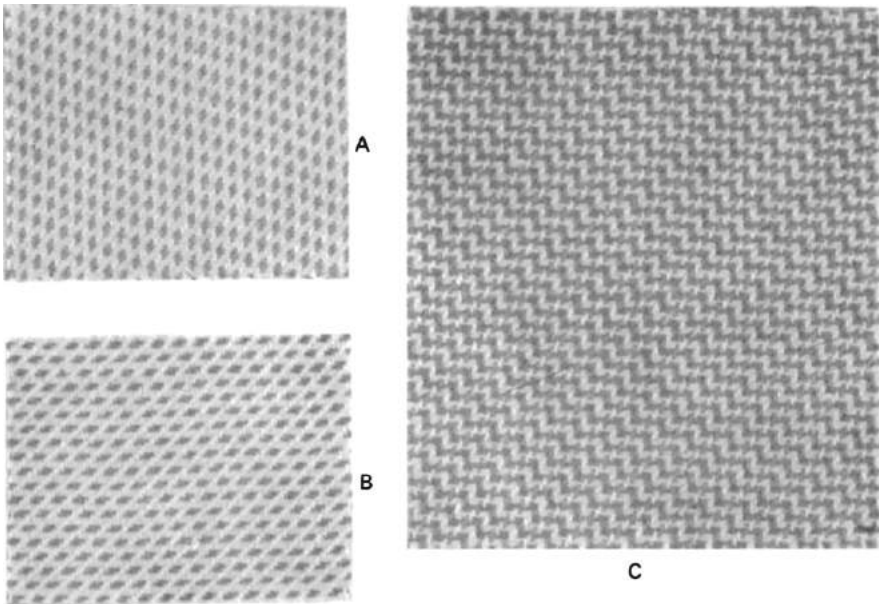


## Simple Colour and Weave Effects

### GENERAL CONSIDERATIONS ARISING FROM THE COMBINATION OF WEAVE WITH COLOUR

A colour and weave effect is the form or pattern in two or more colours produced by colour and weave in combination. It is frequently quite different in appearance from either the order of colouring or the weave, because (a) the weave tends to break the continuity of the colours of warp and weft; and (b) a colour shows on the face of the fabric, whether it is brought up in warp float, or in weft float. This is illustrated in *Figure 9.1*, where, in the 3-and-3



*Figure 9.1*

twill weave, A shows the effect produced by colouring 2 dark, 2 white in the warp, with white weft; B, 2 dark, 2 white in the weft, with white warp; and C, 2 dark, 2 white in both warp and weft. Each effect consists of a small black

form on a white ground; but while in A the floating of the dark warp on the face produces the form, in B it is produced by the floating of the dark weft, and in C by the combination of dark warp float and black weft float on the surface.

*Representation of colour and weave effects upon design paper*

Colour and weave effects may be readily indicated upon point-paper, and for experimental purposes the method is useful, since it enables the designer to see the effect any colour plan will produce with a given weave. Three things

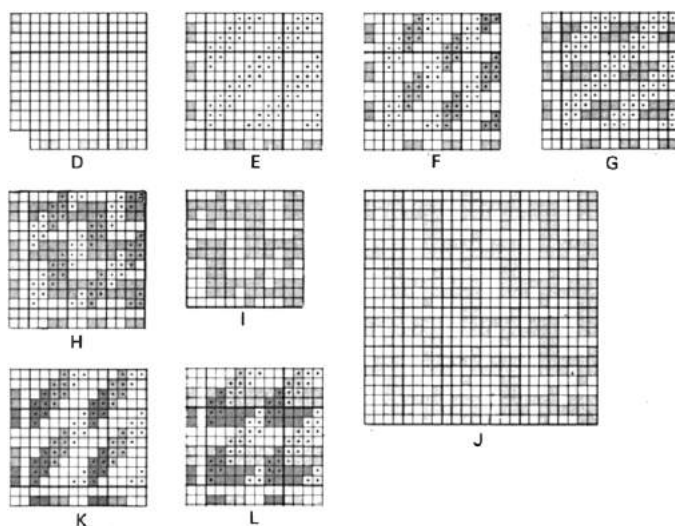


Figure 9.2

require to be known—i.e., the order of warping, the order of wefting, and the weave. The examples D to I in *Figure 9.2* illustrate in stages the working out of an effect in which the threads are arranged 2 dark, 2 light in warp and weft, while the weave is 3-and-3 twill. The example corresponds and may therefore be compared with that shown in *Figure 9.1*. The size of the repeat is obtained by finding the l.c.m. of the number of threads in one repeat of the colour plan, and in one repeat of the weave—in this case 12 ends by 12 picks. At D the arrangement of the ends as to colour is indicated along the bottom, and of the picks up the side of the reserved space. At E, the weave is inserted in the form of dots; the weave marks indicating warp float. At F the dark ends are followed vertically in successive order, and where there are weave marks—that is, where the warp is floated on the surface—the squares are filled in solid. At G the dark picks are followed horizontally in successive order, and where there are blanks in the weave—that is, where the weft is floated on the surface—the squares are filled in solid. H shows the appearance of the sketch at this stage, while I represents the complete effect with the weave marks removed. For better appreciation of the effect formed it is often necessary to show several repeats of the completed design as indicated at J.

In the plan I in *Figure 9.2* the marks represent one colour and the paper the other colour. In working out an effect in colours, the ground may be indicated in the second colour after the first colour has been painted in in the manner described; or the lighter colour may be first painted entirely over the space, and the pattern in the darker colour be afterwards indicated over it.

The method of working is similar when more than two colours are employed, as shown at K and L in *Figure 9.2*. The weave is 3-and-3 twill, and the warp and weft threads are arranged 2 dark, 2 medium, 2 light—the different colours being represented by different marks. The ends are followed first, each colour being dealt with in turn, and where there are weave marks the squares are filled in with the required colour, as shown at K. Afterwards the effect is completed by following the picks, and filling in the squares which are blank with the required colour, as shown at L. As before it is usually preferable for the sketch to be extended over two or more repeats in each direction.

#### *Classification of colour and weave effects*

A convenient classification of the orders of colouring the threads is as follows: (a) Simple warping and simple wefting; (b) compound warping and simple wefting; (c) simple warping and compound wefting; (d) compound warping and compound wefting. In (a) and (d) the order of warping may be the same, or different from the order of wefting. To each order of colouring, simple, stripe, and check weaves may be applied. The style of pattern which is produced by the combination of each order of colouring with each type of weave, is given in *Table 9*.

**Table 9**

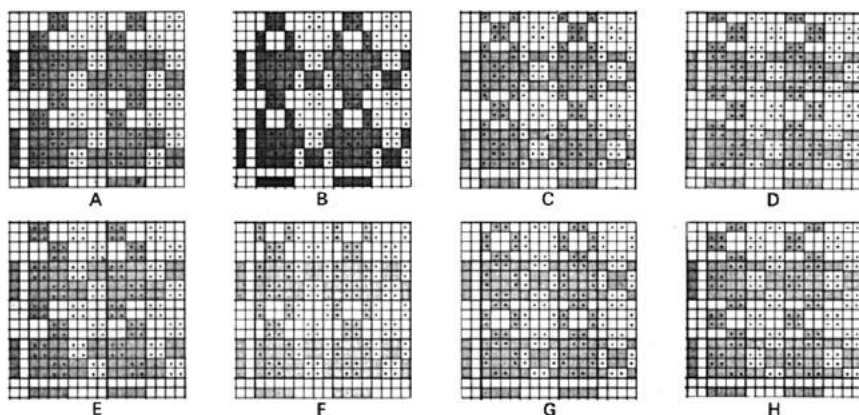
<i>Order of Colouring</i>	<i>Simple Weave</i>	<i>Stripe Weave</i>	<i>Check Weave</i>
Simple Warping and Simple Wefting	Simple Pattern	Stripe Pattern	Check Pattern
Compound Warping and Simple Wefting	Stripe Pattern	Stripe Pattern	Check Pattern
Simple Warping and Compound Wefting	Cross-over Pattern	Check Pattern	Check Pattern
Compound Warping and Compound Wefting	Check Pattern	Check Pattern	Check Pattern

In addition to the foregoing styles, special orders of colouring and weaves are arranged to coincide with each other in such a manner as to produce special effects.

#### *Methods of producing variety of effect in the same weave and colouring*

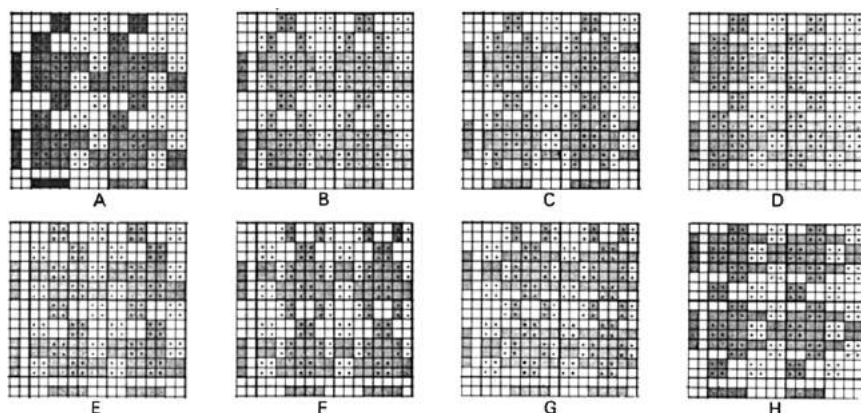
An important factor to note in designing colour and weave effects is that different patterns can usually be obtained in one order of colouring and one weave by changing their relative positions. This is illustrated by the patterns represented in *Figures 9.3* and *9.4*. Each pattern, A to H in *Figures 9.3* and

9.4 is produced by the combination of a 4-and-4 order of warping and weft-ing, with a 2-and-2 hopsack weave. There are two ways in which the change of effect may be brought about: (1) As shown in *Figure 9.3*, the warp and weft threads may be arranged as to colour in the same manner throughout (i.e. 4 dark, 4 light), but with the weave placed in a different position in each



*Figure 9.3*

case. (2) As shown in *Figure 9.4*, the weave may be placed in the same position throughout, but with the colour pattern commencing in a different manner in each case. In the latter method either the warp, or the weft, or both the warp and the weft colours may be changed in position. It will be noted that the difference of effect in some cases is very slight, one-half of the patterns when turned over being simply duplicates of the other half. The example, however, is illustrative of the necessity in weaving of always retaining the



*Figure 9.4*

same relation between the colouring and the weave throughout the length of the cloth. In subsequent examples it is shown that the change of effect thus produced can be made use of, not only in designing small patterns, but also in the economical production of stripe and check designs in very great variety.

