle indicated. The system of wefting which has been practised in producing the pattern formed of the design worked out on the base of Fig. 216 is as follows:—

For 24 picks. { 1 pick of black worsted.
1 „ crimson silk.
1 „ green silk.
40 picks of black worsted.

Blue and white, orange and blue, and salmon and light-blue, also give neat patterns. Light shades may be, moreover, employed, with satisfactory results, in the ground of the fabric.

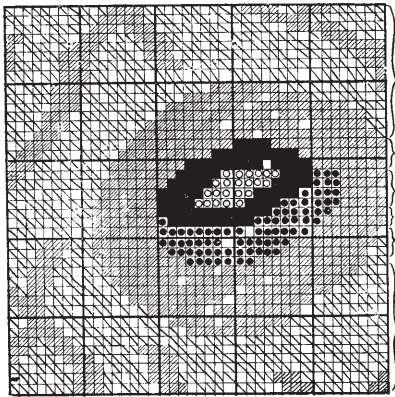


FIG. 217.

246. *Four-Cover Styles*.—

Having considered two specimens of vestings in worsteds, an example in five shades may be examined in woollens. Each shade of weft in figured textiles adds to the construction of this type of design. First, it implies a larger number of cards; and, second,

more picks to the inch, necessitating more weaving. While, however, these complications are the result of the employment of a diversity of colours, yet it is mainly by multiplying the shades of weft that richness of design is obtained. In the example in the four-cover vestings, Design 217, the foundation of the texture is broken crow or weft swansdown. All the effects are due to solid weft floats. The marks \square represent Shade 1 in the fabric, the $\text{\textcircled{\square}}$'s Shade 2, the \square 's Shade 3, the \blacksquare 's Shade 4, and $\text{\textcircled{\blacksquare}}$'s Shade 5. The order of weft colours is:—

For 26 picks. { 1 pick of Shade 1.
1 „ „ 2.
For 12 picks. { 1 pick of Shade 1.
1 „ „ 2.
1 „ silk, Shade 3.

$$\begin{array}{l}
 \text{For } \left\{ \begin{array}{l} 1 \text{ pick of Shade 1.} \\ 1 \text{ " " 2.} \\ 1 \text{ " silk, Shade 3.} \\ 1 \text{ " " 4.} \end{array} \right. \\
 8 \text{ picks.} \\
 \\
 \text{For } \left\{ \begin{array}{l} 1 \text{ pick of Shade 1.} \\ 1 \text{ " " 2.} \\ 1 \text{ " silk, Shade 3.} \\ 1 \text{ " " 4.} \\ 1 \text{ " " 5.} \end{array} \right. \\
 20 \text{ picks.} \\
 \\
 \text{For } \left\{ \begin{array}{l} 1 \text{ pick of Shade 1.} \\ 1 \text{ " " 2.} \\ 1 \text{ " silk, Shade 4.} \end{array} \right. \\
 9 \text{ picks.} \\
 \\
 \text{For } \left\{ \begin{array}{l} 1 \text{ pick of Shade 1.} \\ 1 \text{ " " 2.} \end{array} \right. \\
 12 \text{ picks.}
 \end{array}$$

In preparing the cards, first cut all but \square ; second, cut all but \boxtimes ; third, cut all but \square ; fourth, cut all but \blacksquare ; and, fifth, cut all but \boxplus . Picks *A* are stamped twice, picks *B* three times, picks *C* and *E* four times, and picks *D* five times.

247. *Honeycomb Vestings*.¹—These are an old style of woven textural effect produced in weaves irregular in structure, or in which there is contrast of warp and weft floats, forming diamond, mat, and other effects. The fabrics may be single, backed, or compound in structure. An example of the first type is given in Pattern 1, Plate XXXVIII., the weave being Fig. 218, on a diamond base. The warping and wefting are as follows:—

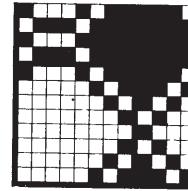


FIG. 218.

2/18 ^s white	2	21	21	21	19
Double 22 ^s /2 yellow silk	3	-	-	-	-
2/16 ^s black	-	3	-	3	-
10 ^s /2 red silk	-	-	3	-	-

A more irregular type is that seen in Fig. 219, in which the

Not infrequently with extra colour weft or warp spotting, but the example—Pattern 1, Plate XXXVIII.—is coloured on the ordinary method.

diamond principle is combined with mat weave, Fig. 220. The method of manufacture is as follows:—

<i>Warp.</i>			
Three-fold 2/30's white worsted	-	24	
Four-fold 2/36's blue ,,		4	8

Weft.
Three-fold 2/30's white worsted.

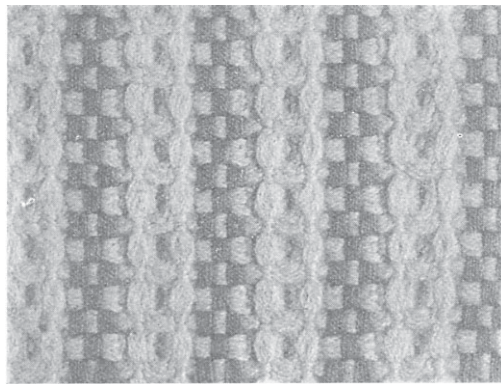


FIG. 219.

It will be seen from both examples that there is much irregularity of weave structure and also in counts of yarn.

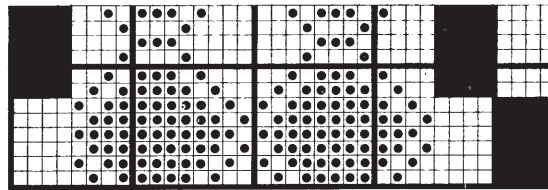


FIG. 220.

