

# COMBINATION WEAVES

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## INTRODUCTION

1. One of the most common methods of producing new or novel weave effects in a fabric is by combining two or more weaves as a whole. In this method of amalgamating weaves, one or more repeats of each weave are joined together, instead of combining the weaves pick and pick or end and end. As twill, basket, satin, corkscrew or other weaves produce entirely distinct effects in a fabric, a large field is opened by this method for the production of new effects.

In the formation of combination weaves there are two important points that should be taken into consideration. In the first place, the yarns with which the cloth is to be woven, whether woolen, worsted, silk, or cotton, must be considered. If the yarn is woolen, the weaves must be uniform in structure, as woolen yarn is so constructed that it is not especially adapted for developing weave effects, the surface of the yarn being too rough and fibrous. Simple combinations and good colorings are the essential points in woolens.

In worsted or cotton fabrics, a large diversity of fancy weaves may be used, since the yarns are comparatively smooth (the fibers being laid in parallel order) and are thus excellently adapted for bringing out every detail of the weave. Silk is a still more suitable yarn for developing weave effects.

The second point, to which it is especially desired to call attention, is that however widely the weaves that are to be

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combined may differ in respect to the effects that they produce in the cloth, they must be somewhat similar as regards the number of interlacings of the warp and filling, otherwise they cannot be made to weave together evenly. When desiring to form new effects by the method of combining two or more weaves, this latter fact should constantly be borne in mind, as it is absolutely essential to the satisfactory weaving of the cloth.

2. Fig. 1 is a representation of a sample of cloth made by combining two weaves without regarding the number of interlacings of warp and filling. The ends in (a) are interlaced on the 6-end-basket principle, while those in (b) are working plain, so that the ends in (a) interlace with the filling only four times in the 12 picks shown in this figure,

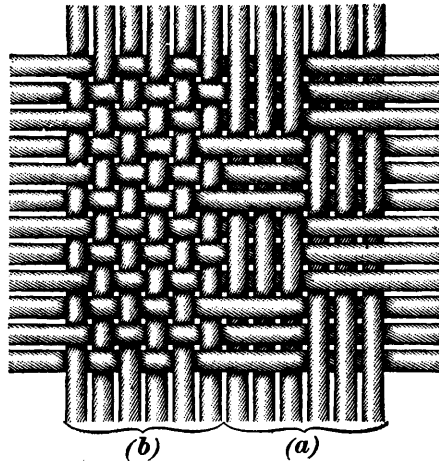


FIG. 1

while the ends in (b) interlace twelve times during the same number of picks. The result of this will be a tendency to prevent the picks of (b) from being as closely pressed against one another as those in (a), where the intersections are not so frequent. In (b) the warp yarn interlaces at every pick; therefore, the ends lie between one pick and the pick following, separating

these by a distance nominally represented by the diameter of the warp yarn, and thereby preventing each pick from being beaten up against the preceding one. In (a), there is nothing to prevent one pick from being beaten up against the adjoining one in those places where the picks are three in a shed, supposing, of course, that this weave was being used

alone irrespective of the weave used in (*b*); but between the third and fourth, sixth and seventh, ninth and tenth, and also the twelfth and first picks, the warp yarns change positions, and those lying between the third and fourth picks prevent these picks from being beaten up against each other, while the same is true in each of the other cases.

The more frequently the warp and filling interlace with each other, the greater difficulty there will be in driving each pick of filling closely against the preceding one; consequently, if the picks were beaten up close together in (*a*), the warp ends in (*b*) being deflected from a straight line to a much greater extent than those in (*a*), would take up faster and consequently work tighter during weaving, which would soon produce a cockled, or wrinkled, appearance. On the other hand, the more open the weave, the closer can the filling be inserted; for instance, as 3 ends of warp are depressed or elevated during 3 picks in succession in (*a*), this portion of the cloth admits the filling much more freely. For these reasons, closely woven and loosely woven weaves should rarely, if ever, be combined if the warp yarns are all run from the same beam, as they can be made to weave only with great difficulty. There are some instances, however, where unlike weaves may be combined without detriment to the regularity of the fabric, although these are the exception rather than the rule.

The ends and picks must interlace and form the build, or structure, of the fabric in addition to producing a design. Therefore, the practicability of a design in regard to its weaving should always be as carefully considered as the appearance of the woven cloth.

## STRIPES AND CHECKS

### STRIPE WEAVES

#### COMBINATIONS OF WARP- AND FILLING-FLUSH WEAVES

3. **Stripes** are continuous effects running lengthwise of the cloth, or in the direction of the warp. The most elementary form of a stripe obtained by a combination of weaves results from combining the warp prunelle with the filling prunelle. Fig. 2 is a stripe design complete on 18 ends resulting from combining these two weaves. The first 15 ends are made by repeating the warp prunelle  $\frac{2}{1}$  five times, while the last 3 ends are the filling prunelle  $\frac{1}{2}$ . In combining weaves in this manner, it is always best wherever possible to make the weaves *cut* where they oppose each other. By **cutting**



FIG. 2

is meant that, where the weaves join, the warp floats of one weave will oppose, or come against, the filling floats of the other, and the filling floats oppose the warp floats. This has been done in Fig. 2. Thus, the fifteenth end is the last end of the warp prunelle, while the sixteenth end is the first end of the filling prunelle, and on those picks on which the fifteenth end is raised, the sixteenth end is lowered, while on those picks on which the fifteenth end is lowered, the sixteenth end is raised. But there is another joining point of these two weaves besides the fifteenth and sixteenth ends. If the weave should be repeated in its ends, the first end would come next to the last end. Therefore, when seeking to have weaves cut where they are joined, this point should be as carefully considered as the former. Fig. 2 complies with these requirements, since on those picks on which the last end is

raised, the first end is lowered, while on those picks on which the last end is lowered, the first end is raised.

4. All weaves should run up in regular order and they should not be made irregular for the purpose of making the weaves cut, although they may be commenced on different ends and picks to attain this end. When weaves are combined and it is impossible to make them cut perfectly, always try so to combine the weaves that the warp and filling floats will not be any longer in the combination weave than they were in the separate weaves. To illustrate this point, suppose that it is desired to combine the two weaves shown in Fig. 3 (a) and (b).