### EXAMPLES OF SIMPLE WEAVE AND COLOUR COMBINATIONS

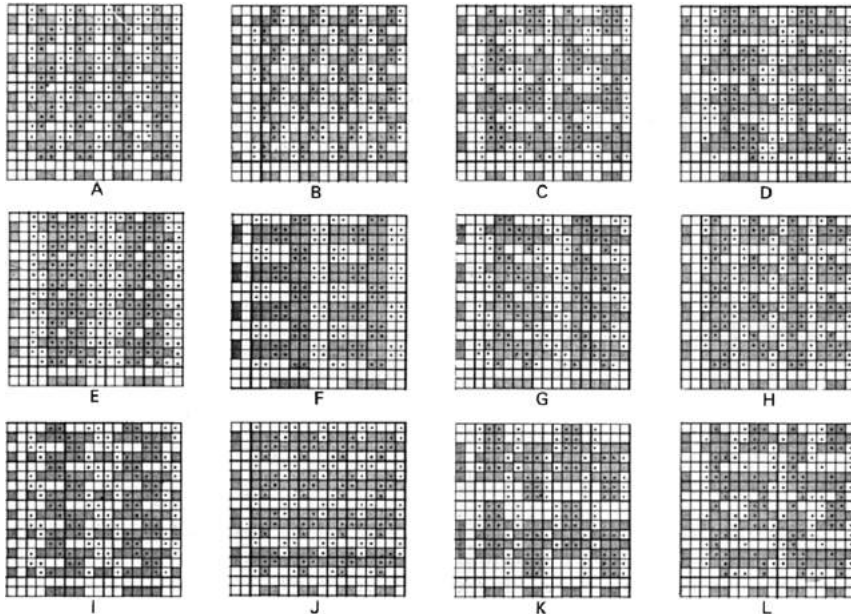
In these styles the arrangement of the threads as to colour may be regular (as for example, 4 dark, 4 light, or 3 dark, 3 medium, 3 light), or irregular (as, for example, 2 dark, 1 light, or 3 dark, 2 medium, 1 light). Many good effects are also obtained by arranging the weft in a different order from the warp (as, for example, 2-and-2 warping crossed with 1-and-1 wefting, or 4-and-4 warping crossed with 2-and-2 wefting).

The effects produced by applying simple weaves to simple orders of colourings comprise continuous line effects, hound's tooth patterns, bird's-eye and spot effects, step patterns, hairlines, and all-over patterns.

#### *Continuous line effects*

Examples of continuous effects, in which the lines run lengthwise of the cloth, are given in A to I in *Figure 9.5*. The weaves are dotted in, and the exact position of the dark threads in relation to the weave is indicated by the shaded marks along the bottom and at the side of the designs. All the particulars are thus given for reproducing the effects, and for the beginner it will be found good practice to work out the patterns on design paper using the technique previously described.

A in *Figure 9.5* shows the typical line effect produced by colouring the 2-and-2 twill in the order of 2 dark, 2 light; while in the effects shown at B to D the lines are more or less of a symmetrical zig-zag character. In E the lines are symmetrical and straight; in F and G they are serrated on one side, and in H and I small spots occur between the lines.

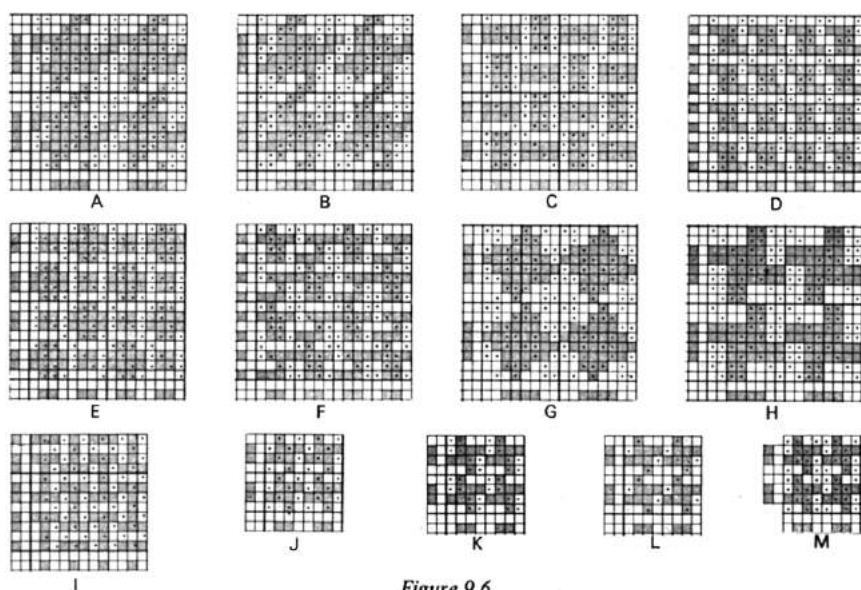


*Figure 9.5*

J to L in *Figure 9.5* show effects in which the lines run continuously across the piece. As a general rule, patterns in which the horizontal lines show prominently are satisfactory only when used in combination with other effects. On comparing some of the designs in *Figures 9.3* to *9.5* it will be noticed that similar weaves and colourings are employed for, both, the vertical, and the horizontal line effects, and that the change from one direction of the line to the other can be frequently accomplished by an apparently insignificant shift of the weave in respect of the colour or vice versa. (Compare A with J in *Figure 9.5*; and B with D in *Figures 9.3* and *9.4*.)

### *Hound's-tooth patterns*

Typical examples of hound's-tooth (or, dog's-tooth) effects are shown at A and B in *Figure 9.6*. In each the order of colouring is 4 dark, 4 light in warp



*Figure 9.6*

and weft, and the weave 2-and-2 twill, the slight difference between the effects being due to the weave having been placed in different positions in relation to the colouring. B in *Figure 9.7* shows a useful variation of the hound's-tooth style.

### *Bird's-eye and spot effects*

The term bird's-eye is applied to patterns in which the surface of the cloth is covered with distinct, small detached spots of colour. Examples are given at C to M in *Figure 9.6*. The simplest style of bird's-eye pattern is obtained by introducing the spotting yarn in the warp, and using the same shade for the weft as the ground shade of warp, as shown at A in *Figure 9.1*, and F in *Figure 9.2*.

Good spot patterns may be obtained in practically all the simple orders of warping and wefting, because where a warp colour is intersected by the same colour of weft, a spot formed of that colour appears on the surface of the cloth, whether the warp, or weft, or both are floated. Therefore, by suitably arranging the floats where different colours intersect, a required form of pattern may be produced. Thus, identical effects result from each of the arrangements given at J to M in *Figure 9.6*, a comparison of which will show that the weaves vary only where dark crosses dark, and light crosses light, but where one colour crosses the other the interlacing of the threads is the same.

Larger spot effects are shown at C to I in *Figure 9.6*. It will be noted that patterns G and I are symmetrical, which is due in each case to the centre of the weave having been arranged to coincide with the centre of either the solid dark or the solid light space.

In the effects represented at D, F, and H in *Figure 9.6* the weft is arranged in a different order from the warp, as indicated. A further series of patterns is illustrated at A to C in *Figure 9.7*, and at C the dark threads are grouped together in such a manner as to form enclosed spaces of the light colour. It will frequently be found that the grouping of the threads causes the woven effect to appear differently from the squared paper design, the small details in some cases being entirely concealed in the cloth, and in others brought out prominently.

