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A STUDY IN WEAVE FORMATION.

COMBINATION WEAVES.

As the name indicates, this refers to fancy weaves the result of the combination of two or three (sometimes more) different foundation weaves or their derivatives, like for example: Twills and Granites, Satins and Diagonals, Baskets and Broken Twills, Different Granites, Broken Twills and Granites, Different Twills, etc. This will indicate to us that there are a great many of these combination weaves that can be designed.

However, not every two or three weaves can be combined in this way. Considered from a practical point of view, *i. e.,* in the finished fabric, weaves thus combined must be adapted for this work. They must have corresponding repeats, or one repeat to be a multiple of the other, again their amount of interlacing in a certain number of threads must somewhat correspond, so that the combination weave produces a balanced effect on the face of the finished fabric. Weaves must be selected which will take-up (about) uniformly, both in weaving and finishing, more particularly when dealing with woolen and worsted fabrics; cotton, linen and silk will make less trouble.

Care must be exercised at the joining of the weaves so that no excessive floats result, both warp and filling ways. This explains another reason why not every kind of weaves can be combined and produce a perfect face in the resulting fabric.

With reference to the arrangement of the combination we find: (*a*) Stripes, (*b*) Diagonals, (*c*) Checks and (*d*) Fancy Effects.

Stripe Effects.

Weave Fig. 1 is given to explain subject, showing the combination of the 5-harness satin, warp effect (see *cross* type) and the 5 by 10 diagonal (see *full* type). The amount of interlacing in both weaves is balanced, *i. e.,* in 10 picks satin every warp-thread interlaces $\frac{4}{1}\frac{1}{1}$ four times and which is the same with the corresponding 10 picks of the diagonal and when every warp-thread interlaces $\frac{5}{2}\frac{1}{2}$ also four times, insuring an equal take-up to every warp-thread in the loom and in turn a perfect face structure in the finished fabric, although the general appearance of the effect of the two weaves in the finished fabric differs vastly.

The arrangement of the two weaves is:

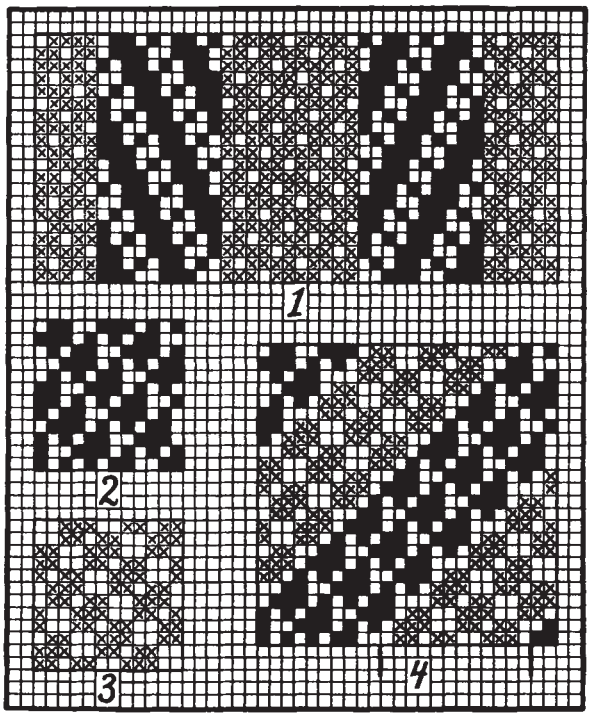
11 warp-threads satin
10 " " diagonal \
11 " " satin
10 " " diagonal /

42 warp-threads and 10 picks, repeat of combination weave, and which, if so desired, can be woven on 10-harness, using 5 for the satin and 5 for the diagonal.

Diagonal Effects.

Weaves Figs. 2, 3 and 4 are given to explain subject, and of which the first two are the foundation weaves and Fig. 4 the combination diagonal.