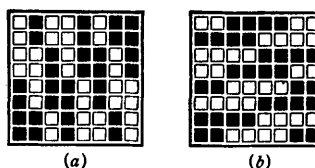
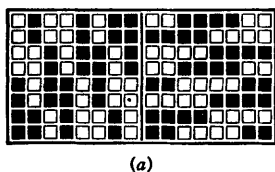
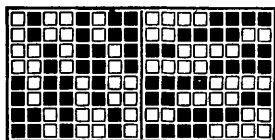


FIG. 3

In the first case they will be combined just as they are; that is, by copying the 8 ends of Fig. 3 (a) for the first 8 ends of the new weave and copying the 8 ends of Fig. 3 (b) for the last 8 ends of the new weave. Fig. 4 (a) shows the weave formed by combining the two weaves by this method.



(a)



(b)

FIG. 4

On the third pick there is a filling float of 6 ends, while in neither of the weaves that were combined was there a filling float of more than 4 ends; also, on the seventh pick, 6 ends are raised side by side, while in neither of the weaves combined were there more than 4 ends up together on the same pick.

Fig. 4 (b) shows another combination of these two weaves, but in this case on no pick does the filling float

over a greater number of ends than it did in either of the weaves combined; neither are more ends raised together on any one pick. In this figure the first 8 ends are Fig. 3 (a), taken just as they are, while the last 8 ends are Fig. 3 (b), commencing with the seventh end and taking the ends in regular

order; that is, the ninth end of Fig. 4 (*b*) is the seventh end of Fig. 3 (*b*); the tenth end of Fig. 4 (*b*) is the eighth end of Fig. 3 (*b*); the eleventh end of Fig. 4 (*b*) is the first end of Fig. 3 (*b*); the twelfth end of Fig. 4 (*b*) is the second end of Fig. 3 (*b*), and so on.

It is not always possible so to combine two weaves that they will cut perfectly, nor in some cases so that there will not be any longer floats than in the individual weaves themselves; but the best manner of combining them should always be sought, since, if combined well, the resulting weave has a much better effect in the cloth. A description of the formation of a few of these weave combinations will be given in order to enable the method employed to be thoroughly understood.

5. One method of combination that is as satisfactory as any for certain classes of weaves is to combine two weaves, one of which is the reverse of the other in regard to the warp and filling flushing. These weaves can always be made to cut where they are joined. Thus, for example, suppose that two

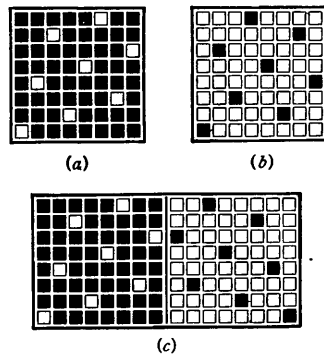


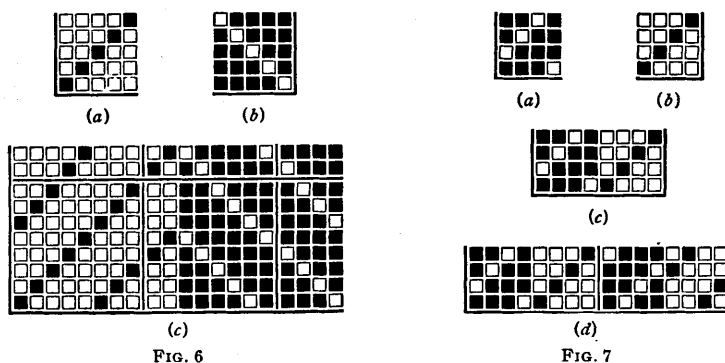
FIG. 5

8-end satin weaves are to be combined on this basis. Fig. 5 (*a*) shows an 8-end warp satin moving on a base of 3, while Fig. 5 (*b*) shows an 8-end filling satin moving on a base of 5. In making a combination weave from warp and filling satins, in order to have the weaves cut it is necessary to have the sum of the numbers used for the bases of the satins equal to the number of ends on which each satin weave is complete. Thus, in the case of Fig. 5 (*a*) and (*b*) the warp satin moves on a base of 3 while the filling satin moves on a base of 5, and  $5 + 3 = 8$ , which is the number of ends on which each satin weave is complete.

It is next necessary to combine these two weaves in such a manner that they will cut, and since, if they were combined

as shown in Fig. 5 (a) and (b), the desired result would not be obtained, it will be necessary to start one of the weaves on either a different end or a different pick. By copying Fig. 5 (a) just as it is for the new weave, and starting Fig. 5 (b) on the second end, the weaves will be made to cut. Fig. 5 (c) shows these two weaves combined in this manner. Dealing with the second section of Fig. 5 (c) alone, the ninth end is the second end of Fig. 5 (b); the tenth end, the third end of Fig. 5 (b); the eleventh end, the fourth end of Fig. 5 (b); and so on.

6. Another good method of forming combination weaves with warp- and filling-flush weaves is to combine two twill weaves in one of which the warp flushes to an extent equal to the filling flushes of the other weave. Fig. 6 (a) and (b) are two such twill weaves, and by combining them as shown in Fig. 6 (c), they form a weave that cuts perfectly where the two weaves are joined. In Fig. 6 (c), both of the weaves that are combined have been repeated in both ends and picks.



In these figures, the twill in one figure runs in a direction opposite to the twill in the other; that is, the twill in Fig. 6 (a) runs to the right, while that in Fig. 6 (b) runs to the left. If it is desired to combine warp- and filling-flush twills in which the twill lines run in the same direction, it will be found necessary either to continue the weaves as a whole or else to continue one of the weaves for a portion of a repeat, in order to make them cut. For instance, suppose

that it is desired to combine Fig. 7 (a) with Fig. 7 (b) so that the width of each section of the stripe will be equal; that is, so that each will contain one repeat of the weave, or 4 ends in this instance. If this weave is made as shown in Fig. 7 (c), a perfect cut is not obtained between the eighth and first ends, but if it is continued as shown at Fig. 7 (d), the last, or sixteenth, end will cut perfectly with the first, and perfect cuts will also be made at all the other places where the warp-flush weave joins the filling-flush weave, or vice versa. In each section of Fig. 7 (d), the weaves shown in Fig. 7 (a) and (b) are used, but the sections that have been repeated are started on different ends, so as to make perfect cutting possible.