248. *Two-Cover Designing.*—Several types of fabrics in addition to Pattern 2, Plate XXXVII., are coloured and figured on this system, which admits of the production of a considerable diversity of effects. Pattern 1 of Plate XXXIX. is an example. The warp of this fabric is cotton, but as the ground weave is a five-end weft sateen, it flushes the worsted picks constituting

the foundation of the texture on the surface, concealing thereby the cotton yarns. A section of the design used in weaving this example is given in Fig. 221. By changing the ground weave to twill, and employing a shade of warp distinct from the weft, the pattern could be improved in colouring. As here tinted, however, it is evident that by this scheme of designing orna-

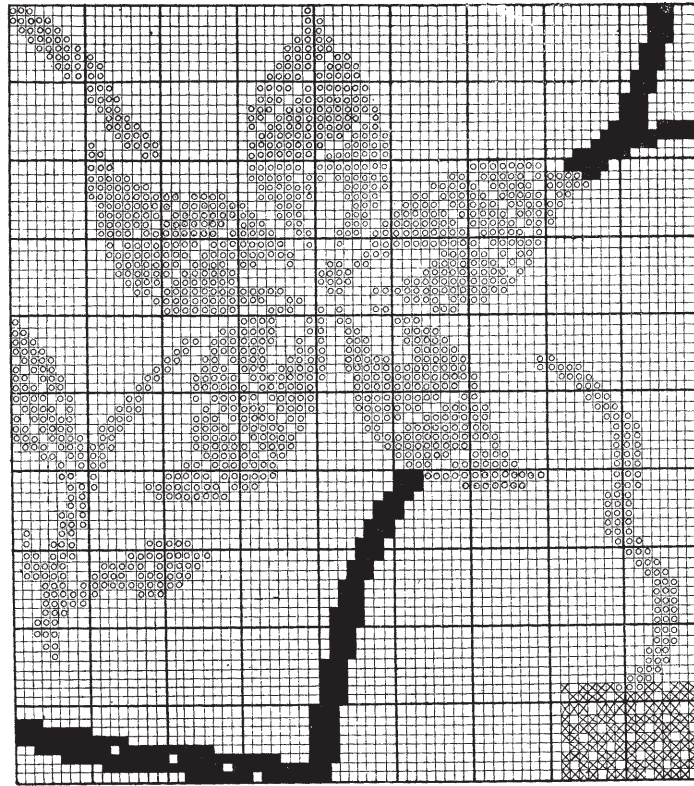


FIG. 221.

mental details may be clearly developed in the texture. The order of wefting is one pick of light fawn, one pick of black silk, and one pick of lavender silk. The texture being two-cover, the process of card stamping is as follows: I., cut blanks, solid blacks, and small circles; II., cut crosses, blanks, and circles; and III., cut crosses, blacks, and blanks.

249. *Four-Cover Pine Design*.—An interesting specimen of four-colour figuring is given in Pattern 2 on Plate XXXVIII.

It is a good combination of colours, textile effects, and principles of weaving. First, as to the blending of tints and the figuring obtained. Though only four colours are used in the weft—claret, lavender or blue grey, olive, and salmon—yet five-tinted effects are produced. The extra tint is due to interweaving the

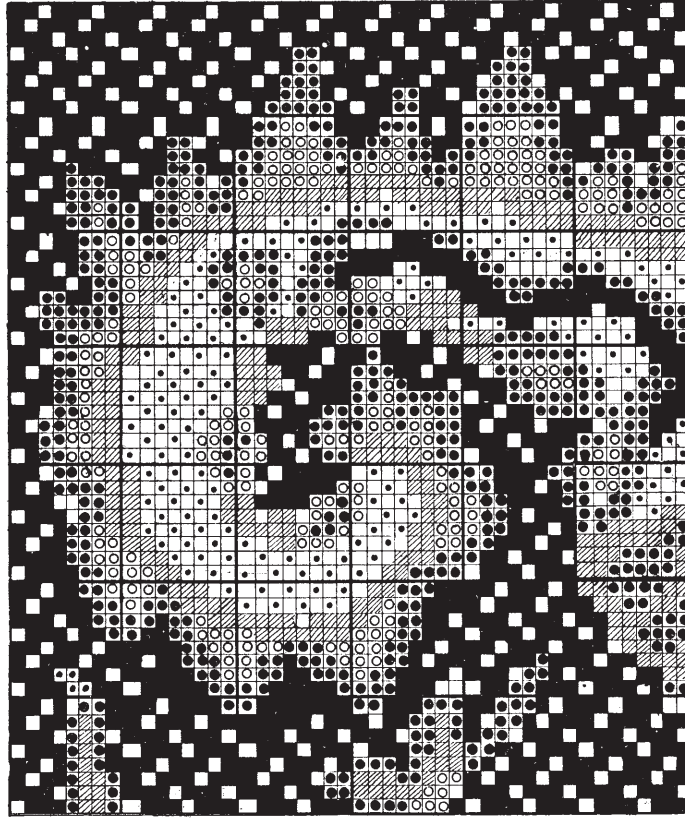


FIG. 222.

warp—which is a bright crimson—plain with the salmon weft, forming that intermingled colouring composing the ground of the interior of the pine figures. The rich claret shade which constitutes the ground of the fabric gives a velvety aspect to the entire pattern, and develops the other tints in the texture.

The order of wefting and colouring is thus: *warp*, all crimson; *weft*, 1 pick of claret, 1 pick of salmon, 1 pick of lavender, and 1 pick of olive. Each shade runs through the fabric, and



1



2

Plate XXXVIII

1. HONEYCOMB PATTERN
2. PINE FIGURING

is continually helpful in imparting tone and character to the whole composition of both ornamental and textural details.