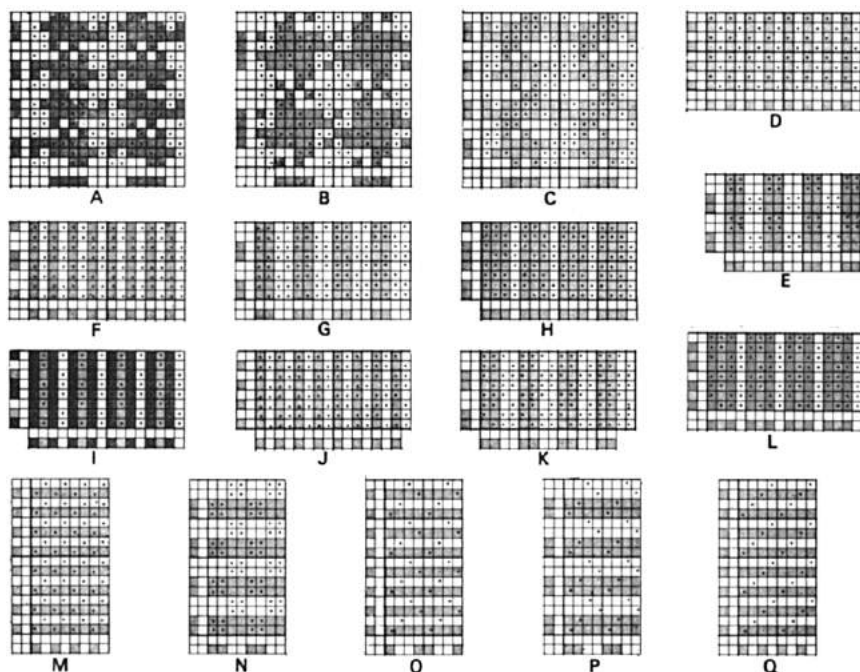
### *Hairlines*

These patterns consist of solid vertical or horizontal lines in 2, 3, 4, or more colours; the term hairline being specially used to distinguish effects in which each line of colour is equal to the width of one thread. By suitably arranging the weave and colouring, however, solid lines of colour may be produced which are equal in width to two or more threads. Examples of vertical hairlines are given at D to L in *Figure 9.7*, with the orders of colouring indicated by different marks alongside and at the bottom. D and E in *Figure 9.7* respectively show the single and double thread vertical hairline in two colours; the former being produced by colouring the plain weave 1 dark, 1 light in warp and weft, and the latter by colouring the 2-and-2 hopsack weave 2 dark, 2 light. Identical patterns can also be produced in the 4-thread warp satinette weave, as shown at F and G. This weave is preferred to the plain weave for the single-thread effect in some classes of fabrics, because the cloth is fuller and softer to handle and can be made heavier. Also when used for the double-thread effect, the 4-thread satinette yields a smoother and softer texture than the 2-and-2 hopsack weave, and in the latter there is, in addition, a tendency for the threads which work alike to twist round each other.

Patterns H and I in *Figure 9.7* show further examples produced in the 4-thread warp satinette weave, the effect at H being 3 dark, 1 light, and at I, 1 dark, 1 medium, 1 dark, 1 light.

The hairline effects obtainable in the satinette weave can also be produced in the 4-thread twill. Thus the patterns J to L in *Figure 9.7*, in which the 3-and-1 twill is employed, correspond respectively to F, G, and I. The satinette is usually preferable because a straight twill always results in a harsher texture than a weave of the satin type.

The plans M to Q in *Figure 9.7* are similar to D, E, F, G, J, and K except that in this case the weaves and colourings are arranged to produce horizontal hairlines. Thus, M and N respectively produce the single and double horizontal hairlines corresponding to D and E. Plans O and P show the 4-thread weft satinette, and plan Q the 1-and-3 twill arranged to produce horizontal effects which correspond to the vertical hairlines given at F, G, and J. On account of their barry appearance the horizontal hairlines are not much used, except in combination with the vertical hairlines and other effects in the construction of stripe, check, diagonal, and spotted patterns.



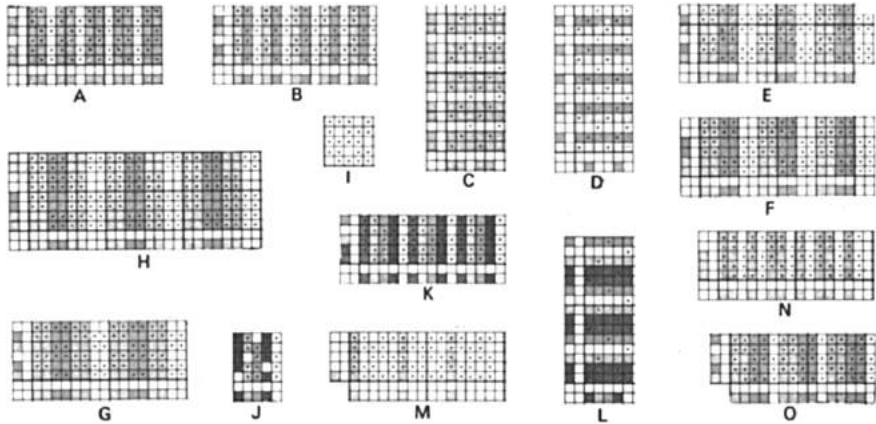
*Figure 9.7*

The construction of hairlines in the 3-thread twill weaves is illustrated at A to D in *Figure 9.8*, A producing a vertical effect in two colours, and B in three colours while C and D produce corresponding horizontal patterns. The plans given at E and F which are modifications of the 2-and-1 twill, will each produce a pattern in 2 dark, 2 medium, 2 light and as the modified weaves are looser in structure than the regular 3-thread twill, they permit denser settings in warp and weft and can, therefore, be used for heavier makes of cloth. The design G shows the 2-and-1 twill specially modified to produce a vertical hairline in which the colours are arranged 2 dark, 2 medium, 2 dark, 2 light. This pattern also results from the arrangement given at H which is a modification of the warp faced satinette. The plans E to H thus show how a regular weave may be modified to fit a required order of colouring when a special cloth structure is desired.

A comparison of the weaves with the orders of colouring in *Figures 9.7* and *9.8* will show that in constructing solid coloured hairline patterns the following rules are applicable: The same shades should be used for the weft as for



the warp. For vertical hairlines each warp thread should pass under the corresponding colour of weft, and be raised over the other colours. For horizontal hairlines, each weft pick should pass under the corresponding colour of warp, and over the other colours. For example, assuming that a single thread vertical hairline in five colours is required, the weave must necessarily be so arranged that each end is down for one pick and up for four picks; hence the 5-thread warp twill, or, as shown at I in *Figure 9.8*, the 5-thread satin may be employed.



*Figure 9.8*

J shows the colour plan for the warp indicated along the bottom, the five shades being represented by different marks. The order of wefting, in the same five shades as the warp is obtained by noting, pick by pick, the colour of the warp thread which is depressed. Thus, as shown at K, the first pick is the same in colour as the first end, which is depressed on the first pick, the second pick is in the same colour as the fourth end; the third pick, as the second end; the fourth pick, as the fifth end; and the fifth pick, as the third end.

For the single-thread horizontal hairline in five colours, each pick must pass under one end and over four; the colour of each being determined by the colour of the end that it passes under, as shown at L in *Figure 9.8*. If the 1-and-4 twill weave is employed, however, the order of wefting is the same as the order of warping.

Other examples of vertical hairlines, obtainable in the 5-thread satin weave, are given at M to O in *Figure 9.8*, the effect at M being 1 dark, 4 light; at N, 2 dark, 1 light, 1 dark, 1 light; and at O, 2 dark, 2 medium, 1 light.

### *Step patterns*

In these, vertical and horizontal lines unite and form zig-zag lines of colour which run in a diagonal direction, as shown in the examples given at A to F in *Figure 9.9*. They can be constructed with any ordinary twill weave in which there are two intersections, and the floats of warp and weft are equal, by arranging the colour plan on a number of threads, which is equal to half the

number of threads in the repeat of the weave. Thus, at A the 2-and-2 twill is coloured 1 dark, 1 light; at B, the 3-and-3 twill is coloured 1 dark, 2 light; and at C, the 4-and-4 twill is coloured 2 dark, 2 light. A 3-shade step pattern can be produced in the 3-and-3 twill by colouring 1-and-1 in three shades, and a 4-shade in the 4-and-4 twill by colouring 1-and-1 in four shades. D shows a form of step pattern which is produced by colouring the Mayo weave 2 dark, 2 light, while the weave used in E produces exactly the same style of pattern in the 2-and-2 order of colouring as the 4-and-4 twill, and can be used in place of the latter when greater firmness of cloth is required. The 3-thread twill, when coloured 1-and-1, as shown at F, produces an interesting step

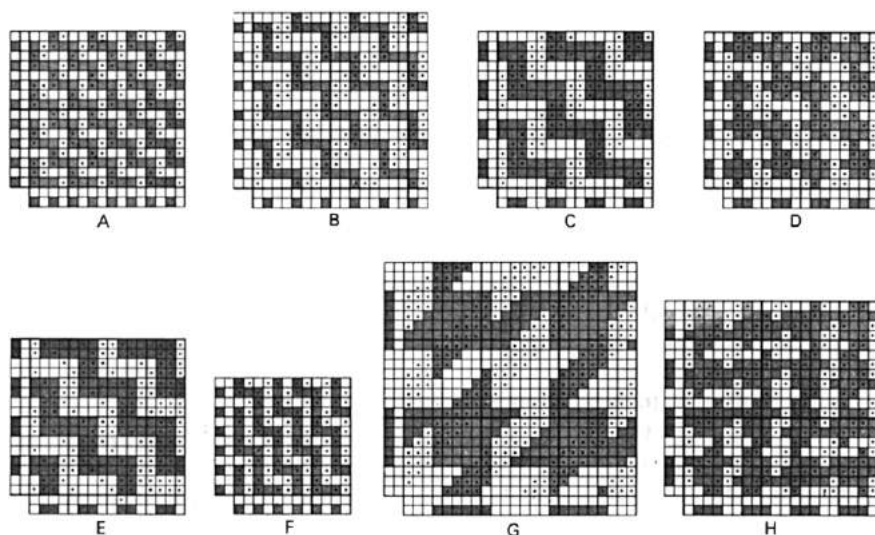


Figure 9.9

pattern, while a further variety of effects can be obtained in the 1-and-1 order of colouring by using twill weaves in which the floats are combined with the plain weave interlacing.