Weaves Figs. 2 and 3 are two granite weaves, each repeating on 12 by 12. Every warp-thread in these two weaves interlaces alike, *viz.:* Weave Fig. 2 $\frac{3}{1}\frac{3}{3}\frac{1}{1}$ and Weave Fig. 3 $\frac{2}{1}\frac{2}{2}\frac{3}{2}$ *i. e.,* every warp-thread interlaces six times in the repeat of 12 picks. Each weave is shown in different type so as to clearly show their combination in weave Fig. 4, and where



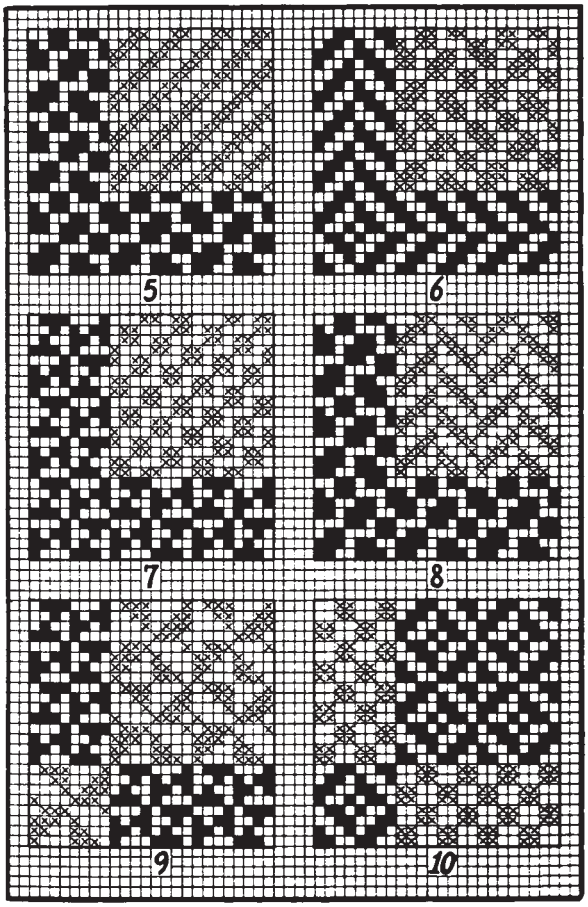
each granite calls for 12 warp-threads, transposed in a twill shape. Weave Fig. 2 in connection with pick 1 in weave Fig. 4 (see *full* type) calls for warp-threads 1 to 10 and 23, 24; weave Fig. 3 (see *cross* type) claims warp-threads 11 to 22 for its first pick, as shown by dashes below the weave.

Check Effects.

Weaves Figs. 5 to 10 are given to illustrate subject. Two different weaves are used in the construction of these combination weaves. Small effects only are shown, so as to bring illustrations within compass of column. For larger effects draw each individual weave once, twice or more times over before using its mate weave, resulting in producing larger designs. To more clearly explain the construction of these combination weaves each of the two foundation weaves is shown in different type.

Weave Fig. 5, by its two kinds of type, illustrates the construction of a check effect, showing by *cross* type a check of 16 warp-threads and 16 picks interlaced with the 4-harness even sided twill, the same be-

ing over-checked (see *full* type) with 8 warp-threads and 8 picks of an 8 x 8 granite. Repeat of weave 24 by 24; lowest number of harness possible to use is 16.



In weave Fig. 6, we find a square of 16 warp-threads and 16 picks (see *cross* type) interlaced with and 8 x 8 granite weave, over-checked (see *full* type) with 8 warp-threads and 8 picks of broken twill. The 8 warp-threads are broken warp ways, the 8 picks filling ways, both forming where they meet an 8 x 8 diamond point, *i. e.*, a broken twill—broken warp and filling ways. Repeat of weave 24 by 24; use 16-harness fancy draw.

Weave Fig. 7 shows the combination of two different granites, one (see *cross* type) being used for the centre of the check, the other (see *full* type) being used for the over-checking. Repeat of weave 24 by 24; 16-harness fancy draw.

The centre portion of weave Fig. 8 is interlaced (see *cross* type) with 16 warp-threads and 16 picks of 4-harness broken twill, broken every four warp-threads. An 8 x 8 granite (see *full* type) is used for the over-checking. Repeat of the combination weave is 24 by 24, calling for 16-harness fancy draw.

In some instances the over-checking of the pattern is done by the checker-board principle in place of the over-checking thus far illustrated, one of the foundation weaves then forming two squares, a large and a small one, the other foundation weave being used in connection with the two rectangular surfaces. Weaves Figs. 9 and 10 illustrate the subject.

Weave Fig. 9 shows the combination of two granite weaves, one used for the two square surfaces, the other for the two rectangular surfaces.

Weave Fig. 10 shows the 4-harness broken twill (broken every four threads, both warp and filling ways) used for the two squares (see *full* type) using the 4-harness basket weave for interlacing warp-threads and picks in the two rectangular surfaces. Repeat of both combination weaves is 24 warp-threads and 24 picks, calling in connection with either weave for a 16-harness fancy draw.