As to the construction of the design. The ground weave—Fig. 222—is a weft broken $\frac{3}{1}$ twill. All the figured parts of the design, excepting where the warp yarns work plain with the salmon picks, are flushed solid. This is apparent from Fig. 222, which is the weave-design of the upper part of the pine figures. Here the solid squares correspond to the claret in the texture, the dots to the salmon, the circles to the lavender, and the grey marks to the olive. Every pick of the weave-design is stamped four times as follows:—

- | | |
|------|--------------------------------|
| I. | Cut all marks but solid black. |
| II. | " " " dots. |
| III. | " " " circles. |
| IV. | " " " greys. |

The ground weft is tied regularly, but the other wefts are flushed on the under surface of the fabric.

250. *Paisley Shawl Colouring.*—Fig. 223 is on the pine base, similar to No. 2, Plate XXXVIII, but the ornament is of a more elaborate character. The structure of the fabric is seen from the section of a design of this character, Fig. 224, the colours being inserted chiefly in the weft. The weaves in the various parts of the figuring are fine twills running in different directions, and the ground is warp twill. Each kind of mark represents the different colour of weft in which the figuring is developed. Each colour stitches in the weft to make a continuous twill.

251. *Compound-Weft Reversibles.*—Reference should be made, in treating of fabrics coloured in the weft, to rugs and reversible textures, for some classes of shawls, and—in light materials—for mantlings. These textures are composed of weaves which are double or three-fold in the weft but single in the warp. Thus they are of such a character as to allow of the employment of two series of weft threads of different colours. One layer of picks is spread over the other. This will be understood on referring to Fig. 225. The weaves used in the construction

of this 2-ply build of fabric are supplied in Fig. 226. They are simply swansdown twills backed, hence, when combined and woven in a warp composed of small yarns, and with thick weft yarns arranged one pick black and one pick grey, a textile is



FIG. 223.

produced of the same structure as that represented in Fig. 225. Here it is apparent that the system of weaving causes the black picks to cover the grey picks in part *A*, and *vice versa* in part *B*. In the actual texture, the black picks are close together, completely concealing the layer of picks over which they are spread. The same may be remarked of the grey picks in part

B; consequently the warp threads, being small, are all but entirely hid, and indeed they should not be observed on either side of the finished fabric.

As the designs are two-fold in the weft, they may contain twice the number of picks to threads per inch, in which case they would be worked out on 8-by-16 point paper. Having determined on

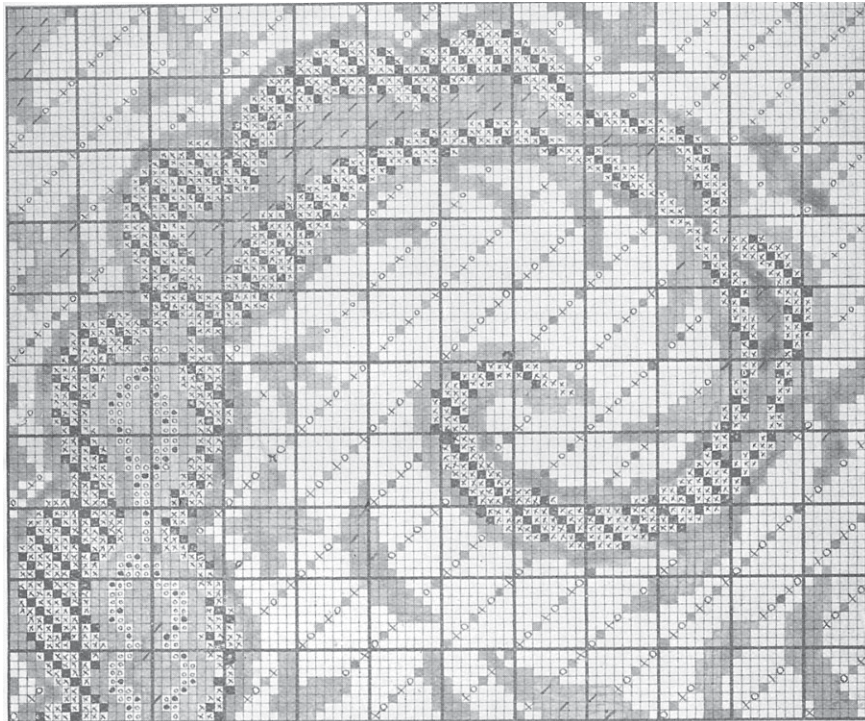


FIG. 224.

the ornamental arrangement of the pattern, say that given in Fig. 227, the sketch is transferred on to the plan paper on the same principle as in designing for double-plain reversibles. Weave *A* of Fig. 226 is then applied to the figured sections, and weave *B* to the ground, and for the hard effect or shade, a weave arranged 2 picks face and 2 picks backing, intermingling the two colours, is also used. Should black and white wefts be employed, the figure on the upper surface would be in black and the ground in white, and the grey portions, Fig. 227, in black and white.

In the 3-ply colouring, Fig. 228, weaves, threefold in structure in the weft, have been used. A simple type of weave for this purpose is given in Fig. 229, where the face and back of the texture are in weft twills, and the centre in plain weave. If a

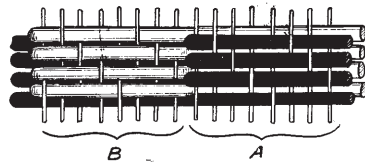


FIG. 225.

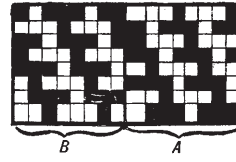


FIG. 226.

finer fabric is required, then six-end sateen with warp prunelle twill in the centre may be used, Fig. 230. By such weaves, three colours of weft may be combined, one for each part of the figuring, and the pattern developed in three shades.

