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DESIGNING AND FABRIC STRUCTURE.

COMBINING TWO FOUNDATION WEAVES, OF UNEVEN REPEAT, IN THE FORMATION OF LARGE EFFECT WEAVES.

The object aimed at in designing these weaves is to produce new weaves of large repeats, Jacquard effects as we might call them, but which, on account of their foundation weaves, only call for few harnesses for their execution on the loom.

For foundation, we may select weaves from most any system, twills, broken twills, skip twills, cork-screws, granite weaves, etc., in fact, affairs not considered by themselves proper weaves, can, in this instance, be used as foundations for these combination weaves.

The principle of constructing these weaves is to select two foundation weaves, each of a different repeat; next draft alternately one warp thread from one weave and one warp thread from the other weave, and continue drafting in this manner until both foundation weaves are at the same time used up; not until that moment is the repeat for the new weave obtained.

Provided we would, in this manner, combine two weaves of an equal repeat, such a combination would produce a new weave twice the width of either foundation weave, and not the large effect weave we desire. For example, two 8-harness weaves combined 1:1, warp-ways, equal a new weave repeating on 16 warp threads and 8 picks.

However, this is changed if dealing with foundation weaves of a different repeat towards each other, and is best explained by means of a few calculations.

For instance, let us consider the combination of two weaves, repeating respectively on 3 warp threads and 3 picks, and 4 warp threads and 4 picks. Using light face numerals for calling the warp threads of the 3-harness weave, and black face numerals for those of the 4-harness weave, we get the following combination:

1, 1; 2, 2; 3, 3; 1, 4; 2, 1; 3, 2; 1, 3; 2, 4; 3, 1; 1, 2; 2, 3; 3, 4; showing us that it takes

12 warp threads of the 3-harness weave, *i. e.*, 4 repeats of said 3-harness weave, and

12 warp threads of the 4-harness weave, *i. e.*, 3 repeats of said 4-harness weave for the

24 warp threads, repeat of the new weave.

Filling-ways, the repeat of the weave is 12 picks, since 12 is the lowest common multiple of 3 and 4, the respective repeats of the two foundation weaves.

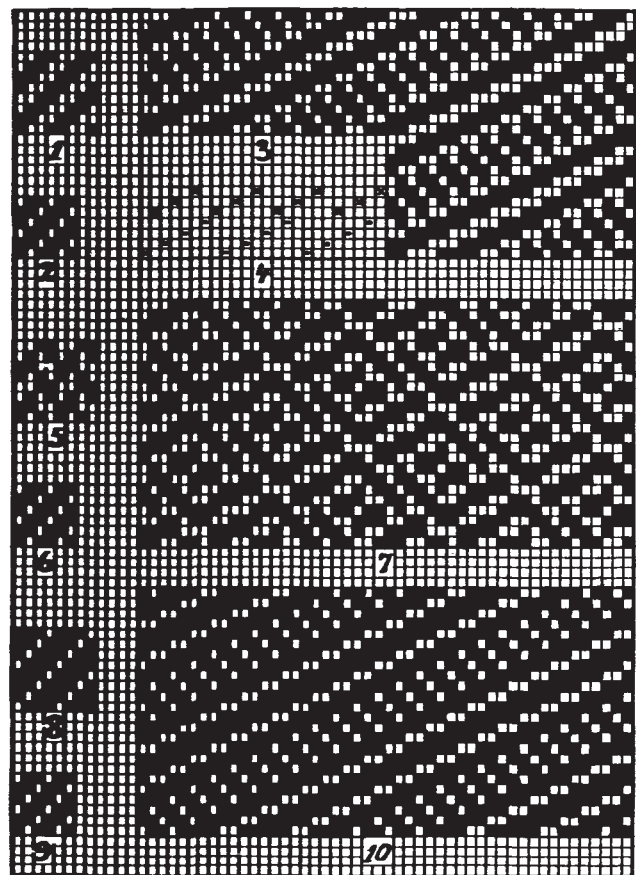
This feature will show that the new combination weave calls for twice as large a repeat for the warp threads, compared to its repeat in the filling.

Combining, in this manner, two weaves, repeating respectively on 3 warp threads and 3 picks, and 5 warp threads and 5 picks, for a new combination weave, will give us:

3 and 5 call for 15 as their lowest common multiple, and

15 × 2 (15 threads drafted from each weave) = 30 warp threads, repeat of combination weave, with 15 picks repeat filling-ways (no drafting filling-ways being done).