Another method of obtaining a perfect cut in a case like this is to continue one section for a number of ends sufficient to make a perfect cut; thus, 2 extra ends are added to the filling-flush weave in Fig. 8, or, in other words, a repeat and a half of this weave is used, which makes the last end of the weave

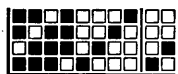


FIG. 8



FIG. 9

work exactly opposite to the first, thus insuring a perfect cut. This method makes one stripe, in this case the filling-flush stripe, wider than the other. If even stripes are desired and the method employed in Fig. 7 (d) cannot be used, perfect cuts can be made by adding 1 end to both the warp- and the filling-flush section of the weave, as shown in Fig. 9. In this case a perfect effect in the cloth will be obtained, although even repeats of each weave will not be shown, each section having 1 end in excess of a repeat.

#### COMBINATIONS OF EQUALLY FLUSH WEAVES

7. Very frequently stripe weaves are formed by using an equally flush twill as a chain draft and arranging the drawing-in draft so as to produce the required stripe effect. Fig. 10 (a) shows a stripe weave made in this manner, in which the first 4 ends are the cassimere twill  $\frac{2}{2}$ ; the next 2 ends have the same interlacings as the second end; the



next 2 ends have the same interlacings as the fourth end; the next 8 ends are the regular twill commencing with the second end; the next 2 ends have the same interlacings as the third end; the next 2 ends have the same interlacings as the first end; while the last 2 ends are the cassimere twill commencing with the third end and running in regular order. It will be noticed that the last 2 ends are a continuation of the first 4 ends; that is, the last end does not cut with the first end but continues the weave regularly.

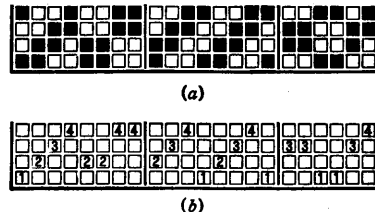


FIG. 10

In all other places where this weave changes, the ends cut. By this means a perfect stripe is obtained that is the same as though the  $\frac{2}{2}$  basket were combined with the cassimere twill, yet the stripe may be obtained by using the cassimere twill as the chain draft and drawing the warp ends through the harnesses, as indicated by the drawing-in draft shown in Fig. 10 (b).

Fig. 11 (a) is another stripe weave formed in a similar manner from the equally flush twill  $\frac{3}{3}$ . The first 18 ends of this stripe design are formed by running the regular twill  $\frac{3}{3}$

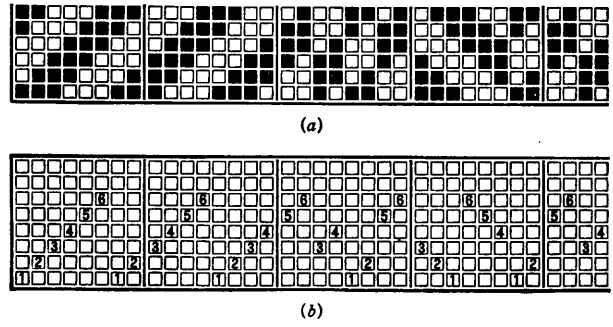


FIG. 11

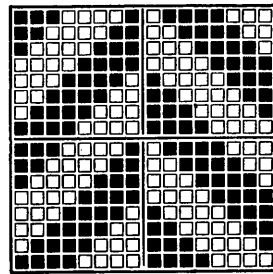
in regular order; the next 2 ends are the same as the third and fourth ends of the twill; the next 2 ends are similar to the first and second; and the next 2 ends are similar to the

fifth and sixth. The next 6 ends are the regular  $\frac{3}{3}$  twill with the twill running in the opposite direction, and commencing with the third end. The next 2 ends are the same as the first and second ends; the next 2 ends are similar to the fifth and sixth; while the last 2 ends are similar to the third and fourth. In this case, as in the previous one, each end in Fig. 11 (a) is a certain end of the regular  $\frac{3}{3}$  twill, and, consequently, it is possible to weave this design on 6 harnesses. The harness draft for Fig. 11 (a) on 6 harnesses is shown in Fig. 11 (b).

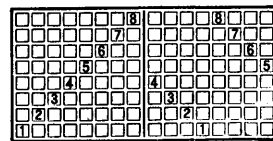
8. Another method of forming stripe weaves, and one that is quite generally adopted, is that of running a regular equally flush twill up for a certain number of ends and then reversing the weave, but commencing with an end that will

cause the weave to cut where it is reversed. This effect may be obtained by using a regular equally flush twill weave as a chain draft with an angled drawing-in draft.

Fig. 12 (a) shows a weave of this class, while Fig. 12 (b) gives the harness draft, which, it will be noticed, is an angled draft. In Fig. 12 (a), the weave is repeated in its picks, since 16 picks are shown, although the weave is really complete on 16 ends and 8 picks. At the ninth end it is reversed, and this end is the same as the fourth end; the weave also cuts at this point, as the warp and filling floats of the eighth end



(a)



(b)

FIG. 12

oppose the warp and filling floats of the ninth end. The warp and filling floats of the first end also oppose the warp and filling floats of the last end, thus causing the weave to cut at this point, since these 2 ends come together in the cloth.

The width of either section of the stripe can readily be changed by repeating that section of the drawing-in draft.

Thus, if the first 8 ends of the drawing-in draft were repeated four times and the last 8 ends were not repeated, the first section would be complete on 32 ends and the last section on 8 ends, the whole weave being complete on 40 ends, although it would require only the same number of harnesses to weave it, namely 8 harnesses. By changing the drawing-in draft in this manner, a large number of different weaves can readily be formed, and by changing the twills in the weave, a still greater variety can easily be obtained.