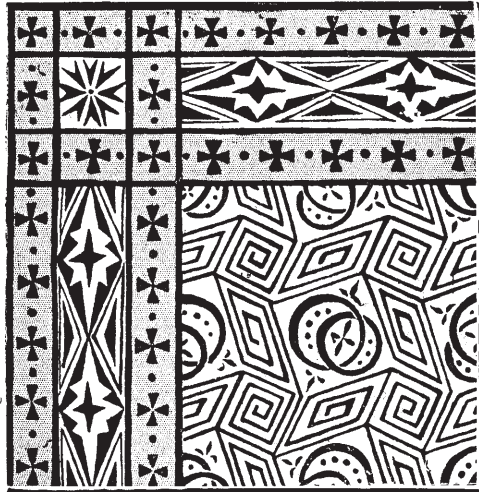


FIG. 227.

252. *Warp and Weft Colouring.*—This species of colouring is principally practised in figured textiles. The ordinary system relates to flushing the warp and weft—which are of different shades—in the construction of the figure, as is instanced in Pattern 3 of Plate XXXIX. Here the outside of the oblong figures consists of floats of weft, and the interior of floats of warp. Now by warping 96 ends of crimson and 96 ends of



FIG. 228.—Three-ply Weft Reversible.

lavender, and weaving 96 picks of tan and 96 picks of white, several tinted effects are obtained. First, a solid square of lavender is formed; second, square *B* is composed of crimson and lavender; third, square *C* is composed of crimson and tan; and fourth, square *D* is composed of tan and lavender. By this scheme of colouring and weaving, considerable diversity of pattern is producible.

Design 231 is an example in compound warp and weft colouring. The colour of the warp of this fabric would partially form both the ground and the figured effects. Two wefts might be used, say brown and light brown, the former producing the figure and the latter the ground of the texture. The \square 's represent the rib groundwork, the dots the light brown, and

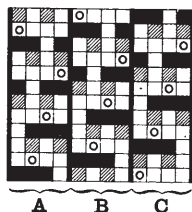


FIG. 229.

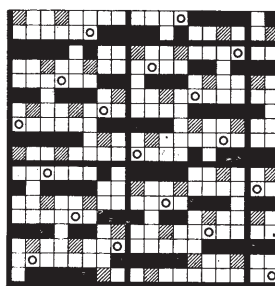


FIG. 230.

the greys the solid floats of warp. Being composed of two wefts, the design is prepared for the loom by first cutting all but \square 's; and, second, by cutting all but \circ 's. The light brown is regularly tied to the under-side of the texture.

Other types of colouring, having "extras" in both warp and weft, are also practised. They are, however, mainly compounds of the two systems of colouring already illustrated.

A useful example is Pattern 2, Plate XXXIX. The broader floral figuring is developed in warp cord (see sectional design 232). Between such floats of warp making the cord, a firm groundwork is formed. The weft figuring consists of long floats of the light silk yarn, underneath which is also constructed a fast woven texture. The ground weave is a fine cord.

253. *Curls, Textiles of the Astrakhan Group.*—"Curls" are a

type of textile that belong, strictly speaking, to fabrics of the astrakhan and lambskin type. One of the objects here is to

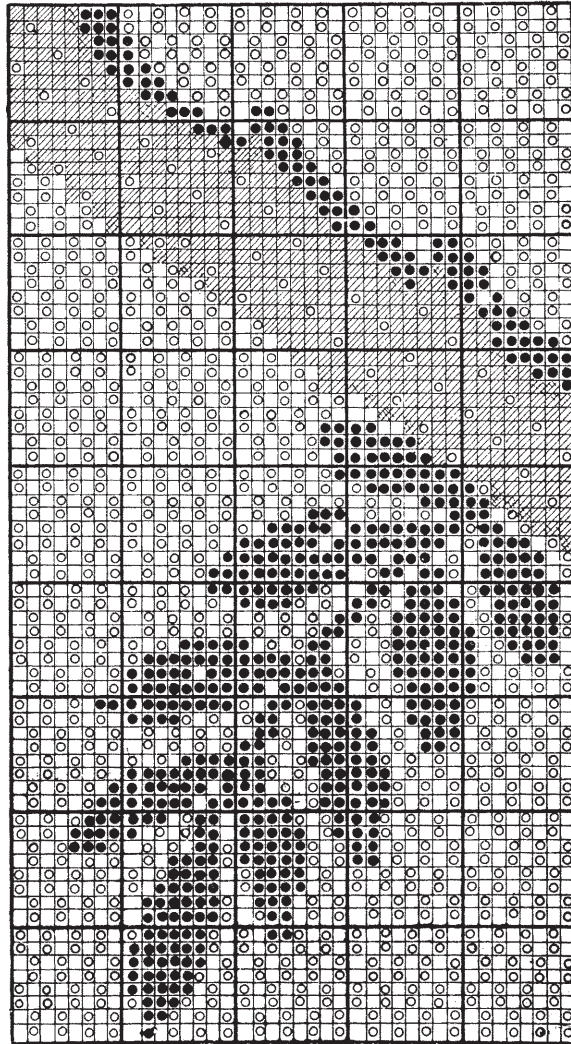


FIG. 231.

manufacture a fabric similar in appearance, texture, and general character to the original astrakhan. But at the same time, it is sought to acquire these effects by cheaper and more expeditious methods than are practised in making astrakhan, lambskin, and