Weaves Figs. 11, 12, 13 and 14 show larger effects, each weave requiring 24-harness fancy draw for its execution in the loom.

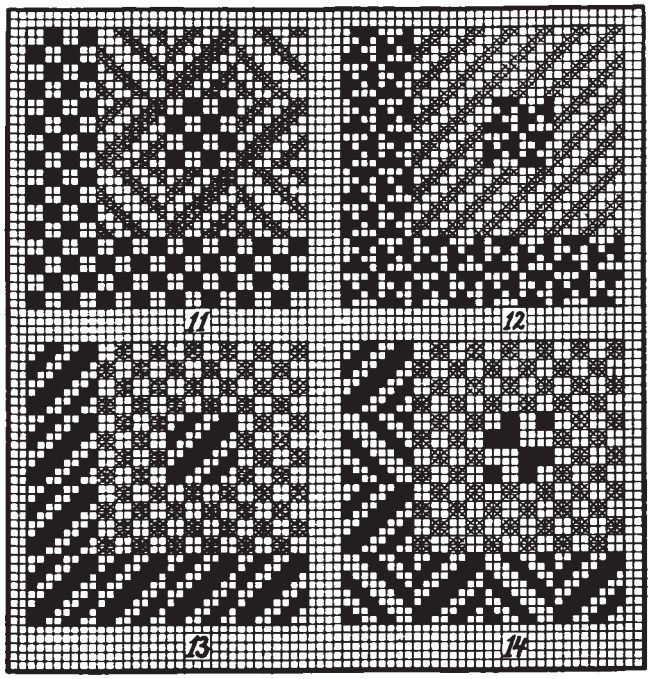
Three changes of effects compared to the two changes in the previous six examples given are used in the new four weaves. Each effect thus shown can be reproduced as a unit given, or the unit may be drawn two or more times over, the duplicating filling ways being done by the pattern chain, in turn producing larger effects. The affair will not require any special design, simply giving directions for the proper drawing-in draft to use, *i. e.*, indicating to the drawer-in how often to draw each effect (unit) over, before drawing-in the next, having the chain builder do the same with reference to extending the picks in each effect (unit) to the required number of bars, corresponding to directions given to the drawer-in.

Three effects in every instance will result, a centre effect and two check effects, one over-checking the other.

Weave Fig. 11 has for its centre as well as the over-check the 4-harness basket weave, using a broken twill (broken every 8 threads and 8 picks) for the centre check. The latter is in this instance produced by means of an uneven sided 8-harness twill, filling effect of the weave exchanging with its warp effect.

Weave Fig. 12 shows us an 8 by 8 granite used for the centre effect, as well as the over-check, the centre check interlacing with the 4-harness even sided twill.

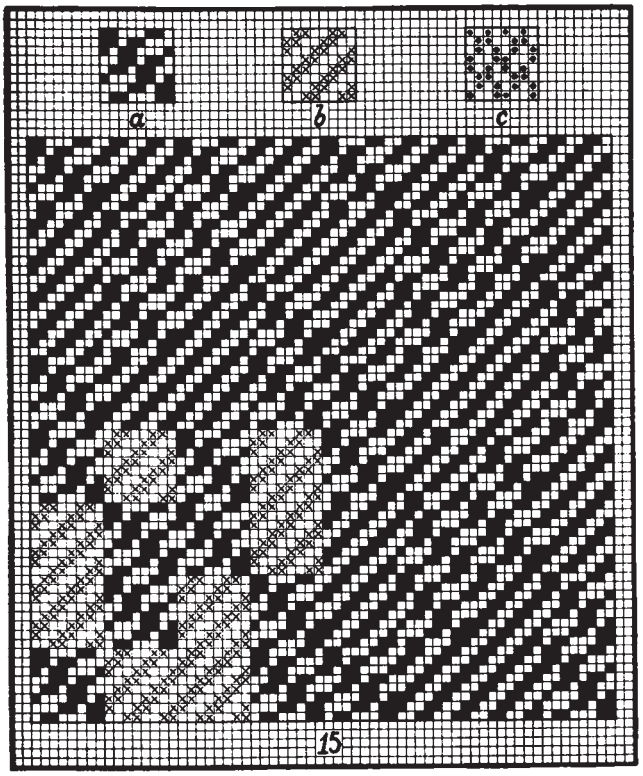
Weave Fig. 13 shows us a plain twill used for the centre, but which, provided the multiple of the portion



of this weave given is duplicated, triplicated, etc., both warp and filling ways, it will change this plain twill into a skip twill. The centre check is interlacing

on the 4-harness basket, the over-check on the skip twill previously referred to, using the centre weave for its foundation.