#### SINGLE-END STRIPES

9. Another class of stripe designs that is met with quite frequently includes weaves known as **single-end stripes**. These weaves are generally formed by opposing a warp-flush weave with a single end of a filling-flush weave, or vice versa, having the ends cut where the two weaves oppose each other; the effect of this is to form a *cut mark*, or fine indented line, which is generally arranged to run warp way of the cloth. Fig. 13 illustrates one of these weaves; the first end is an end of a filling-flush weave; the next 6 ends are the regular  $\frac{2}{1}$  warp-flush twill; the next end is a filling-flush end; the next 6 are the  $\frac{2}{1}$  twill; the next end is a filling-flush end; and the last 3 are the  $\frac{2}{1}$  twill.

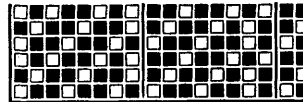


FIG. 13

Where the weaves are combined they cut on both sides of the single end, and in order to accomplish this it is necessary to have the end on one side of the single end of the filling flush exactly like the end on the other side. Thus, the seventh and ninth ends of the weave illustrated are the same, also the fourteenth and sixteenth, and also the second and eighteenth.

#### EXAMPLES FOR PRACTICE

1. Make a stripe design on 12 ends by reversing the 6-end twill  $\frac{3}{2}$ : have the weaves cut where they reverse.
2. Make a single-end stripe design on 20 ends, using the 4-end twill  $\frac{2}{1}$ .

3. Make a stripe design on 14 harnesses, using warp- and filling-flush satins; have the weaves cut where combined.
4. Make a stripe design on 20 ends, using the 5-end warp and filling satins repeated in the ends.
5. Give a harness draft complete on 24 ends that will give a stripe effect in the cloth when using the  $\frac{2}{3}$  twill for a chain draft.

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### CHECK-WEAVES

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#### COMBINATIONS OF EQUALLY FLUSH WEAVES

10. Check-weaves may be made in a variety of ways, many of these weaves having a twill or satin base. In many cases the figure on one part of the check will be found to be produced by the warp, while the figure on the other part will be produced by the filling. Check-weaves to a certain extent may be considered as simply extensions of stripe weaves. It has been explained how a stripe may be formed in the cloth by opposing one weave with another; if, after this is done, the weave should be extended in its picks, taking pains to have the picks oppose one another in the same way as the ends were opposed in the stripe weave, the resulting figure will form a check in the cloth.

11. Suppose, for example, that it is desired to make a check-weave with the regular equally flushed weave shown in Fig. 14 (a) as a base. First, it is necessary to form a stripe design from the regular twill. Fig. 14 (b) shows the stripe design formed from the regular twill shown in Fig. 14 (a). The formation of this weave agrees with the descriptions given, and the harness draft for it will be an angled draft. Next consider the stripe as two separate sections, that is, the first 6 ends will be one section and the last 6 ends will be another, after which extend each section in its picks, taking care to have the weaves cut in the picks the same as in the ends when forming the stripe. In other words, extend each section as if it were to form a stripe across the cloth instead of lengthwise. Fig. 14 (c)

shows the first 6 ends extended in this manner, while Fig. 14 (d) shows the last 6 ends extended. The weaves cut perfectly in their picks, since in both weaves the sixth pick opposes the seventh, and the first and last picks oppose each other. In actual practice the picks in each of the two sections of the weave, as shown in Fig. 14 (b), would be run up without separating the weaves; they have been separated here simply to make the process clearer. Therefore, the complete check-weave will be the weave shown in Fig. 14 (e), which is Fig. 14 (c) and (d) brought together.

An important point that should be noted in connection with this check is that the weave cuts all around; that is, the sixth pick opposes the seventh pick; the sixth end opposes the seventh end; and, further, the first and last picks, and also the first and last ends, oppose each other. This feature should be present in check-weaves formed in this manner.

The same harness draft that would be used in connection with the weave shown in Fig. 14 (b) would also be used for the weave shown in Fig. 14 (e). Therefore, in actual practice, when it is desired to change a stripe weave to a check, all that is necessary is simply to alter the chain draft to give the desired effect. With stripes formed on this principle, the size of the stripe can be enlarged to any desired extent by simply altering the drawing-in draft. The same rule holds good when dealing with checks formed in this manner, with the exception that in the latter case the chain draft must also

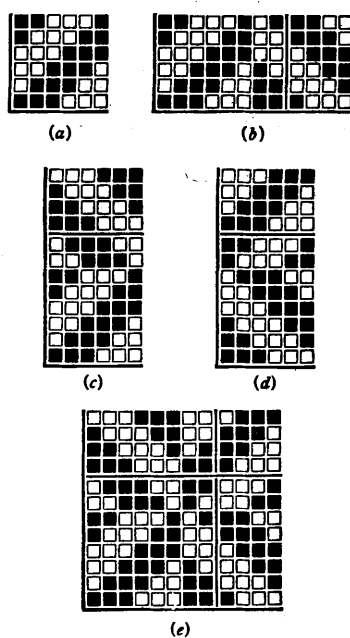


FIG. 14

be altered, that is, the size of the check may be increased as desired by changing the drawing-in draft and chain draft to suit the requirements. Fig. 15 illustrates a design formed by this method of enlarging a check-weave; it has been

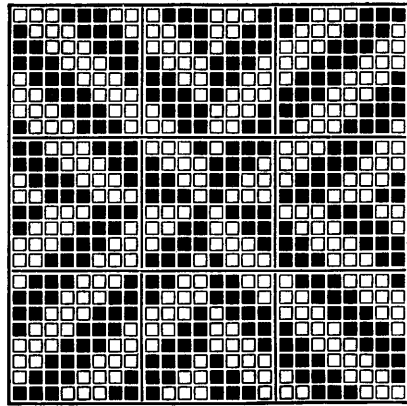


FIG. 15

formed by simply extending each section of Fig. 14 (e) in both ends and picks. Take, for example, the section occupying the lower left-hand corner in both Figs. 14 (e) and 15. Both of these weaves are the same, the only difference being that while in one case the weave occupies 6 ends and 6 picks, in the other it occupies 12 ends and 12 picks. The same has been done with each of the four sections, thus causing the new weave to occupy 24 ends and 24 picks, where it originally occupied but 12 ends and 12 picks. The weave shown in Fig. 14 (e) can be made on 6 harnesses, which is the same number on which Fig. 15 can be woven.