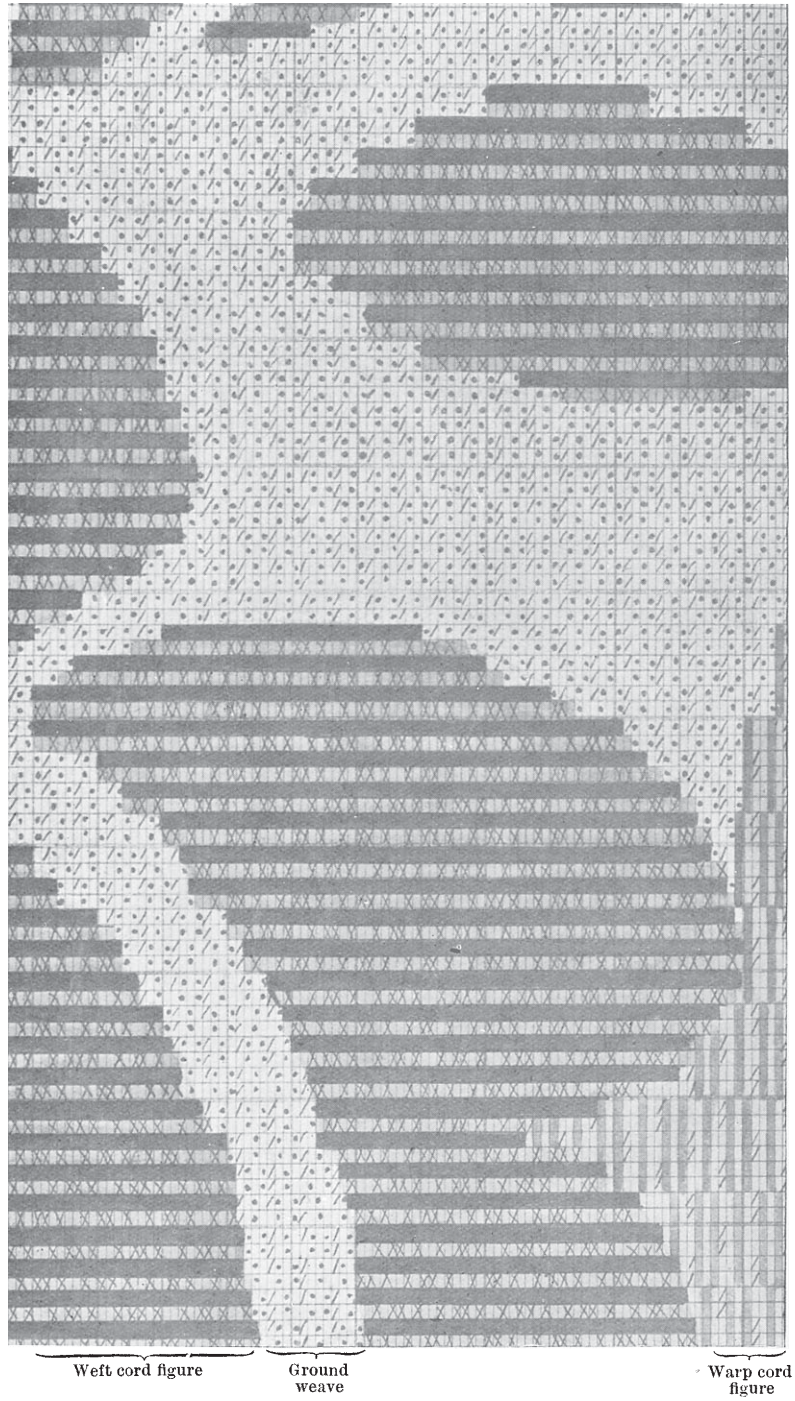


FIG. 232.—Section of Design for Pattern 2, Plate XXXIX.

similar fabrics. The production of cheap, serviceable "curls" has led to the construction of spiral, curled, and knopped yarns—all threads which, when appropriately employed, impart a curly surface to the cloth.

254. *Four Types of Curled Effects.*—Curled effects may be classified under four heads:—

- (1) Those in which the effect is obtained by employing wires in weaving.
- (2) Those in which the yarn is curled previous to weaving, and the flushes of weft thread cut after the piece leaves the loom.
- (3) Curls due to the employment of yarns composed of two or more classes of materials. The curl in this case is developed in milling.
- (4) Fabrics in which a curled thread is used in the weft.

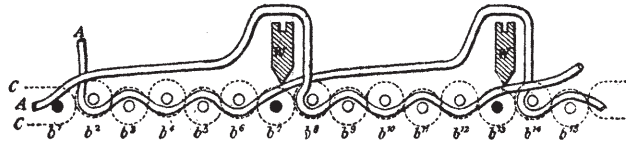


FIG. 233.

The first and second classes of curls represent the original methods of gaining effects of this kind, while the third and fourth classes represent the modern principles of manufacture. Examination of the different classes will show that each possesses some advantages which the other lacks, and also that certain defects are characteristic of each process of production.

In the first species of curls—in which colour is introduced into the warp—are astrakhans, lambskins, and other classes of similar fabrics.

255. *Curls obtained by Wires.*—Curls obtained by the use of wires are fabrics containing two warps—one of which forms the foundation, and the other the curled effect of the texture. The ground warp is usually cotton, the curled warp mohair, and the weft woollen. The mohair yarn is submitted to a process of curling or crimping before weaving, so that when the threads are cut over the wires, in the actual manipulation of the fabric, the ends thus produced twist, twirl, and roll into all kinds of shapes.

The larger the curl, the thicker and more curly the material used in its formation, and the deeper the wires inserted into the cloth during weaving. Fig. 233 will illustrate the principle on which the wires are employed and the part they play in the development of the curly appearance of such fabrics. In this sketch, which is a sectional drawing showing the interlacing of the threads and the position of the wires in a simple astrakhan prior to cutting, threads *A* represent the mohair warp, threads *C* the ground warp, *b* the picks or shoots of weft, and *W* the wires. It will be observed that there are several picks between each wire which interlace with threads *C* to form a texture, or foundation fabric, on to which a layer of curls, closely grouped together, is secured. There is a firm woven cloth in addition to the curled effect in all such structures; and it should be noticed that the more substantial this concealed portion of the foundation, the more durable the texture produced. An insecure ground texture should be prevented in the manufacture of all fabrics in which wires are employed. The picks *b* interweave with threads *C* on the plain principle, but not invariably so, as the three-end twill sometimes forms the plan of intersection for these yarns.

No less than five ground picks are inserted between each wire in the fabric sketched, forming a firm foundation for the wires. Another point secured, by having this number of ground shoots intervening the wires, is the production of a large curl, because the wires are not forced into close or absolute contact with each other.