In the same manner, the combination of a 5 by 5 and a 7 by 7 foundation weave will result in a new weave, repeating on 70 warp threads and 35 picks.



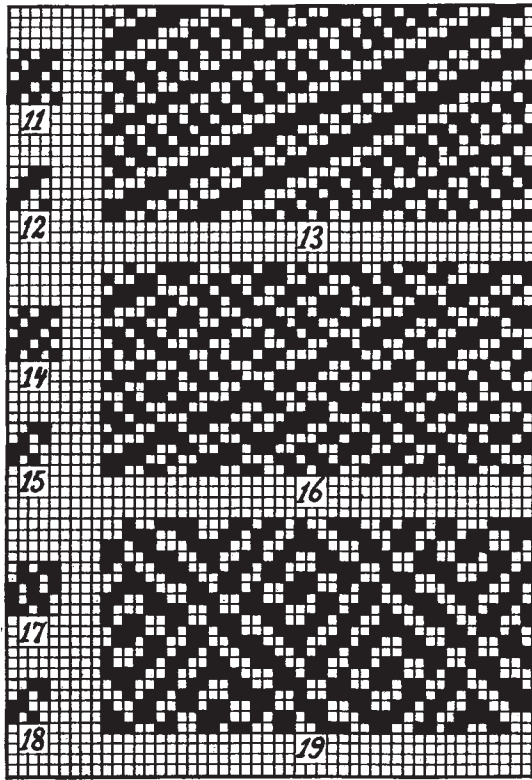
Combining an 8 by 8 and a 9 by 9 foundation weave, will result in a new weave repeating on 144 warp threads and 72 picks, etc., etc.

NUMBER OF HARNESSSES REQUIRED FOR NEW WEAVE.

As mentioned before, *double drafting* of the foundation weaves is used for producing the new weave. *i. e.*, each foundation weave is simply drawn on its own set of harnesses.

Thus with the combination of a 3 and 4-harness weave, the number of harnesses required for the new weave are 3 + 4 = 7 harnesses, although the new weave in itself does not repeat until 24 warp threads and 12 picks; the harness chain required calls for 7 harnesses and 12 bars for its repeat.

In the same manner, the combination of a 3 and 5-harness weave calls for 8 harnesses; 4 and 5-harness weave for 9 harnesses, etc.



However, when dealing with any new weave, we must, from a practical point, consider also its disadvantages as well as its advantages, and if there are any disadvantages, see how to remedy the same, or at least minimize them. In the present system of weaves, we find the disadvantage to consist in the chance of a difference of interlacing of the warp threads, resulting in a varying take-up for the warp. By this we mean, when dealing, for example, with a 3 by 3 and 4 by 4 foundation weave, it is only a natural consequence in the combination of these weaves, that the interlacing of the warp threads of the 3-harness weave with the filling, will take up more than the interlacing of the warp threads of the 4-harness weave. This difference, although only very little, and besides well balanced all over the width of the fabric, however exists, and consequently the greatest of care must be exercised when selecting foundation weaves, so as not to make this difference in the take-up too great, a feature, which when necessary, can only be remedied by using two beams, *i. e.*, one beam for carrying the warp threads for the one weave, the other carrying the warp threads for the second weave.

The nature of the yarn used in the construction of the fabric will always influence any variations in the take-up between the two foundation weaves, some yarns permitting certain combinations which others will not. For instance, with dress goods or light textured suitings, a careful selection of foundation weaves will make little if any trouble in the loom, whereas the same weave, if used for high textured worsted suit-

ings may not work as well; again if the material used in the manufacture of the yarn is of an elastic nature, *i. e.*, the thread will give, stretch, any reasonable difference in take-up between the two foundation weaves will pass, which in connection with a harsh, hard twisted warp, may not work as well in the loom.

We will now explain subject by means of a few practical examples:

Fig. 1 is the $\frac{2}{2}$ 4-harness regular twill.

Fig. 2 is the $\frac{2}{1}$ 3-harness regular twill.