12. Stripes may be formed in a variety of ways, not only by equally flushed twills but also by opposing a warp-flush twill with a filling-flush twill. The same is equally true of checks and, consequently, a check-design may readily be formed from a stripe design that has been obtained by combining warp- and filling-flush twills.

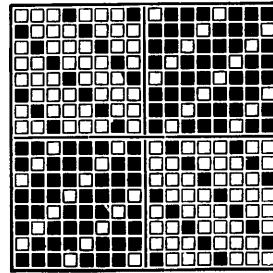


FIG. 16

Fig. 16 is an example of this type of check-designs. The first 8 picks of this design alone form a stripe design, obtained by combining the warp-flush twill  $\frac{3}{1}$  with the filling-flush twill  $\frac{1}{3}$ .

The next 8 picks are formed by opposing the warp-flush section with the filling-flush weave and the filling-flush section with the warp-flush weave. This weave cuts perfectly at all points.

13. Warp- and filling-satin weaves are often combined to form stripe weaves, and these also may be extended to check-weaves and made to cut at all points. Fig. 17 is an example of a cut check-weave made from warp and filling satins. When combining weaves of this class to form a check, the explanations given for stripe weaves made by combining satins should be carefully noted, especially with regard to the relation that the base of the warp satin should bear to the base of the filling satin in order to make the weaves cut at all points, and also with regard to starting the weaves on certain ends and picks for the same purpose. In Fig. 17, the eighth and ninth ends and the first and last ends, also the eighth and ninth picks and the first and last picks, cut perfectly, since in each case the warp and filling floats of one weave oppose the filling and warp floats of the other.

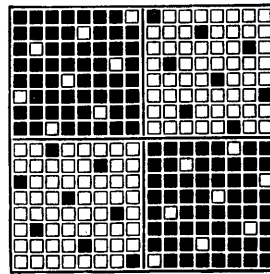


FIG. 17

It will be found advantageous to practice making these weaves, as well as all weaves that are explained in this Course, as it is only by constant practice that familiarity with the methods employed can be obtained. In making a check-weave, it is simply necessary to decide on the weave that is to form the base and run this weave up for as many ends and picks as desired. From this weave, form a stripe design by following the explanations given for stripes and afterwards extending the weave in its picks to form a check, always being careful, however, to see that the weaves cut at all points. Check-weaves constructed after the manner of Figs. 16 and 17 are known as **diaper weaves**.

## CHECKS FORMED BY REVERSING

14. Another method of forming checks is by means of what is termed **reversing**, or **transposing**, and consists of taking any simple weave as a base and combining it with a weave that contains filling floats where the original weave has warp floats and warp floats where the original has filling floats. The combination of these weaves will make a stripe from which a check may be formed by reversing or transposing the stripe design in the same manner as the original

weave was transposed to obtain the stripe.

To illustrate this method of forming checks, suppose that it is desired to form a check-weave using the weave shown in Fig. 18 (a) as a base. This figure occupies 5 ends and 5 picks; taking the next 5 ends and 5 picks across the design paper, fill in those squares that correspond to the squares left blank in the original figure, leaving blank those squares that were filled in in the original

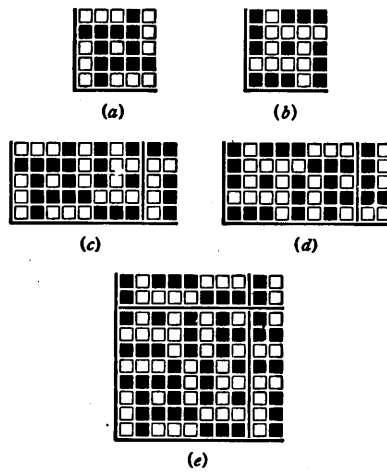


FIG. 18

figure. In order to make this somewhat plainer, the weave will be made from Fig. 18 (a), keeping the weaves separate, although in reality they should be combined when making the stripe design. Fig. 18 (b) shows the weave obtained by transposing the weave shown in Fig. 18 (a). In transposing a weave in this manner to form a stripe, the first end of the new weave is to be the reverse of the last end of the original weave; the second end of the new weave is to be the reverse of the next to the last end of the original; and so on.

Considering Fig. 18 (a) and (b), the last, or fifth, end of Fig. 18 (a) is lowered on the first pick, raised on the second



pick, and lowered on the third, fourth, and fifth picks. The first end of Fig. 18 (b) is exactly the reverse, since it is raised on those picks on which the fifth end of Fig. 18 (a) is lowered, and is lowered on those picks on which the fifth end is raised. The fourth end of Fig. 18 (a) is exactly the reverse of the second end of Fig. 18 (b), since on those picks on which one end is raised the other end is lowered, and also on those ends on which one end is lowered the other end is raised. The same is true with the third end of Fig. 18 (a) and the third end of Fig. 18 (b); with the second end of Fig. 18 (a) and the fourth end of Fig. 18 (b); with the first end of Fig. 18 (a) and the last end of Fig. 18 (b). Thus, if these two weaves were combined to form a stripe, they would be found to cut perfectly. Fig. 18 (c) shows the stripe weave formed in this manner.

It next becomes necessary to form a check-design from the stripe shown in Fig. 18 (c). In order to form this weave, the stripe must be extended in its picks by reversing the picks. This will be dealt with in the

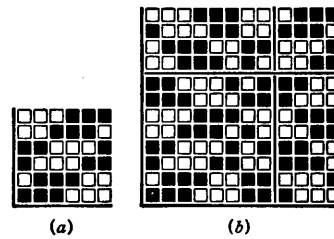


FIG. 19

same manner as when forming the stripe from the original weave. Fig. 18 (d) shows the weave formed from the stripe that must be combined with it to make the check. This weave is formed by reversing the picks of Fig. 18 (c) in the same manner as Fig. 18 (b) was formed by reversing the ends of Fig. 18 (a). Thus, the first pick of Fig. 18 (d) is the reverse of the fifth pick in Fig. 18 (c); the second pick of Fig. 18 (d) is the reverse of the fourth pick of Fig. 18 (c); the third pick of Fig. 18 (d) is the reverse of the third pick of Fig. 18 (c); and so on for all the picks.