### All-over effects

In all-over patterns the colour effect runs more or less connectedly over the surface of the cloth. They are best constructed by arranging the repeat of the colour plan and the repeat of the weave on such numbers that two or more repeats of each are required to produce one complete repeat of the pattern. For example: Assuming that the 2-and-2 twill is coloured 4 dark, 4 light, 4-dark, 3 light, fifteen repeats of the weave and four repeats of the colour plan are necessary, the complete effect being on 60 threads. Pattern G in Figure 9.9 shows the effect produced by colouring the 4-and-4 twill 6 dark, 6 light; while pattern H shows the 2-and-2 twill coloured 3 dark, 2 light.

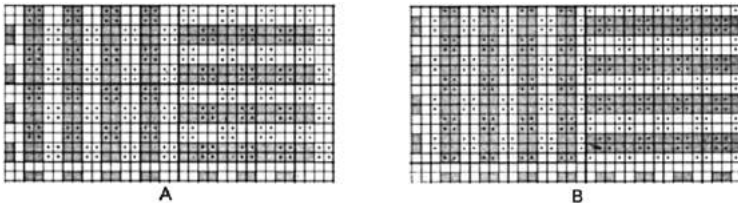
## Compound Colour and Weave Effects

### STRIPE COLOUR AND WEAVE EFFECTS

#### *Changing the relative position of the weave and colouring*

It has previously been shown that variety of pattern can be produced in the same weave and the same order of colouring by changing the position of one in relation to the other. The change of effect thus obtained may be made use of in the production of colour and weave stripe patterns, by modifying the warp arrangement, or the weave, in such a manner that their relative positions are different in succeeding sections of the design.

An example illustrating the method of modifying the warp colour order is given at A in *Figure 10.1*, and of modifying the weave at B. The object of preparing these and subsequent examples has been to show the different effects distinctly but in each case only a limited width of stripe is given. It



*Figure 10.1*

should be readily understood that a considerable diversity of form could be obtained by varying the width of each section.

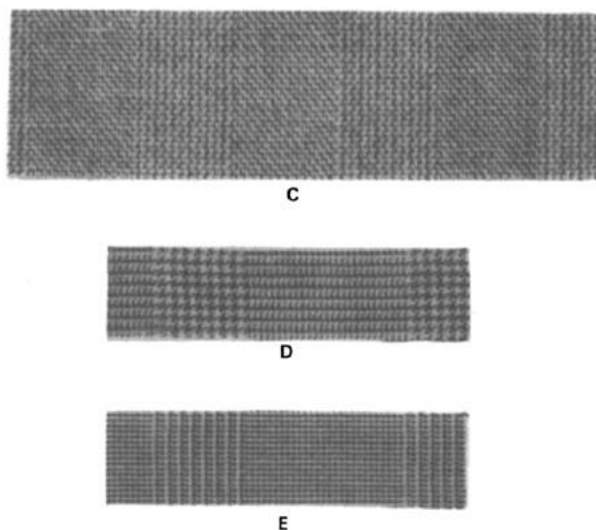
It will be observed in A, *Figure 10.1* that the 2-and-2 hopsack weave is continued throughout the full width of the pattern and the change of effect is obtained by breaking the continuity of the warp colouring order. The warp, instead of being arranged continuously in the order of 2 dark, 2 light is modified by the introduction of 4 light threads at the end of each section this being sufficient to throw the colouring on to a different footing in relation to the weave. In B, on the other hand, the order of colouring is 2 dark, 2 light throughout, but while the weave is the 2-and-2 hopsack, a change of footing is made in it where the pattern changes. A comparison of A with B in *Figure 10.1* will show that the two methods produce similar styles. The first method,

however, is usually the more convenient, as with a straight draft it is only necessary to modify the warp order of colouring according to the form of pattern required, whereas in the second method a special order of drafting is necessary.

In addition to the above two methods, colour and weave stripe patterns of more varied appearance can be produced in simple orders of wefting by employing: (1) simple weaves and compound orders of warping; (2) stripe weaves and simple orders of warping; (3) stripe weaves and compound orders of warping.

*Simple weave and simple wefting with compound warping*

Examples of this class are represented at A to H in *Figures 10.2* and *10.3*, and the three cloth samples C, D, E shown in *Figure 10.2* correspond with similarly lettered plans in *Figure 10.3*.



*Figure 10.2*

A and B in *Figure 10.3* show the 2-and-2 hopsack weave with identical compound warp arrangement of 2 dark, 2 light and 4 dark, 4 light orders of colouring but with different orders of wefting. At C an entirely different effect is produced in the same weave coloured 1 dark, 1 light, and 2 dark, 2 light in the warp with a simple 1 dark, 1 light arrangement in the weft (see also C in *Figure 10.2*).

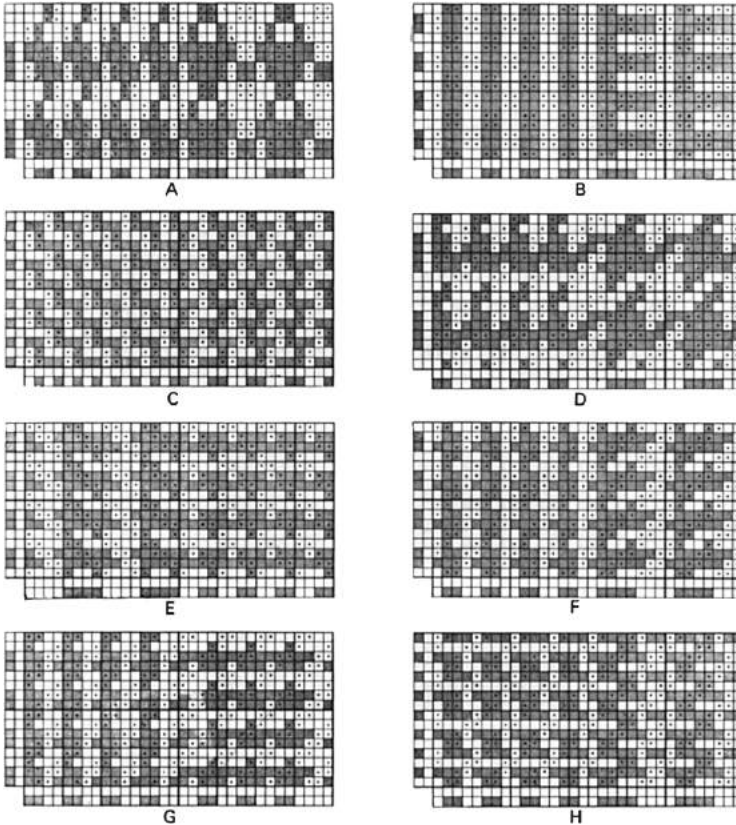
The patterns given at D to H in *Figure 10.3* show the application of the 2-and-2 twill weave to a variety of compound warping plans in conjunction with several simple orders of wefting.

All the constructions given in *Figure 10.3* result from the application of only three different compound orders of warping and three simple orders of wefting to two common weaves. Very many different compound orders of warping can be, however, readily arranged, to which different weaves and

orders of wefting can be applied and it will be evident that even within the limits of tappet shedding there is almost unlimited scope for the production of stripe colour and weave effects.

*Stripe weave and simple wefting with simple warpings*

Patterns constructed on the above basis are shown at A to F in *Figure 10.4*. In the plans A and B both the wefting and the warping consists of a simple 2 dark, 2 light colour order. The right hand sections in each of the above two patterns are also similar consisting of the 2-and-2 twill weave in which the



*Figure 10.3*

variety of effect was achieved by starting the twill on a different footing in each plan. The left hand side sections are quite varied in appearance as each has been produced in a different weave. A is constructed on a simple 2-and-2 twill diaper base, whilst B consists of a twilled hosiery.

C and D are both coloured 2 dark, 2 light in the weft and 4 dark, 4 light in the warp. In the pattern C the Mayo weave is combined with the 2-and-2 twill whilst in the pattern D a fancy 8-shaft weave is worked together with a 2-and-2 broken twill.

The bold effect achieved in the design E is due to the 4 dark, 4 light colouration in both the warp and the weft combined with the Mayo and the 2-and-2 hosiery weave arrangements.