256. *Process of Weaving Curls produced by Wires.*—The routine of the actual operation of weaving this style of curl may be briefly stated:—The proper number of ground picks *b*, having been interlaced with yarns *C*, one half of the mohair warp is elevated and wire 1 inserted; the same number of ground picks is again introduced into the warp *C*, and then the reverse half of the mohair warp raised and wire 2 inserted. This completes the process as far as the interlacing of the threads is concerned. One particular that has not been noticed is the mode of binding the curled warp to the texture; this is effected by depressing the mohair yarns both previous to, and after the

insertion of the wires, crossing them of course with the picks *b*. After some five or six wires have been secured, as shown in the illustration, cutting takes place. This is done by the weaver running his knife down the grooved part of the wire, a process which divides the loops and liberates the threads, when their curling properties cause them to twist and curl so effectually together as to entirely cover the surface of the ground fabric on to which they have thus been fastly woven. The spiral condition into which the ends twist themselves on being liberated, is seen in Figs. 234 and 235, a section of an astrakhan fabric after cutting.



FIG. 234.

A feature in which this class of curls differs from others is that if two or more shades of yarn, and several depths of wires are used, one for each colour of curled warp, then, by a suitable arrangement in the design, an attractive combination of effects results.

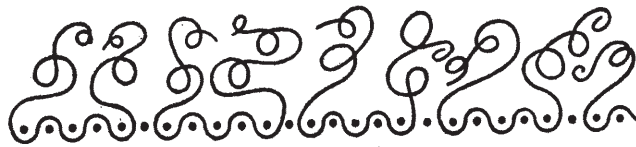


FIG. 235.

257. *Curls formed by the Weft in which the Warp is Cotton Threads.*—This class of “curls,” which may be examined in detail, also includes fabrics of the astrakhan group. But here, instead of the curl being obtained in the warp, it is obtained in the weft yarn. In cloths of this order the warp is invariably cotton, while the weft is woollen and mohair—the wool being utilized in the construction of the ground of the texture, and the mohair in the formation of the curly effect.

The system of forming the curl by the warp offers larger scope for variety of pattern and texture, than when it is produced on the weft principle. In this instance, the cloth is

simple in structure. It is possible, however, on this principle of intertexture, to have either a short or long curl. As in warp effects, the mohair yarn has to be curled or crimped prior to weaving by submitting it to a process of boiling, which may be continued for two or three hours, according to the quality of the yarn and the permanence with which it is sought to fix the curl.

258. *The Weave of Weft Curls.*—The weave of this type of fabric is arranged on a simple principle. It first admits of several mohair or flush picks being introduced into the warp, which are followed by a plain ground shoot. If the weave occupies, say twenty-four threads, each flushing pick might float over seventeen ends, and then form a plain interlacing with the remaining seven ends of the series. This process securely fastens the curl picks on to the ground of the fabric.

259. *Structure of Weft-Curl Fabrics.*—Fig. 236 is a section



FIG. 236.

of the interlacing of the warp and weft yarns in this make of textile. Here dots *a* represent the ends of the warp threads; *B*, the mohair weft yarns or flushing picks; and *c*, the plain ground picks. The fabric is twofold in the weft and single in the warp. Picks lettered *B* are placed, in weaving, over the picks or shoots *c*, which produce, along with the ends lettered *a*, a foundation texture on to which shoots *B* may be fastened. The warp threads are thus made to interlace with both kinds of weft, producing, with the cotton or woollen weft *c*, a plain fabric, and, with the mohair picks *B*, a cloth in which the face is formed of long flushes of weft yarn.

Feather trimmings, Fig. 237, are made on this principle, only several widths, *A*, *B*, *C*, of the curl effect are formed in one width of the fabric. The mohair yarn to form the curl is crimped or curled before weaving. The floats in the texture vary in length, and extend from Series *A* to Series *B*, and from *B*

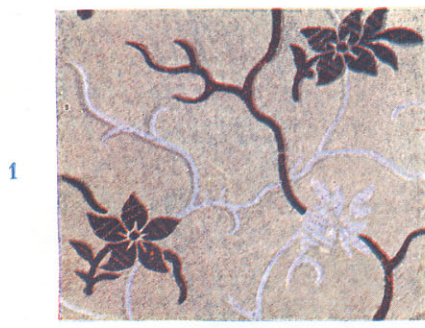


Plate XXXIX
FIGURED STYLES DEVELOPED IN WARP AND WEFT
COLOURINGS

to *C*. In the illustration, the weft threads floating over such spaces have been severed and allowed to form the curl effect of which the trimming consists. Many methods of colouring are practised in the production of such fabrics, and also, as seen from the specimen *D*, special figuring due to the ordinary type of weaving.

260. *Operation of Cutting after Weaving.*—When the cloth leaves the loom there is no appearance of a curl effect, its under surface being nothing but a plain weave, and the

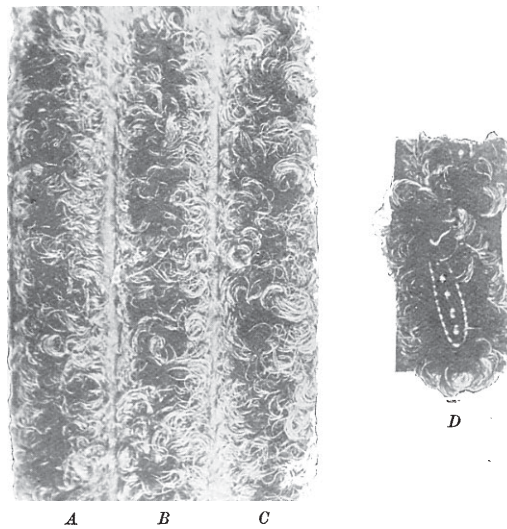


FIG. 237.

face consisting of long floats of mohair yarn. To produce the curl these flushes require to be severed or cut, when the ends thus obtained twist and twirl into the spiral forms shown in Fig. 235. The cutting process is done as follows:—About two yards of cloth having been stretched tightly on a frame, the cutter inserts the fine point of the knife and guide under one of the row of long flushes formed by picks *B*, Fig. 236; the loops or flushes being arranged in rows, the knife can be made to travel very accurately under each row of loops to the end of the length of texture spread on the frame. As it is forced through this tunnel of loops, it severs the threads, and, as the yarns were curled or crimped

previous to weaving, they immediately assume curly, spiral conditions.