By combining these two weaves, the check-design shown in Fig. 18 (e) is obtained, which cuts at all points. Fig. 19 (a) is another base from which to form a check-weave after the manner described, while Fig. 19 (b) shows the completed weave. This weave also cuts at all points—a feature that

is always desirable with these weaves. Check-weaves are produced by a variety of methods. It is not necessary always to have the different weaves that form the check cut perfectly, although much neater and clearer effects are produced when this is the case.

#### COMBINATIONS OF WEAVES OF DIFFERENT STRUCTURE

15. Another method of forming check-weaves is that of combining different weaves in such a manner that distinct effects will be formed in the cloth, so arranged that the whole will produce a check. Fig. 20 shows a check-weave formed in this manner. The whole figure may be divided into four parts; namely, the lower left-hand corner, the

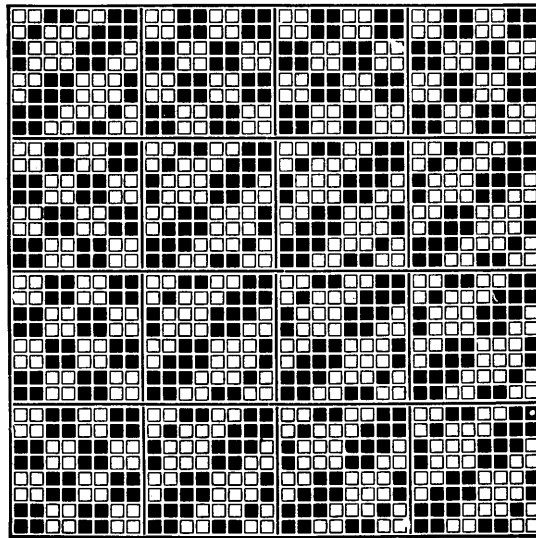


FIG. 20

lower right-hand corner, the upper left-hand corner, and the upper right-hand corner. The weave in the lower left-hand corner is the regular 4-end basket repeated twice in its ends and six times in its picks; the weave in the upper right-hand corner is the same, but instead of occupying the same number of ends and picks in this case, it is repeated

six times in its ends and twice in its picks. The weave in the upper left-hand corner is a fancy twill complete on 8 ends and 8 picks, while in the lower right-hand corner the same weave is repeated three times in both ends and picks. By combining these weaves in this manner, a distinct check

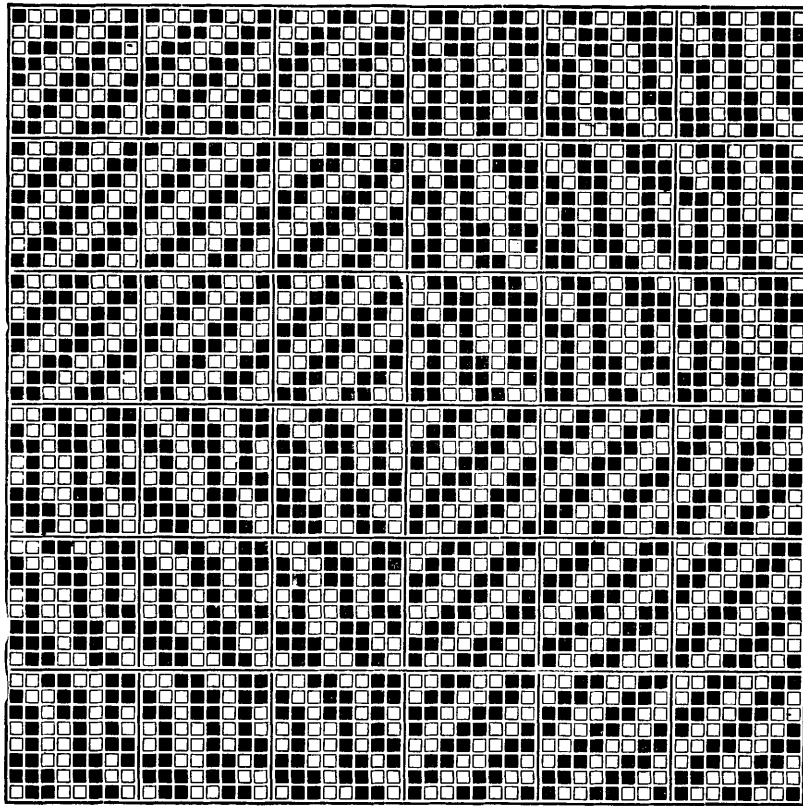


FIG. 21

effect is formed in the cloth, and they cut perfectly where joined. Although this weave occupies 32 ends and 32 picks, it is possible to draft it down to 16 harnesses.

Checks formed by combining different weaves in this manner are more difficult to construct than those previously

described, on account of the difficulty in finding weaves of different constructions that will cut perfectly. In all cases, perfect cuts are not obtainable in this class of checks, but the joining places should always be made as perfect as possible and the weaves should be combined in such a manner that the floats of warp or filling will not be any longer than possible.

**16.** Check-weaves are sometimes formed by combining twill weaves that form different angles in the cloth. Fig. 21 is an example of this class of weaves, in which the check is formed by combining a cassimere twill that makes an angle of  $45^\circ$  with a fancy upright twill complete on 8 ends and 8 picks. The weave is complete on 48 ends and 48 picks, but can be drawn and woven on 16 harnesses. Check-weaves made on this principle can very rarely be made to cut perfectly all around, as is the case with Fig. 21.