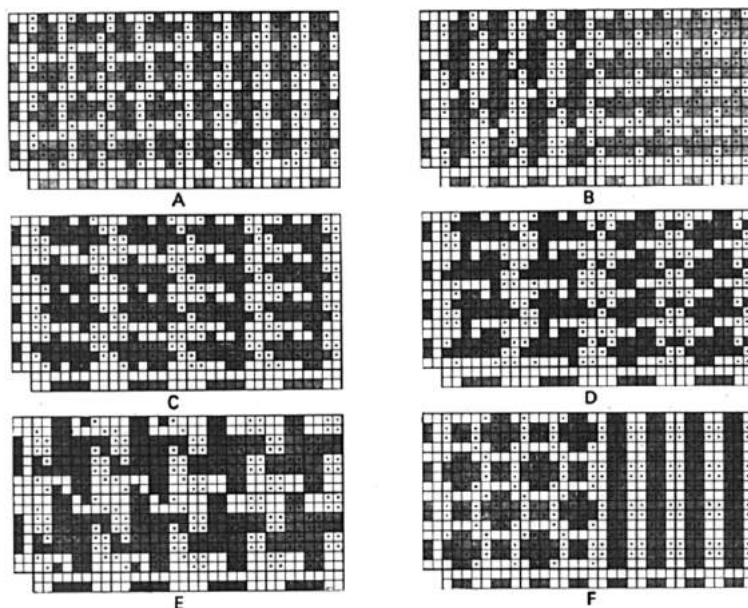


Figure 10.4

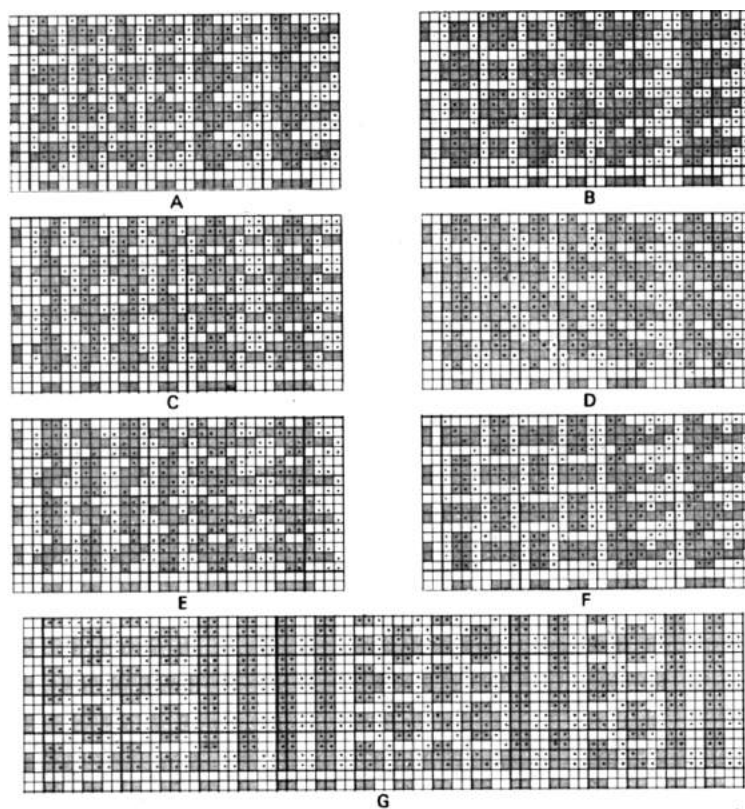


Figure 10.5

Pattern F is coloured 2 dark, 2 light in both the directions and shows a frequently employed combination of a bird's-eye effect with a double hair-line, the latter being developed in the 2-and-2 hopsack weave, whilst in the former use is made of a simple Grecian structure.

#### *Stripe weave and simple wefting with compound warping*

This type of construction is shown at A to F in *Figure 10.5*. All the examples have been produced with the same compound order of warping of 2 dark, 2 light followed by 4 dark, 4 light, and with an identical order of wefting of 2 dark, 2 light.

In A a 2-and-2 twill diaper in one section is combined with an ordinary 2-and-2 twill in the other, whilst B shows the effect of the combination of a Grecian weave with the 2-and-2 twill. In C and D the left hand section consists of the Mayo weave and the right hand sections are made with the 2-and-2 hopsack and 2-and-2 twill weaves respectively. The unusual effect at E results from the combination of a fancy 8-shaft weave with a 2-and-2 broken twill whilst the design F is obtained with the 8-shaft diaper in one section and the 2-and-2 twill in the other.

For the sake of simplicity of presentation all the examples illustrated in *Figures 10.3 to 10.5* are shown with an equal width of stripe. However, considerable diversity of pattern could be obtained by varying the space which each stripe occupied. This is shown at G in *Figure 10.5* where the Grecian and the 2-and-2 hopsack weaves used in combination are arranged in stripes of different size, the former alternating with the latter in the order of 16, 16, 16, 8, 8, and 8 ends. This arrangement is only one of many and if further variety of effect was required more than two weaves, or more than two different orders of warping could be readily combined together.

## CHECK COLOUR AND WEAVE EFFECTS

### *Changing the relative position of the weave and colouring*

The designs given at A and B in *Figure 10.6* illustrate the method of producing check effects in one weave and one order of colouring by varying the position of one in relation to the other. In both designs each quarter consists of 2-and-2 hopsack weave and 2-and-2 warping and wefting, but it will be noted that in A while the weave is continuous, the 2-and-2 order of colouring is broken, a 4 of white occurring at each change of the effect. Thus, the change of footing in the colouring causes the relative positions of it in respect of the weave to be changed, and alternate sections of vertical and horizontal lines result. Design B produces similar style but in this case the order of colouring is continuous, the change of footing being obtained by making a break in the weave at each change of effect. An analysis of the two designs will show that each requires four healds, but the first method, illustrated by A, is more convenient and more economical than the second. Thus, while A can be produced in a regular draft by means of tappets, B requires a special draft and, on account of the large number of picks in the repeat, a dobby shedding mechanism. The boxing plan in the first method is more complex, but this

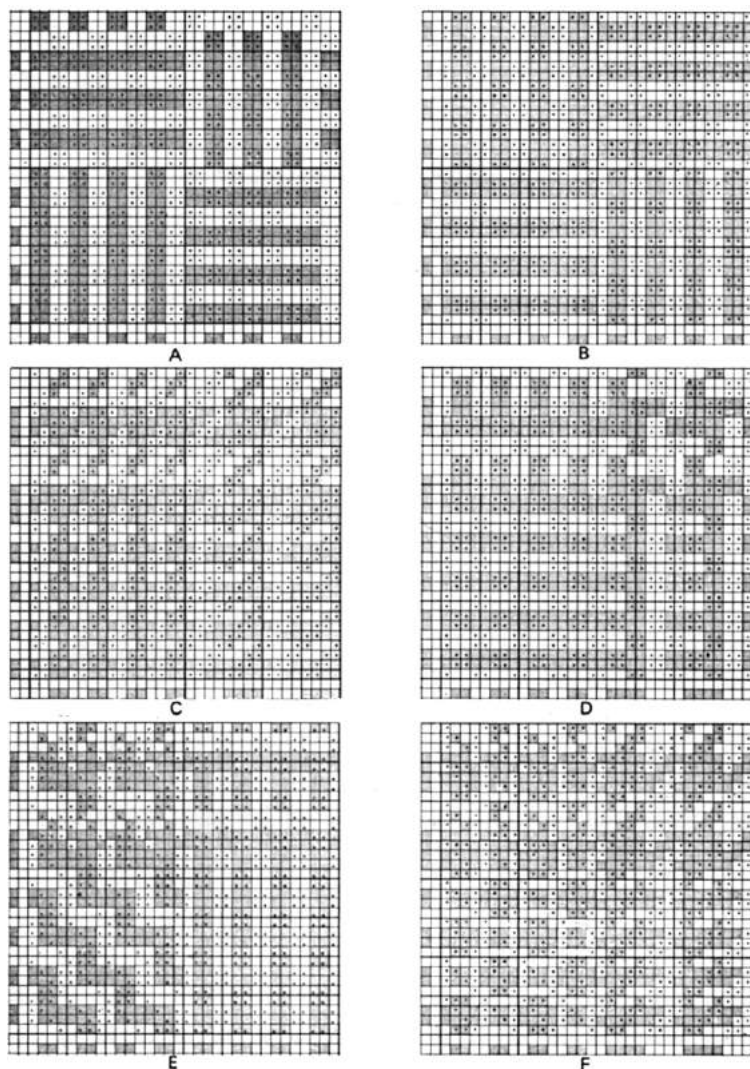


Figure 10.6

does not materially affect the question, since a check motion is required in either case. A design similar to A is represented by the fabric A in Figure 10.7.

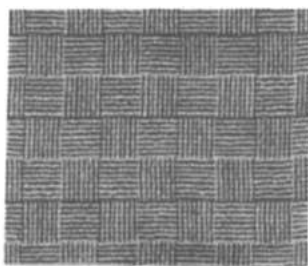
In addition to the foregoing styles where checks are obtained due to changes in either weave or colour relationship, check designs are also produced in each of the combinations in Table 10.

#### *Simple weave, compound warping and compound wefting*

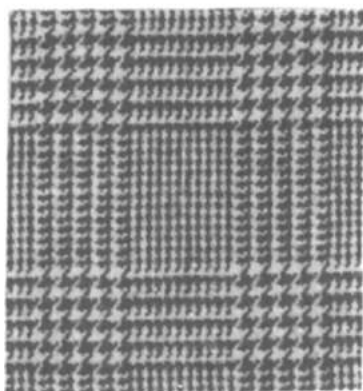
This combination is illustrated by the designs C and D in Figure 10.6, and by similarly lettered patterns in Figure 10.7. The order of warping and wefting for the two examples is the same—i.e. a compound of 2 dark, 2 white, and 4 dark, 4 white colourings as shown along the bottom and up the side of both designs. In C, the weave is 2-and-2 twill, and D, 2-and-2 hopsack.



It will be noted that both designs consist of four different effects, the reason for which will be evident if the order of colouring be compared with the weaves. Thus, in the first quarter of each design the effect is due to the 2-and-2



A



C



D

*Figure 10.7*

order of warping being crossed with 2-and-2 wefting, in the second quarter (moving clockwise) to the 2-and-2 warping with 4-and-4 wefting, in the third quarter to 4-and-4 warping with 4-and-4 wefting, and in the fourth quarter to 4-and-4 warping with 2-and-2 wefting. The best effects usually result in the quarters where the warping and wefting orders are the same. The cross effects produced where one order of colouring is crossed with another, while

**Table 10**

1. Simple	weave,	compound	warping,	compound	wefting
2. Stripe	..	simple	..	..	..
3. ..	..	compound	..	..	..
4. Cross-over	..	..	..	simple	..
5. ..	..	..	..	compound	..
6. Check	..	simple	..	simple	..
7. ..	..	compound	..	..	..
8. ..	..	simple	..	compound	..
9. ..	..	compound	..	..	..

not so good, usually give sufficient variety to make the patterns interesting. In the same manner that the pattern consists of four effects when the warping and wefting plans are compounds of two simple orders, nine effects result from compounds of three-colour schemes, and sixteen effects when the arrangement is a compound of four-colour schemes, because each warping order is crossed with all the wefting orders.