By a slight modification of this principle of weaving it is possible to produce a large variety of patterns. One example of this class of effects is a pattern with a figured design (see *D*, Fig. 237), in which the pine pattern is developed in extra silk weft in addition to the curl effects. Mohair may be the material used for the curled figures and silk for the figuring.

261. *Curls developed by Milling.*—In the two classes of these fabrics already described, the curl effect is the result of preparing the yarn by subjecting it to a crimping process before using it as warp or weft in the composition of the cloths. Both types of curls considered are, moreover, submitted to a cutting operation, which, severing the loops or flushes of mohair yarns, results in the production of the curled characteristic of the textures. In the curled cloths produced in milling, the curl is not due to cutting one series of the yarns in the fabric, but to the more rapid shrinking of some threads in the texture than others, a process which develops loops on the surface of the piece. The curl in this instance is produced by the doubling of certain threads, and not by any curling and cutting operations the yarns may be subjected to either previous to, during, or after weaving.

262. *Points of Dissimilarity in the Various Builds of Curled Textures.*—If a fabric in which the curl is obtained in the warp and by the use of wires is dissected, it will be observed:—On removing, in the first place, to withdraw a curl thread it would be found to be divided into short lengths, each curl being a separate length. The entire series of curls might be removed and still a plain woven texture would remain intact; if, however, either the warp or weft of this foundation structure were disturbed, the whole fabric would be reduced to a group of loose ends.

Let a fabric in which the curl is formed by the weft yarn and developed by cutting, after the piece leaves the loom, be next analyzed. Here it is possible to remove the curls, as in the other fabric, and yet to retain a woven texture. The wide dissimilarity between this fabric and the warp

curl is to be found in the fact that the various short lengths of mohair which form the mass of small curls, covering the texture, are in this case sections of picks of weft and not threads of warp.

Curl textures, which obtain the curly appearance in the milling machine (see Figs. 239, 241, and 243), are constructed on an entirely different principle of manufacture. To remove any thread or pick from this fabric, curl or otherwise, destroys the structure of the cloth. In this type of curl there is only one warp and one weft, the threads of which appear alternately on both sides of the piece. Either warp or weft may contain both woollen and mohair yarns, but still the cloths are constructed from single weaves.

263. *Two kinds of Curls developed by Milling.*—Curled fabrics of this group may be divided into two classes: (1) those in which the curl yarn is introduced into the warp; and (2) those in which it is employed in the weft. The warp thread which forms the curl is in some cases made of the noil resulting from combing mohair or alpaca, or the waste from the machines in making lustre worsted yarns. These materials possess exactly the curling properties that are requisite to the production of the effect characterizing this kind of curl. As to the weft thread, it is made chiefly of "extract" and similar materials.

264. *Spiral Threads used for Warps.*—The warp is composed of twist threads known as "spirals," a name applied to them on account of their crimped form. They derive their principal characteristic from the system on which they are prepared; thus one of the two threads utilized in their production is, during twisting, only slightly tensioned, while the other thread is highly tensioned. This arrangement causes the compound yarn resultant to be crimped or spiral, and to possess an undulated, wavy appearance. When the piece is subjected to heat, soapy moisture, and the friction of the milling process, the thick, slack thread shrinks up into loops, or forms small buttons, or curls, on the surface of the cloth. The process of fulling these cloths is interesting. Previous to this operation the fabric possesses a level surface; for there is little indication in the

cloth when it leaves the loom as to any curly or looped effect. This is entirely a subsequent development. As soon as the felting operation commences, this characteristic appears, the thick and soft threads of the twist yarns forming loops or curls which cover both sides of the fabric.

265. *Variety of Patterns in Spiral-Warp Curls due to Colour.*—Pattern or design in these goods is mainly due to colour combinations. As the weave is generally a four-end twill, there is facility for developing effects of this character with precision and clearness. Styles of a mixture, stripe, and check class are employed. One example of a mixture effect is as follows: Warp, two ends of maroon (spiral) and two ends of green (spiral); weft, all olive brown. The pattern thus obtained is

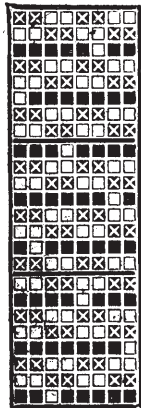


FIG. 238.

intermingled in colouring, the warp threads giving indefinite and mellow patches of maroon and green, while the weft forms a solid and continued series of olive-brown twills.

266. *Twist-Yarn Cotton-Warp Curl.*—This is a backed fabric, the face or right side being formed of curled twists and the back or under side of woollen yarn. Diversity of pattern or style is, in this kind of curl, obtained by employing several colours or shades of twists. Amongst the twists which are largely used three or four may be mentioned, namely, black and white, black and steel grey, black and olive, and black and medium blue, the white, steel grey, olive, and medium blue forming the loops or curls of the respective threads.