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## WEAVES RESULTING FROM OTHER COMBINATIONS

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### WEAVES FORMED FROM MOTIVES

**17.** When weaves are to be combined so as to produce a more or less elaborate pattern instead of a simple arrangement as in stripes and checks, the order or method of their arrangement is usually indicated by a *motive*. A **motive** as considered in this connection is a weave figure that shows the arrangement of the separate weaves in the combination weave. It may be defined as a plan, or skeleton, of the desired pattern that may be enlarged into an extensive design; the motive simply shows the general arrangement of the pattern, but gives no idea of the ultimate extent of the resultant combination weave nor of what weaves are to be combined. In using a motive as a plan for combining weaves, the filled squares of the motive are assumed to represent one of the weaves to be combined and the blank

squares another weave, the combination weave being made of any desired size by extending the motive.

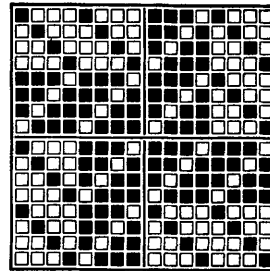
For instance, Fig. 22 (a) shows a motive from which it is desired to produce a design that will be complete on 16 ends and 16 picks. The motive occupies 4 ends and 4 picks, and the filled-in squares and the blank squares of the motive represent two distinct weaves. The first item to be determined when constructing a weave from a motive is the number of ends and picks occupied by the weave that is represented by each square of the motive. Thus, since the constructed weave is to occupy 16 ends and 16 picks, while the motive occupies 4 ends and 4 picks, each square of the motive must represent 4 ends and 4 picks of the constructed weave ( $16 \div 4 = 4$ ), or, in other words, the weave represented by each square of the motive must occupy exactly 4 ends and 4 picks, in order to make the constructed weave complete on 16 ends and 16 picks.

It will be assumed that each blank square of the motive represents the filling crow twill  $\frac{1}{3}$ , while each filled-in square of the motive represents the warp crow twill  $\frac{3}{1}$ . It now remains to combine these

weaves in such a manner that they will occupy the same relative positions in the constructed weave that the filled-in and blank squares occupy in the motive. Fig. 22 (b) shows the weave made in this manner from the motive shown in Fig. 22 (a). Comparing these views, the square in the lower left-hand corner of the motive is blank; therefore, the first 4 ends and 4 picks of Fig. 22 (b) are composed of the filling crow twill. The next square of the motive counting across the page is marked; therefore, the next 4 ends and 4 picks are composed of the warp crow twill. This method is continued throughout the weave, and the effect when produced in the cloth will be similar to the motive shown in Fig. 22 (a).



(a)



(b)

FIG. 22

## EXAMPLES FOR PRACTICE

1. Make a check-weave on 16 ends and 16 picks with the  $\frac{4}{4}$  twill.
2. Enlarge the weave given in answer to question 1 so that it will occupy 32 ends and 32 picks.
3. Form a check-weave with a 5-end warp-flush and a 5-end filling-flush satin.
4. Form a check-weave by reversing weave 32, *Glossary of Weaves*.
5. Considering weave 200, *Glossary of Weaves*, as a motive, construct a weave on 32 ends and 32 picks, using the filling-flush crow twill weave for the filled-in squares of the motive and the warp-flush crow twill for the blank squares.

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**FOUR-CHANGE METHOD OF CONSTRUCTING  
NEW WEAVES**

**18.** New and novel weaves may be constructed from simple foundation weaves by means of what is known as the **four-change method**. Some of the weaves thus obtained will be found to be granite weaves, while others partake of the nature of small fancy twills. In constructing a new weave by four changes, a simple weave of regular structure, such as the cassimere twill, the crow weaves, 6-, 7-, or 8-end twills, etc., should be selected as a foundation. It is also important to select a weave for a base that repeats on the same number of ends as picks. The new weave obtained will always be complete on twice as many ends and picks as the foundation weave; thus, if a weave is used for a base that is complete on 6 ends and 6 picks, the derived weave will occupy 12 ends and 12 picks.

To illustrate this method of originating weaves, suppose that it is desired to construct a new weave from the cassimere twill, Fig. 23 (*a*). Since the cassimere weave is complete on 4 ends and 4 picks, the new weave in this case will occupy 8 ends and 8 picks. The first step is to place the foundation weave on design paper in such a manner that each end of the weave is separated from the next by 1 blank end, and each

pick from the next by 1 blank pick, as shown by the 1's in Fig. 23 (b). The design paper is then turned one-quarter way around to the right, that is, so that the last end will be in the position of, and considered as, the first pick, and the same weave placed on the design in exactly the same relative position as in the first instance, as shown by the 2's in Fig. 23 (c). The design paper is then turned a quarter way around again, that is, so that the last pick in Fig. 23 (b) will occupy the position of, and be considered as, the first pick, and the weave again placed on the design in exactly the same manner, as shown by the 3's in Fig. 23 (d). The design

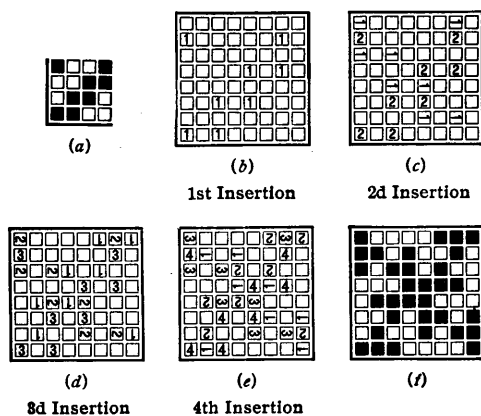


FIG. 23

paper is then turned in the same direction another quarter revolution, so that the first end will occupy the position of, and be considered as, the first pick, and the same weave inserted for the fourth and final time, as shown by the 4's in Fig. 23 (e). In Fig. 23 (b), (c), (d), and (e), numbers are used instead of filled squares, so that each insertion of Fig. 23 (a) may be clearly indicated in its proper relative position. Considering each number in Fig. 23 (e) to represent a riser, or filled square, the new weave as shown in Fig. 23 (f) will result; that is, Fig. 23 (f) shows every numbered square in Fig. 23 (e) as a filled square, and is the completed derived weave.