#### *Stripe weave and compound wefting with simple and compound warping*

The design marked E in *Figure 10.6* illustrates a combination in which a stripe weave is used in conjunction with a simple 2 dark, 2 light, order of warping, and a compound order of wefting in which sections of 2 dark, 2 light alternate with 4 dark, 4 light. Pattern F is also obtained in a stripe weave but in this case a compound order of colouring is employed in both, the weft and the warp. An examination of the above two designs will show that each quarter results in a different effect due to either the coincidence of varying colourings with identical weave stripes or same colourings with different weave stripes.

#### *Cross-over weave and compound warping with simple and compound weftings*

These combinations produce similar effects to those resulting from the preceding ones as shown in designs A and B in *Figure 10.8*. In both examples two simple weaves are arranged in cross-over, or horizontal stripe formation, each with the same compound order of warping of 2 dark, 2 light, followed by 4 dark, 4 light. In A the effect is achieved with the aid of a simple order of wefting while in B a compound order of wefting, identical with the warp colouring, is employed.

The chief point of difference between this method and the previous one is that with a cross-over arrangement of weaves a simple draft is required but a vertical stripe necessitates a more complex order of drafting with an advantage, however, of a much shorter lifting plan.

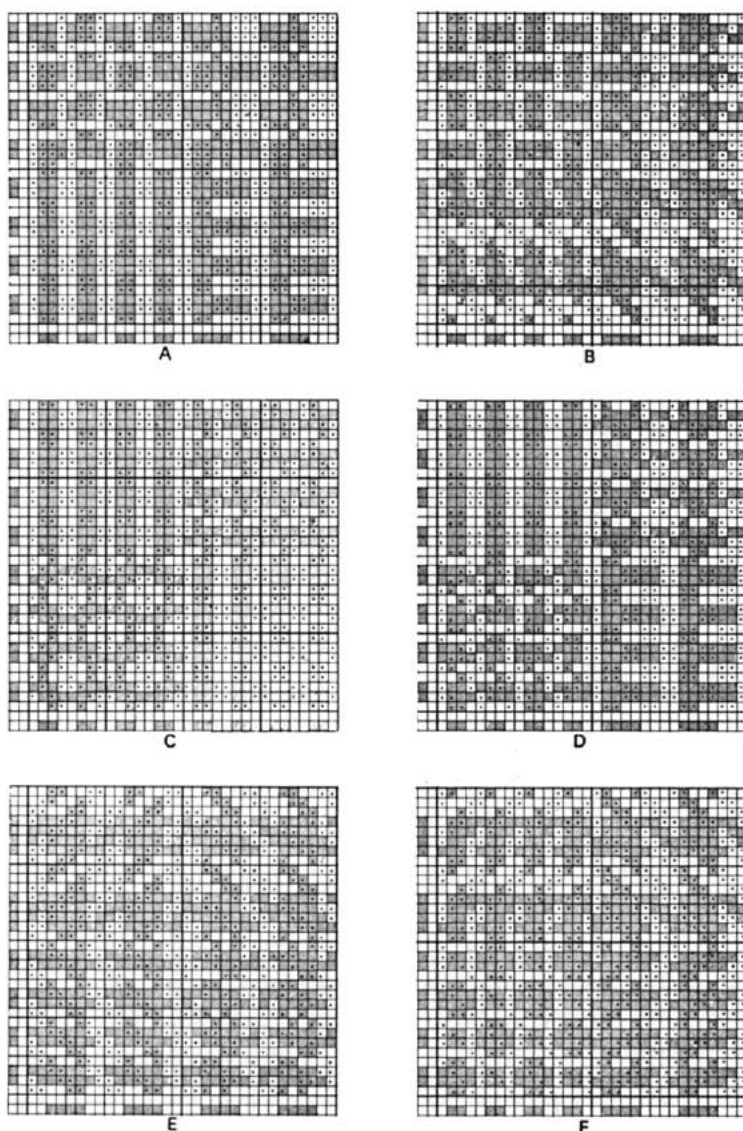
#### *Check weave, simple and compound wefting with simple and compound warping*

The construction of check colour and weave effects by combining a check weave with a variety of warping and wefting orders is illustrated at C to F in *Figure 10.8*. Design C results from a simple, 2 dark, 2 light, colouring in both directions.

In pattern D an identical order of wefting is retained but with a compound order of warping in which sections of 2 dark, 2 light alternate with 4 dark, 4 light. At E and F identical compound orders of wefting are employed but the order of warping is simple in the former and compound in the latter.

As previously stated, in arranging weaves in check form, the most important factor to note is that on the surface no long warp floats occur at the horizontal junctions, and no long weft floats at the vertical junctions. Considerable care is frequently necessary in getting the weaves in satisfactory relation to each other, at the same time that the desired colour-and-weave

pattern is secured. Furthermore, the different portions of a check design do not have to be of the same size and a careful combination of sections of different dimensions introduces a further element of variety as illustrated by the examples C and D in *Figure 10.7*.



*Figure 10.8*

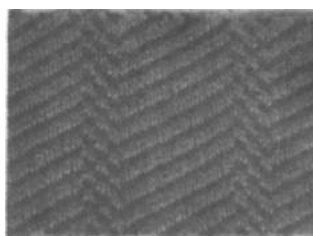
The foregoing colour-and-weave patterns illustrate standard styles, and the numerous examples that are given will, by examination and comparison, make clear how a very large variety of effects can be produced by the combination in different ways of a comparatively few units.

## SPECIAL COLOUR AND WEAVE EFFECTS

*Colouring of rib and corkscrew weaves*

Ordinary warp rib weaves, such as are illustrated at A to F in *Figure 3.1*, and such special rib weaves as those shown at A, B, and C in *Figure 6.3*, naturally lend themselves to a 1-and-1 order of colouring in the warp. Straight and waved horizontal lines in alternate colours are respectively produced by the two classes of weaves. In the same manner, a 1-and-1 order of colouring in the weft is suitable for similar weft rib weaves, by which vertical lines in alternate colours are formed. A regular rib weave may also be coloured in sections in the manner illustrated by the design M in *Figure 6.4*, in which the order in the warp is 1 dark, 1 light for 16 threads, and 1 light, 1 dark for 16 threads; the arrangement producing a small check effect in different colours, as previously described.

The warp cord designs, shown at F and G in *Figure 6.3*, will produce solid vertical lines in alternate colours by arranging the ends—6 dark, 6 light, and the picks 1 dark, 1 light; while the Bedford cord designs, given in *Figure 6.6* will yield similar effects if the ends are arranged in sections in different colours, and a 2-and-2 order of wefting is employed. A special arrangement of coloured threads may be applied to such designs as that shown at H in *Figure 6.3*, which, for instance, may be coloured in the warp in the order of 6 dark; 3 light; 1 dark, 1 light for 6 threads; 3 dark; 6 light; and in the weft in the order of 1 dark, 1 light. The effect will be a stripe of 6 ends warp cord—solid dark; 3 ends weft rib—solid light; 6 ends warp rib—dark and light lines alternately; 3 ends weft rib—solid dark; and 6 ends warp cord—solid light. Check combinations of warp and weft rib weaves, an example of which is given at K in *Figure 7.8*, may be coloured 1-and-1 in both warp and weft, and an effect in four colours is produced by employing colours in the weft that are different from the warp colours.



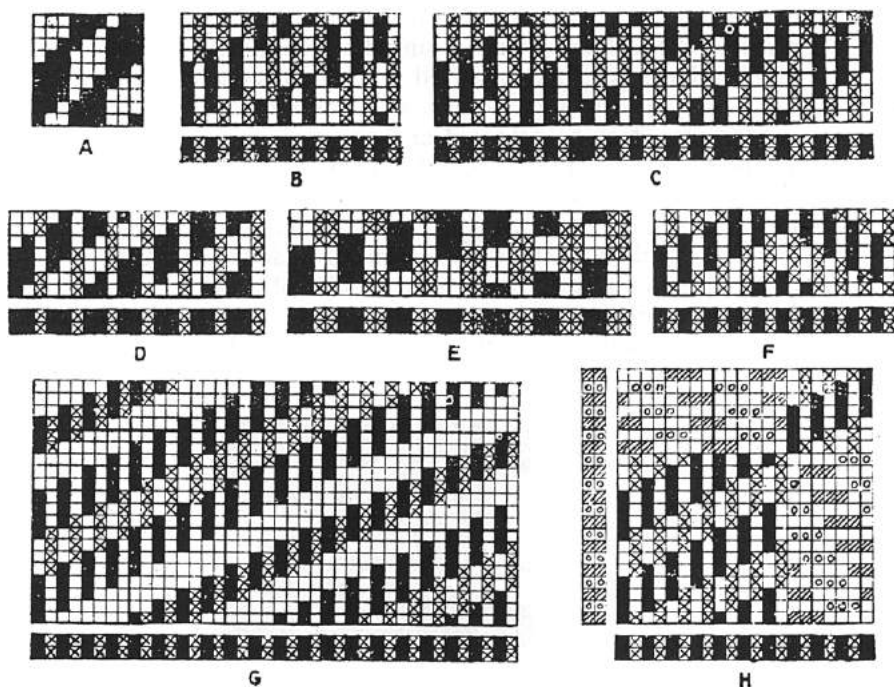
*Figure 10.9*

Ordinary warp and weft corkscrews, which are illustrated in *Figure 6.4*, are appropriately coloured in 1-and-1 order in warp and weft respectively; twill lines being produced alternately in two colours in this case. Further, such designs as L and P in *Figure 6.3* are particularly suitable for 1-and-1 warp colouring, in the same manner that the design N in *Figure 6.3* may be very aptly coloured 1-and-1 in the weft. In most cases, particularly in warp effects—a special order of colouring can be used in conjunction with solid colouring. Thus, a warp corkscrew weave may be coloured 1-and-1 and solid alternately, so as to produce a stripe design.