Weave Fig. 14 has a two threaded granite for its centre, repeating on 8 warp-threads and 8 picks; the 4-harness basket is used for its centre check, and an 8-harness broken twill (broken warp and filling ways) for the over-check.



Fancy Effects.

Weave Fig. 15 is given to illustrate the subject, showing what we have to call a Jacquard effect, repeating on 32 warp-threads and 32 picks, showing at the same time how to proceed to produce larger effects if so desired. Two repeats each way are given, showing the combination of an 8 x 8 granite with that of a 4-harness even sided twill.

Diagram *a* shows one repeat of the *granite* weave, Diagram *b* two repeats of the *twill*, and Diagram *c* the *motive* for distributing granite and twill for the combination weave shown in Fig. 15, using for every square shown in *full* type in motive 8 warp-threads and 8 picks of the granite, vice versa 8 warp-threads and 8 picks of twill used for every empty square in motive.

The same as we used one unit of the granite and two of the twill for each square in the motive, two or more repeats of the granite can be used in connection with four, eight or more repeats of the twill without departing from the principle of constructing the combination weave, the effect produced in the fabric becoming larger, this being the only difference. The drawer-in will attend to the enlargement of the design warp ways, the chain builder to that filling ways.

In order to simplify matters, we have shown the granite and twill effect in different type in the first repeat of weave Fig. 15, its lower left hand corner; the remaining three repeats of the weave are shown in one kind of type only, to convey a clear idea of the resulting weave in the fabric.

ASCERTAINING THE VALUE OF STARCH PASTES.

The buying of a proper starch is of the greatest of importance to the management of the mill since upon its proper selection, quantity and quality of production in the weaveroom, as well as the proper finish for the goods in the market, depends.

Different sorts of starches are employed in the sizing of yarns and the finishing of fabrics, their values depending upon the degree of viscosity of the starch.

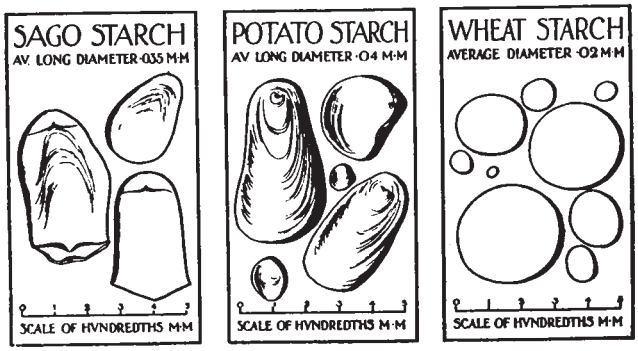
Numerous methods for determining the value of a starch in this respect have been proposed, but the best should be that which determines the viscosity in conditions approaching as near as possible ordinary working conditions.

It has been proposed to determine the resistance to support a given weight, according to the time it takes this weight to force itself into the pasty mass.

Another suggestion has been that a brass disc should be suspended by a thread in the paste for a period of twenty hours, the paste at the normal temperature, and then measuring the power required to pull out the disc.

A few years ago another authority proposed a method based on making a paste with a solution of caustic soda and determining the viscosity by the Redwood viscosimeter. Unfortunately, however, none of these methods complies with the requirements of ordinary working conditions in sizing or in finishing.

In view of this state of affairs it is of interest to give details of a proposal recently made by a member of our Agricultural Department in Washington. It is suggested that the method responds the best to the needs of the textile industries. The method consists in preparing solutions of the starches by boiling the starch in water for a predetermined period and then measuring the viscosity of the warm solution by means of the Scott viscosimeter. A portion of the starch to the amount of about 12 grms. is carefully weighed out in a 600 c.cs. flask, 300 c.cs. of water are added, and the contents of the flask then heated slowly to the boiling point and boiled for ten minutes. In that way a 4 per cent. solution is obtained. In the cup of the viscosimeter 200 c.cs. of the solution are placed, and, without allowing the temperature to vary, the time is noted in which it takes 50 c.cs. to pass through. Then



the relative value is obtained by comparing with the time it takes for 50 c.cs. of boiling water to pass through. Naturally, the viscosity varies, not only according to the nature of the particular starch, but, moreover, even for the same starch upon different factors—principally: the degree of maturity of the cereal, the way the starch has been manufactured, and the method of drying it, which may have left a greater or less proportion of moisture in it. Again, the time of boiling with water exercises a very great action,