Each time a quarter revolution is given to the design paper, the square in the lower left-hand corner is considered

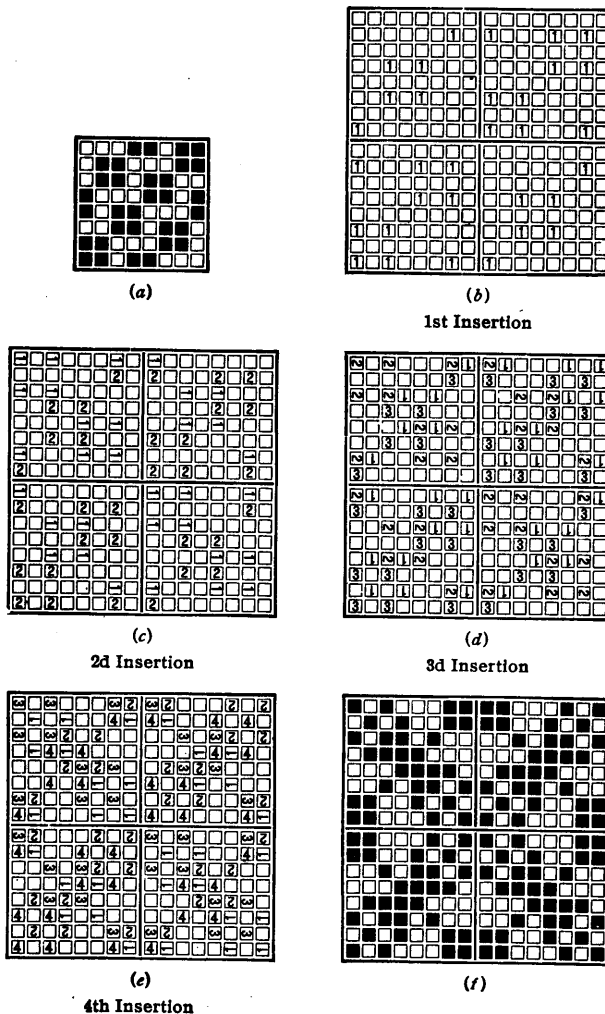


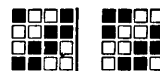
FIG. 24

as the square representing the crossing of the first end and first pick, and the weave is placed accordingly on the design

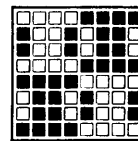


paper in its proper position. If this is done, and the weave properly inserted each time so that each end and pick is separated by one other end and pick, it will be found that no two marks or risers will fall on the same square, but each will find a blank square of its own in which to be placed. If an equally flushed weave is used as a foundation weave, the derived weave will also show an equal amount of warp and filling on the face, and if the foundation weave is unequally flushed, the derived weave will show the warp and filling on the face in the same proportion as the foundation weave.

19. As a further illustration of this method of originating weaves, suppose it is desired to make a new weave with the 8-end twilled basket, Fig. 24 (a), as a foundation weave. Since this weave is complete on 8 ends and 8 picks, the new weave obtained from it will occupy 16 ends and 16 picks. Fig. 24 (b) shows the foundation weave opened out and placed on the design paper in the proper manner. Fig. 24 (c) shows the weave again inserted in the design but with the last end considered as the first pick. Fig. 24 (d) shows the weave inserted the third time, with the last pick considered as the first, while Fig. 24 (e) shows the weave inserted for the fourth time, with the first end considered as the first pick, which completes the weave. Fig. 24 (b), (c), (d), and (e) are not shown in the same relative position, since, as indicated by the position of the original weave in each figure, the design has been turned one-quarter way around for each insertion of the weave. Fig. 24 (f) shows the completed weave, which is a novel fancy diamond effect.



(a) (b)

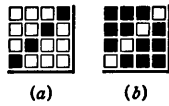


(c)

FIG. 25

20. In many cases entirely different effects are produced by using the same foundation weave, but, when inserting it the second and fourth times, commencing on a different pick, so that the relation of the weave to the first and third insertions is changed. For instance, take the effect formed with the cassimere twill as a foundation weave. If this weave

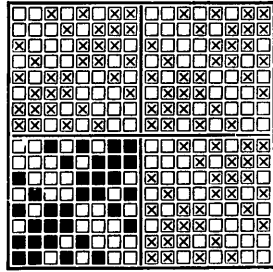
is inserted as shown in Fig. 25 (a) the first time, then turned one-quarter way around and the same weave inserted but commenced on the second pick, as shown in Fig. 25 (b), then turned again and Fig. 25 (a) inserted, and finally turned and Fig. 25 (b) inserted, the weave shown in Fig. 25 (c) will be obtained. This effect is entirely different from that shown in Fig. 23 (f), and yet is produced from the



(a) (b)

same foundation weave, the relation of the insertions of the foundation weave being changed.

New weaves may also be originated by combining warp- and filling-flush weaves. For instance, suppose that it is desired to produce a new weave using the filling-flush crow weave, Fig. 26 (a), and the warp-flush crow weave, Fig. 26 (b), as foundation weaves. First, the filling-flush weave is opened out and placed on the design paper, the weave in this case occupying 8 ends and 8 picks.



(c)

FIG. 26

The design paper is then turned

one-quarter way around and the warp-flush weave inserted, then another quarter revolution and the filling-flush weave inserted again, and finally another quarter revolution and the warp-flush weave inserted, which results in the weave shown in Fig. 26 (c). The weave obtained in this manner may also be varied by commencing one of the weaves on another pick. Fig. 26 (c) shows two repeats both in the warp and filling.

#### EXAMPLES FOR PRACTICE

1. Originate a new weave with the  $\frac{2}{1}\frac{1}{2}$  regular twill as a foundation weave.
2. Originate a new weave with the  $\frac{2}{3}$  regular twill as a foundation weave.
3. Originate a new weave with the  $\frac{3}{2}\frac{2}{1}$  regular twill as a foundation weave.

4. Originate a new weave with the warp- and filling-flush broken  
crow weaves as foundation weaves.
5. Originate a new weave with the warp- and filling-flush 5-end  
satin weaves as foundation weaves.