*Figure 10.9* represents a corkscrew fabric, in which twill lines are produced alternately in two colours, and the example also illustrates the combination

of an ordinary with a special corkscrew effect. In the cloth the ordinary corkscrew weave appears like an ordinary twill, and the special effect like a broken twill.

A broken twill appearance can be produced in the corkscrew structure in two ways: (1) By modifying the corkscrew weave and using a 1-and-1 order of colouring throughout. (2) By modifying the 1-and-1 order of colouring and using an ordinary corkscrew weave throughout. For example, at A in *Figure 10.10* a 9-thread broken twill weave is indicated, while B shows the weave modified on the warp corkscrew principle to fit a 1-and-1 order of colouring, the different marks representing different colours, C on the other hand, shows a continuous 9-thread corkscrew weave in which a similar broken effect is produced by colouring the warp in the order of 1 dark, 1 light for six threads, and 1 light, 1 dark for six threads, as indicated along the bottom of the design. The usual close setting of the ends in the corkscrew weave will cause both B and C to appear similar to the basic weave A—assuming that the latter is woven in—say, dark warp and light weft.



*Figure 10.10*

Three modifications of a warp corkscrew, which may be specially coloured and used in combination with an ordinary weave of the same class, are given at D, E, and F in *Figure 10.10*. At D the weave is arranged to coincide with a 2-and-1 order of colouring, and at E with a 2-and-2 order, while F produces a waved effect in 1-and-1 colouring.

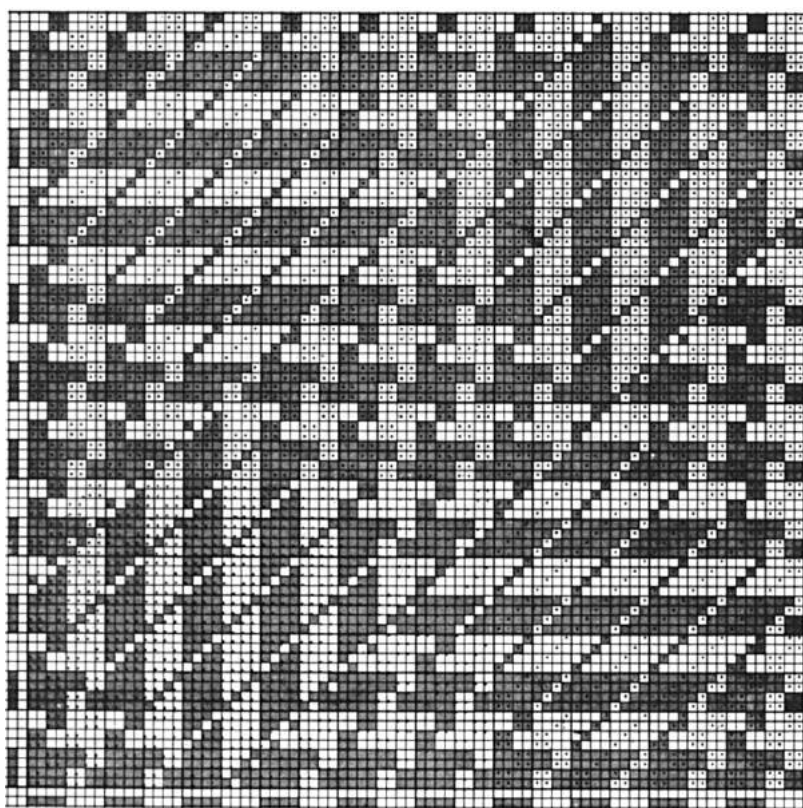
G in *Figure 10.10* shows a form of corkscrew weave which, in 1-and-1 colouring in the warp and solid colouring in the weft, produces differently coloured twill lines of warp, brings up the weft as a third effect, and also produces a twill line in which the warp colours are intermingled.

The design H in *Figure 10.10* is a check combination of warp and weft corkscrew weaves, which if woven in two colours of warp and two different colours of weft, as indicated along the bottom and at the side respectively, will produce an effect in four colours. The example repeats upon an odd number of threads, therefore, if the order of colouring is arranged 1-and-1 throughout, the colours in certain sections will change positions in succeeding repeats. As a rule, in a combination of warp and weft corkscrew weaves, the warp-face weave forms the bulk of the design. The sections of the design H may be repeated any required number of times.

## FIGURED COLOUR AND WEAVE EFFECTS

### *Figured weave arrangements with simple and compound orders of colouring*

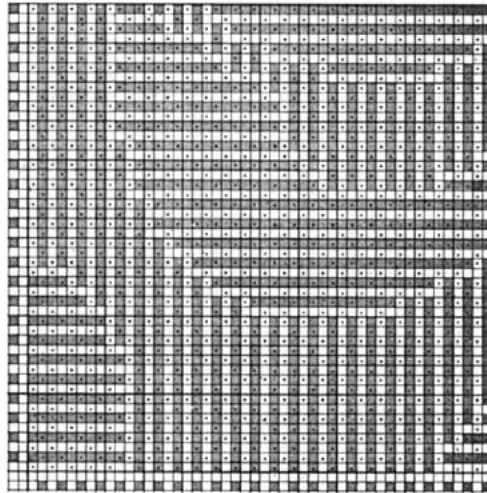
The check designs discussed in the preceding section of this chapter were all arranged on a rectangular base. Such arrangements, although most common, are not the only ones possible and many good colour and weave effects can be produced on a diamond base, or on a non-geometrical base, and are particularly suitable for ladies suitings and overcoatings.



*Figure 10.11*

*Figure 10.11* illustrates one such design which is constructed upon diamond base. The diamond spaces, which in an actual cloth should occupy larger areas to show the effect to full advantage, are constructed in 2-and-2 hop-sack, 3-and-1 twill, and 1-and-3 twill with a simple 4 dark, 4 light order of warping and wefting. The design illustrates one method of arranging weaves in diamond form, their relationship to one another, and to the colouring so as to obtain a well balanced effect. Thus it will be noted that (1) the centre of each diamond space coincides with a central position of the colouring; (2) no long floats occur at the junctions of the weaves; (3) each weave is so combined with the colouring as to produce the required effect.

The design represented in *Figure 10.12* illustrates a method of producing non-geometrical figured styles in one weave and one order of colouring, by varying the position of the former in relation to the latter. The 1-and-1 order of colouring is continuous, but the plain weave which is used for the figure areas weaves on the opposite footing to the plain weave in the ground areas. As a result the figure is produced in the form of a horizontal hairline effect in clear contrast to the vertical hairline effect of the ground. Designs of this type repeat necessarily over a very large number of ends and picks and in *Figure 10.12* only a small portion of the repeat is illustrated. It is

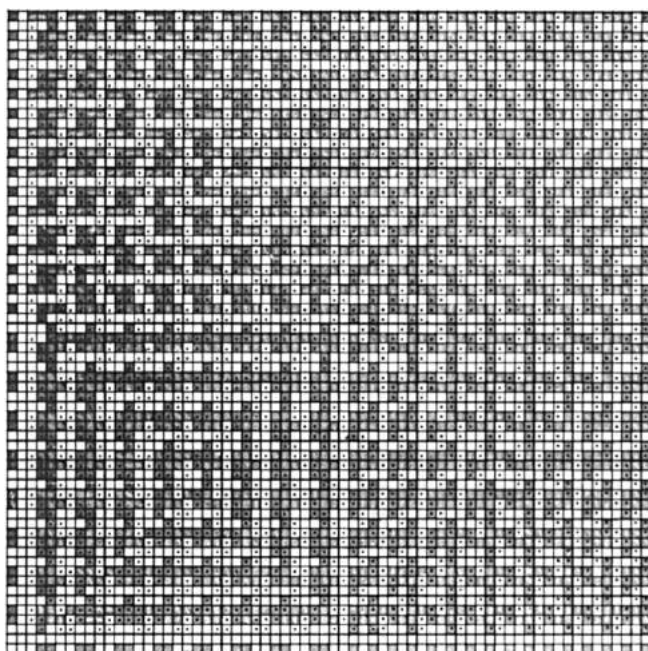


*Figure 10.12*

sufficient, however, to show the main constructional feature of these designs, namely a typical float of two, either of warp or weft at the points at which the figure and ground join together. It is upon the proper arrangement of these floats that the clarity of the outline of the figure depends. One of the colours—and usually, the lighter of the two is the more suitable—should form a fine line separating the figure from the ground, otherwise the form will be indefinite. Assuming that the figure is required to be outlined in the lighter shade, as in the example, the following should be observed in marking the edge of the figure: Where the floats of two are alongside each other they should be in weft float on the light picks, and in warp float on the dark picks; while, where the floats of two are one above the other, they should be in warp float on the light ends, and in weft float on the dark ends. In the case of outlining the figure in the darker shade, the conditions will be exactly the opposite.

The fabric represented in *Figure 10.13* illustrates another construction based on a simple diamond form combined with a compound order of colouring. A portion of the corresponding design given in *Figure 10.14*

*Figure 10.13*



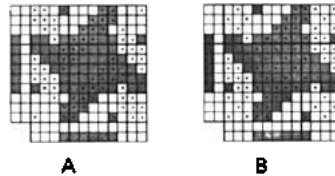
*Figure 10.14*

shows that the weave consists of simple 2-and-2 twill diamonds and the elaborate effect is due mainly to the colouring in which sections of 2 dark, 2 light alternate with sections coloured 1 dark, 1 light in both the warp and weft directions. The use of compound orders of colouring permits the construction of intricate and varied effects on a comparatively simple weave base.