267. *Backed Weave for Curled Cloth.*—A reference to Fig. 238, which is a standard example of the description of crossing employed in making this sort of curls, shows that in reality this curled texture is constructed on the backed weave principle, a system of intertexture which readily allows of the production of a thick cloth. The picks marked in \boxtimes 's represent the woollen yarns, or weft for the ground, and the picks marked in \square 's form the weave for the curl effect, or the looped twist weft. On examining the former series of picks, it will be observed that they interlace weft cord with the warp threads. The face weave—

marked in dots—is the eight-heald doeskin or sateen, a plan of crossing which not only permits the curled yarn to be flushed on the right side of the fabric, but attaches it to the woollen and cotton ground texture in a uniform and secure manner. While the curl yarn should not show on the back of the cloth, the woollen yarn should not be visible on the face.

Of course it will be understood that the character of the curly effect is dependent on the kind of twist weft employed; thus, should the yarn be of several colours and the loops on its surface large, a clear, bold curl will result; but should the loops be more of a knop than a curl, the pattern will be correspondingly indistinct.

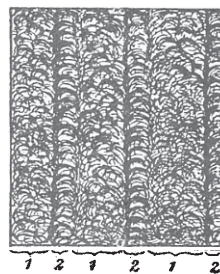


FIG. 239.

268. *Essential Characteristics of Cotton-Warp Curls due to Milling.*—The cotton warp, which constitutes the foundation of the fabric, possesses no felting power, but the mohair yarn which forms the weft, though not possessing the same fulling quality as some classes of wools, yet when floated on the surface of a

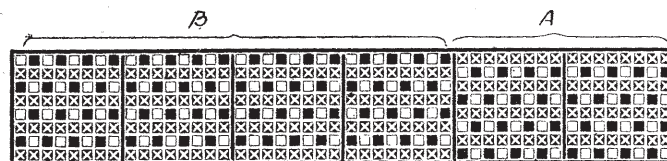


FIG. 240.

cloth of this character, felts to such an extent as to draw, or compress, the warp ends into closer contact with each other; and it is this contracting of the texture in the direction of the weft that produces the curly or looped appearance desired.

It must not be understood that because the curliness is entirely developed in fulling, the structure of the weave in no way affects the pattern obtained, for striped and other effects can be woven by a proper modification in the arrangement of the design. A sketch of a curled stripe made on this principle is supplied in Fig. 239.

269. *Examples in Designs for Cotton-Warp Curls.*—The

weave, Fig. 240, is technically called a plain rib, being so constructed as to flush the curl yarn on the face of the cloth, and yet produce a fast, plain woven texture underneath the floats. All designs for curls of this description are made on the principle illustrated in this weave, and also Fig. 243, it being of equal importance to secure a fast fabric as to float the mohair yarn on the face side of the texture.

Part *A* of the design forms the small curly effects drawn in Section 1 of Fig. 239, while part *B* gives the piping of curls represented in Section 2. When the odd picks—1, 3, 5, and 7—are woven into the warp they flush over the entire series of threads in *A*, but form a plain interlacing with the threads in Section *B*. On the other hand, when the even picks—2, 4, 6, and 8—are introduced into the warp, they flush

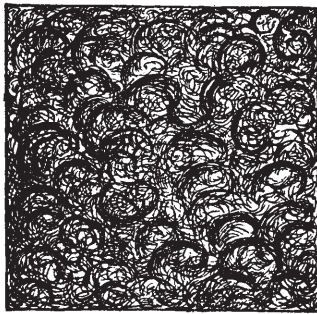


FIG. 241.

over the threads in part *B*, but work plain with the threads in *A*. The woven result of this weave is, first, a striped pattern is formed on the upper side of the cloth, consisting of two distinct bands of curls; second, a firm cloth is produced, though the weft is flushed to such an extent on the upper surface as to conceal the cotton warp, for the picks which give the flushes for the curl in *A*,

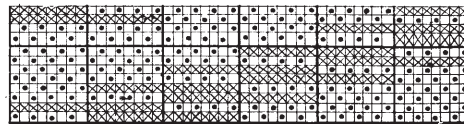


FIG. 242.

form a plain cloth under the picks which float over the threads *B*, while the picks yielding the curly appearance due to Section *B* of the design, at the same time form a plain texture underneath the shoots of weft which pass over threads *A*. So that on this principle, facility is afforded for a proper flushing of the weft yarns on to the upper side of the cloth, yet provision is made in the weave for the construction of an all but plain fabric to which the flushes of mohair that form the curl are securely attached.

Generally these textures are piece-dyed, but in such patterns as those given in Figs. 239, 241, and 243, some excellent styles may be obtained by using two colours of weft yarn, such as black and maroon, blue and olive, and black and white. In such combinations one shade would form the broad and the other the narrow stripe of curls.

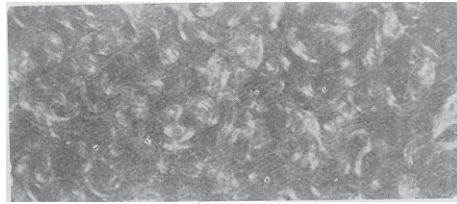


FIG. 243.

In Fig. 241 a fabric is sketched in which the curls are distributed, without any apparent design; yet according to the weave—Fig. 242—there is really a twilled or diagonal dis-

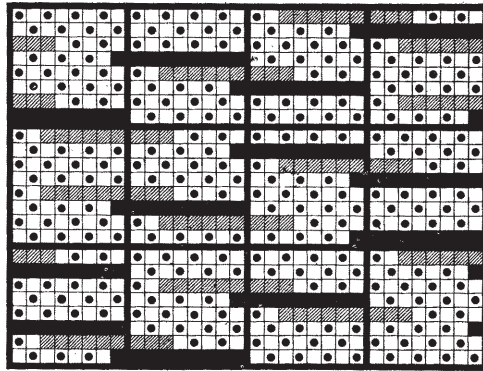


FIG. 244.

tribution of the curls. Felting, however, destroys this characteristic.

A more irregular pattern is that in Fig. 243, produced in Fig. 244, being woven one pick of light, and one pick of dark yarn alternately. In this way, varied colourings and forms of designs are obtainable in these structures.

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