Fig. 3 shows us the combination of weaves Figs. 1 and 2, combined by taking alternately one thread from one weave and one from the other, as indicated below the weave by draft Fig. 4, and where the 4-harness twill is indicated by means of *dot* type, and the 3-harness twill by means of *cross* type, clearly showing that the 4-harness twill has to be drawn three times over, the 3-harness twill four times over, until one repeat for combination weave Fig. 3 is obtained, the latter repeating on 24 warp threads and 12 picks.

Fig. 5 is the 4-harness, even sided, broken twill.

Fig. 6 is the $\frac{2}{1}$ 3-harness twill.

Fig. 7 shows us the combination of weaves Figs. 5 and 6, drafting 1:1; repeat 24 warp threads and 12 picks.

Fig. 8 is the $\frac{3}{1}$ 4-harness twill.

Fig. 9 is the $\frac{2}{1}$ 3-harness twill, and

Fig. 10 is the combination of weaves Figs. 8 and 9, 1:1, repeating on 24 warp threads and 12 picks.

Fig. 11 is the $\frac{2}{1} \frac{1}{1}$ 5-harness regular twill.

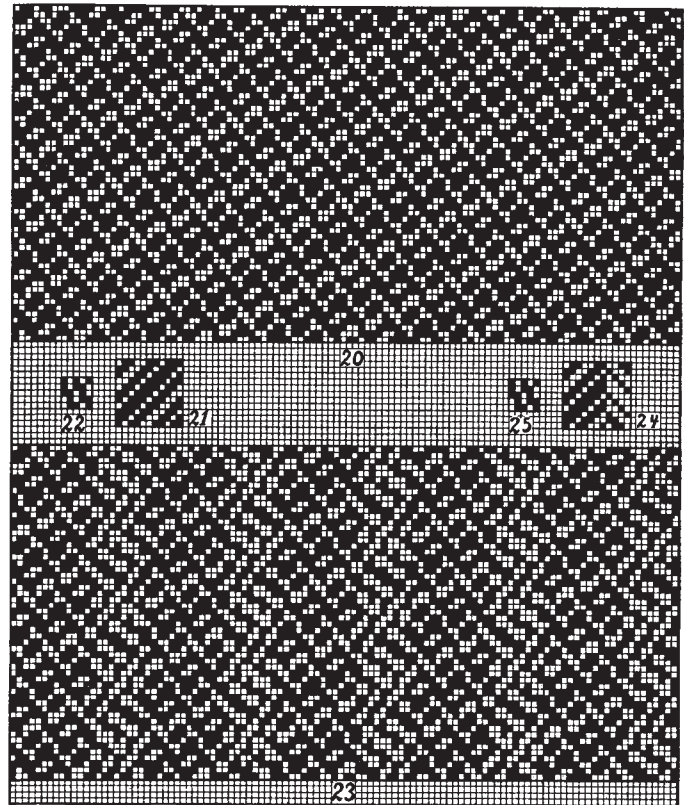


Fig. 12 is the $\frac{2}{2}$ 4-harness regular twill.

Fig. 13 shows us the combination of weaves Figs. 11 and 12, calling for $(5 \times 4 \times 2)$ 40 warp threads and 20 picks for its repeat.

Fig. 14 is the $\frac{2}{1}\frac{1}{1}$ 5-harness twill.

Fig. 15 is the 4-harness, even sided, broken twill.

Fig. 16 is the combination of Figs. 14 and 15, 1:1, repeating on 40 warp threads and 20 picks.

Fig. 17 shows us the 5-harness corkscrew.

Fig. 18 shows us the 4-harness, even sided, broken twill, and

Fig. 19 the combination of corkscrew Fig. 17 and broken twill Fig. 18, 1:1, repeating on 40 warp threads and 20 picks.

Fig. 20 shows us one of these combination weaves of a somewhat large repeat, 110 warp threads and 55 picks, being the result of combining 1:1.

Fig. 21 the $\frac{3}{1}\frac{2}{2}\frac{2}{1}$ 11-harness regular twill with the 5-harness corkscrew shown in Fig. 22.

Fig. 20 calls for its execution on the loom for (11 + 5) 16-harness, double-draw.

Fig. 23 shows us another one of these large combination weaves, showing a striped effect, the result of combining warp and filling in one of the foundation weaves, see Fig. 24. The latter repeats on 11 warp threads and 11 picks, and is used 1:1, in connection with the 5-harness corkscrew, Fig. 25, as the foundation for the new large effect weave Fig. 23. The same repeats on 110 warp threads and 55 picks, calling for (11 + 5) 16-harness, double-draw, for its execution on the loom.