*Construction of special weaves to produce distinct figured effects*

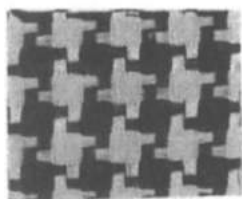
The designs represented at A and B in *Figure 10.15* illustrate a special class of small figured effects produced in simple orders of colouring. Both show an identical star like form and although the colour order in each is the same (6 dark, 6 light) the weaves are different. Design A is constructed on the basis of a 3-and-3 herringbone twill, but it is only to a limited extent that modified simple weaves can be used in producing a special style of pattern. Construction of special weaves, however, allows almost unlimited scope for the production of figured effects. Example B in *Figure 10.15* illustrates the principle involved in the creation of special weaves. In this system advantage is taken of the fact that where a colour of warp is intersected by the same colour

*Figure 10.15*

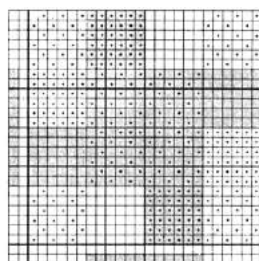
of weft, that colour will appear on the surface whatever the weave is, which enables plain or other firm weave to be employed at these places in order to give the cloth the necessary strength. Where one colour intersects another colour, either may be made to appear on the surface, in forming the required pattern, by arranging the warp and weft floats to correspond. Thus in design B, where dark ends interweave with dark picks, and light ends with light picks, plain weave is employed. Where the design is required to show dark on light picks the dark ends are raised, and where light on dark picks the light ends are raised. Where the design is required to show dark on light ends the dark weft is floated, and where light on dark ends the light weft is floated. Design B thus contains more intersections than A and may be used to produce the same effect in a cloth in which greater firmness is required.

A convenient method which may be employed to construct this type of effect is to develop the design in several stages. Assuming that a dark figure on light ground is required the first stage consists of marking the required shape lightly within the confines of the repeat. A suitable colour scheme is then indicated along the bottom and up the side of the design, the crossing points of the dark threads in the warp and in the weft coinciding with the centre of the figure. In the third stage the required weave is obtained as follows: (a) plain (or other simple weave) is inserted where each colour intersects its own colour; (b) dark ends are then followed vertically and where these cross the light picks in figure area, weave marks are inserted, but where these cross the light picks outside the marked figure area the squares are left blank; (c) dark picks are then followed horizontally and where these cross the light ends in figure areas the squares are left blank but where they cross the light

ends outside the figure area weave marks are inserted. This procedure can be followed by reference to *Figure 10.17* which shows a larger design repeating upon 24 ends and picks with a 12 dark, 12 light colour pattern in both directions. *Figure 10.16* illustrates the appearance of this effect in cloth.

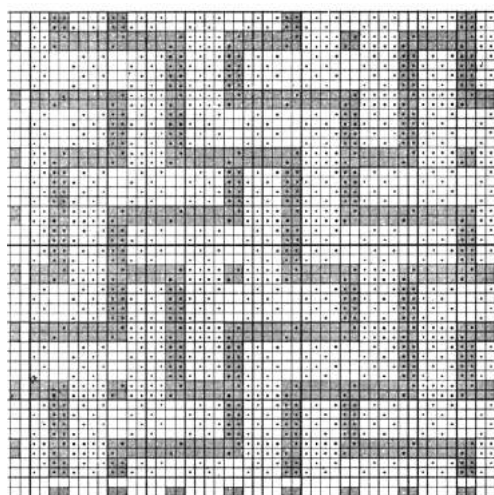


*Figure 10.16*



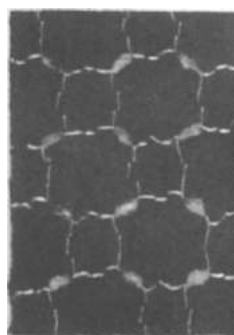
*Figure 10.17*

The system is not limited to the production of detached figures, as by suitably floating the threads of one colour over those of another colour, many interesting effects, consisting of interlacing lines, can be obtained. One such



*Figure 10.18*

design is illustrated in *Figure 10.18* based on a simple order of colouring of 2 dark, 4 light in both directions. It has been constructed exactly according to the method outlined above and although it repeats over 48 ends and picks it can be readily produced by healds, as with careful drafting it requires the use of only 20 shafts.

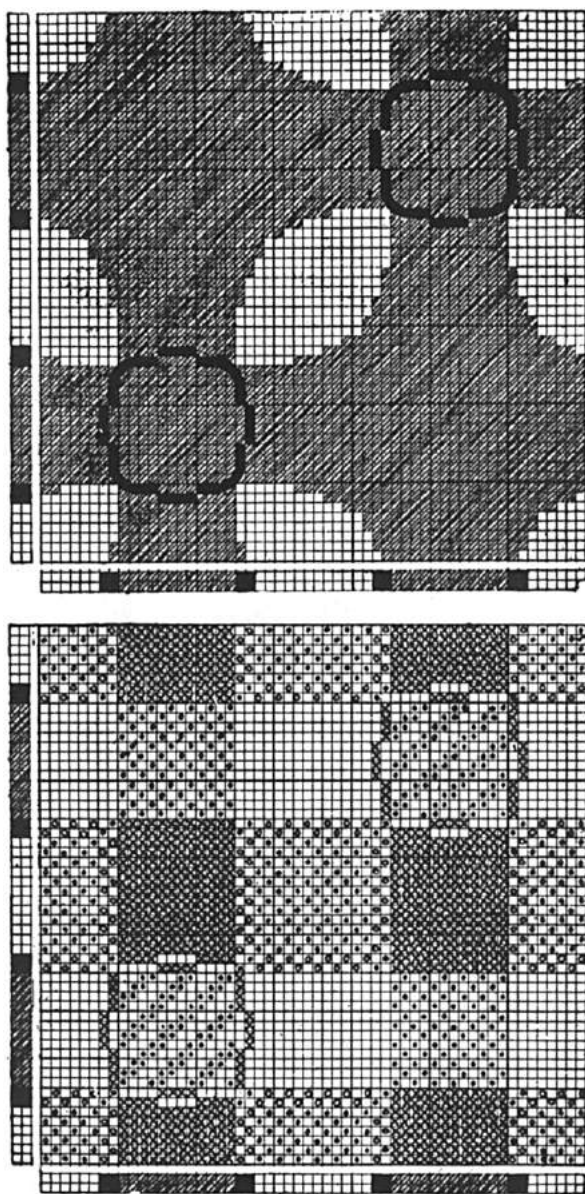


*Figure 10.19*

#### *Combinations of special weaves and special yarns*

A special colour and weave style is represented in *Figure 10.19*, in which yarns of different materials and different thicknesses are combined, a pattern in white filament rayon and thick dark worsted being formed on a ground composed of fine light cotton threads. The arrangement in warp and weft is

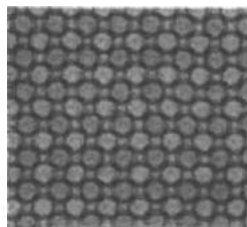
indicated along the bottom and at the side of the corresponding plans in *Figure 10.20*; the solid marks representing the white rayon, the shaded squares the dark worsted, and the blanks the light cotton threads. The design paper sketch in the upper portion of *Figure 10.20* represents the appearance of the effect, but it does not give a correct idea of how it will be necessary for the threads to interweave, because the structure causes considerable distortion of the thick dark threads to take place. An examination of the actual



*Figure 10.20*

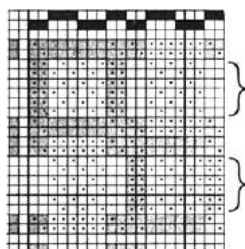
weave given in the lower portion of *Figure 10.20* will show that where the worsted ends intersect with the worsted picks, in alternate sections the weave is 2-and-2 twill surrounded by a 4-and-4 order of interweaving with the rayon threads, while in the other sections the weave is plain with the rayon threads floating on the back. The 2-and-2 twill weave is sufficiently loose to enable the thick threads to approach each other readily, and they therefore group together at these places, and are retained firmly in position by the 4-and-4 stitching of the rayon threads. Where the weave is plain, however, the intersections are too frequent for the thick threads, which therefore spread out,

*Figure 10.21*



there being no obstacle to their distortion, since on every side of the plain interweaving the float is absolutely loose. The fine cotton ends and picks interweave with each other, and with the rayon threads in plain order, but the spreading out of the thick threads partly conceals them, and gives an oval shape to the rectangular space occupied by the fine threads.

The pattern shown in *Figure 10.21* illustrates another method of giving interest to a special style, as in this case not only are yarns of different materials and different counts combined, but alternate sections of the fabric are crammed. The fabric is an all rayon construction, arranged 4 dark,



*Figure 10.22*

6 light in both directions, in which the dark ends and picks are considerably finer than the light ones and being crêpe twisted possess a high degree of liveliness. Where the fine, dark ends and picks interlace together a very open fabric results but the heavy, light ends and picks which are crammed produce dense solid spots in the cloth. Also the floats of the dark ends and picks are so arranged that they lift or depress alternate crammed areas inducing a degree of cloth distortion which is responsible for the attractive, 'pebbly' appearance of the texture. The complete design is represented in *Figure 10.22*, with the order of denting shown above the design and the crammed weft areas indicated by the brackets on the right.