FABRIC ANALYSIS.

(Continued from page 32.)

1 SYSTEM WARP 2 SYSTEMS FILLING.

These are picked-out in the same manner as single cloth samples, picking always the filling out of the warp. Close attention must be paid during picking-out to the serial succession of these two systems of fillings. If in the picking-out of such a pattern it should happen that the back pick has been recorded, and drawn out of the sample before the proper face pick had been taken out, the result, if not noticed, then will be a wrong weave, which before being used, must be corrected. As soon as you see such an error, during picking-out the sample, correct it at once, or better start picking-out over again. If you should fail to record a pick and the pick is pulled out before you noticed it, the same as with any other sample, leave a horizontal row of squares empty, and insert interlacing by theory, after repeat of weave for the sample is obtained.

The fundamental rules of weave formation, to be observed in the construction of this system of weaves, will greatly assist you here in removing difficulties, and when by knowing and adhering to these rules, it is very easy to correct a stitching or misplacement of picks, which has been marked incorrectly, a feature readily explained in connection with diagrams Figs. 7 and 8, and of which Fig. 7 shows an arrangement in which the back pick has been taken out before the proper face pick, and was so recorded on the point paper, whereas in diagram Fig. 8 the corresponding picks have always been taken out in proper rotation.

In the construction of weaves of this kind, the following rules must be always observed: "Stitch

your back filling to your face structure with a warp thread which is down in the face pick preceding and following this backing pick; at the same time distribute this stitching, as good as possible, over all the repeat of the warp threads, i. e., use them as uniformly as possible for stitching said back filling."

Weave Fig. 8, in order to give the face of the fabric a close texture, shows the ratio of the face to the back picks to be 2 : 1, and which is the arrange-

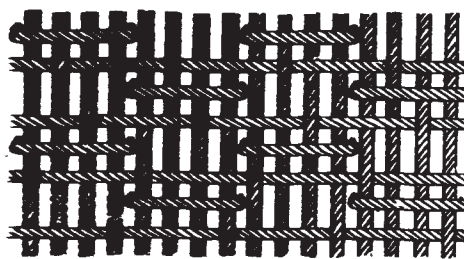
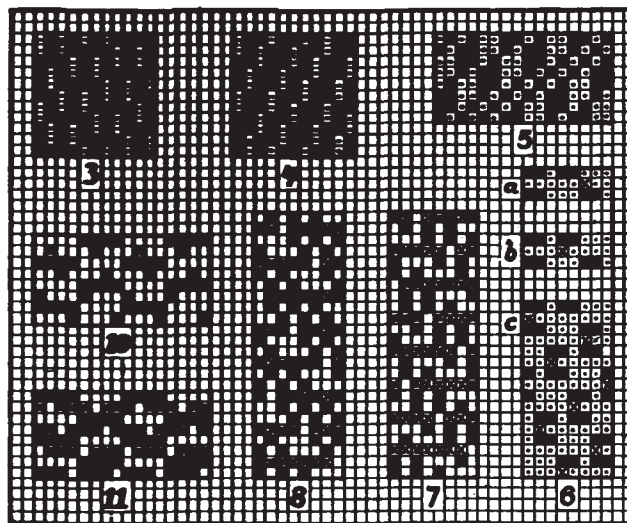


Fig. 9.

ment most frequently met with in connection with these fabric structures. Rules and explanations given, however, will at the same time show, how to proceed if dealing with the arrangement of 1 pick face to alternate with 1 pick back. They are identical, hence no further explanation required.



2 SYSTEMS WARP 2 SYSTEMS FILLING.

This fabric structure is technically known as *double cloth*, and comprises the bulk of our hardest sample to pick out. It can only be mastered after being thoroughly familiar with the fabric structures dealt with until now, since it comprises all rules and explanations thus far given. The experienced designer will, as a rule, handle these fabrics minus picking-out, or at the most, take from one end of the fabric, its lower structure away, ascertain proportion of face and back for warp and filling, ascertain face weave and in turn construct the double cloth weave required, by practical experience gained in his vocation.

Again, there may be samples met with, where he as well as the less experienced, will have to resort to picking-out the sample after the single cloth procedure. In that case, be careful to notice how the combining of