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DESIGNING AND FABRIC STRUCTURE.

COMBINING ENTWINING TWILLS WITH THE REGULAR TWILLS AS USED FOR THEIR FOUNDATION.

This system of constructing large effect weaves finds extensive use in the manufacture of woolen and worsted suitings, being weaves for new styles which for the coming seasons will become popular.

The foundation weaves most frequently used are our $\frac{2}{2}$ 4-harness and the $\frac{3}{3}$ 6-harness regular twills, the difference in the interlacing of the regular twills and the entwining twills producing most pleasing effects in the fabric, which by means of proper color combinations is heightened.

In the November, 1909, issue of the Journal, a thorough description of the construction of entwining twills was given, and to which the reader is referred to.

As will be readily understood, these new combination weaves refer to a class of large repeat weaves, large effects, which by means of proper fancy drawing-in drafts can be woven on the regular harness loom.

Four examples are given to illustrate the construction of these weaves.

Fig. 1 shows us the combination of an 8 by 8 entwining twill, which has for its foundation the $\frac{2}{2}$ 4-harness twill, combined with the latter weave, in

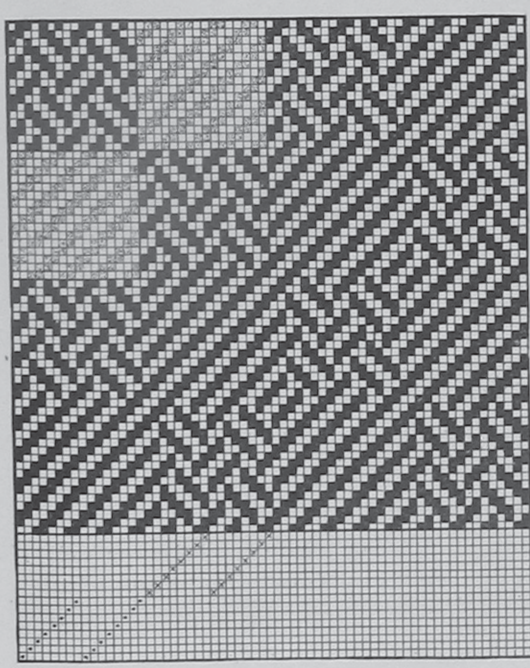

Fig. 1

the formation of a new combination weave. Two repeats of the entwining twill are used for each change, *i. e.*, 16 warp threads and 16 picks of entwining twill alternate, both warp and filling ways, with 16 warp threads and 16 picks of regular twill, the combination

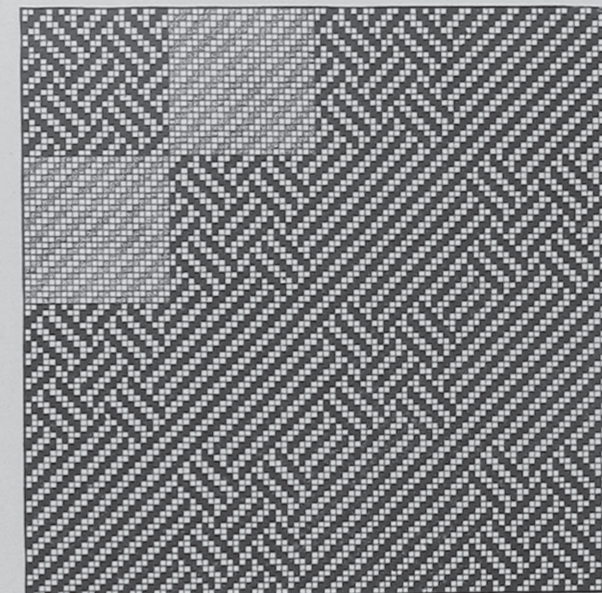

Fig. 2

effect repeating on 32 warp threads and 32 picks, and which, by means of drawing-in draft given below the weave can be woven on 16 harnesses.

The drawing-in draft is shown in two kinds of type, *dot* type for one effect (harnesses 1 — 8) and *cross* type for the other effect (harnesses 9 — 16).

One repeat of the combination weave is shown in two kinds of type, to more clearly show its construction; the entwilling twill effect is shown in *full* type, the regular twill in *gray* type; the remaining three repeats of the combination weave are shown in one type in order to give a clear representation of the weave-effect in the fabric. It will be readily seen from the three repeats of the combination weave shown in *full* type, that we have made it an object to join the regular twill into the entwining twill so as to produce a well balanced affair all around. It will always take some little experimenting to connect the entwining twill and regular twill effects properly.

Fig. 2 shows us an entwining twill, repeating on 12 by 12, combined with its foundation twill and which is again the $\frac{2}{2}$ 4-harness twill. Two repeats of the entwining twill are taken before changing alternately with the regular twill, and which brings the repeat of the new combination weave to (12 x 2 x 2) 48 warp threads and 48 picks. 24 harnesses, fancy draw, are required for the execution of the combination weave in the loom, using 12 harnesses for the entwining twill effect and 12 harnesses for the regular twill effect.

Weave Fig. 3 shows us another one of these combinations of entwining and regular twills. The foundation weave is the $\frac{3}{3}$ 6-harness twill; 24 warp threads and 24 picks of entwining twill effect alternating with the same number of warp threads and picks, interlacing with the regular twill. The entwining twill effect shows two repeats of a 12 by 12 entwining twill, for which reason the complete combination weave, repeating on 48 warp threads and 48 picks, is

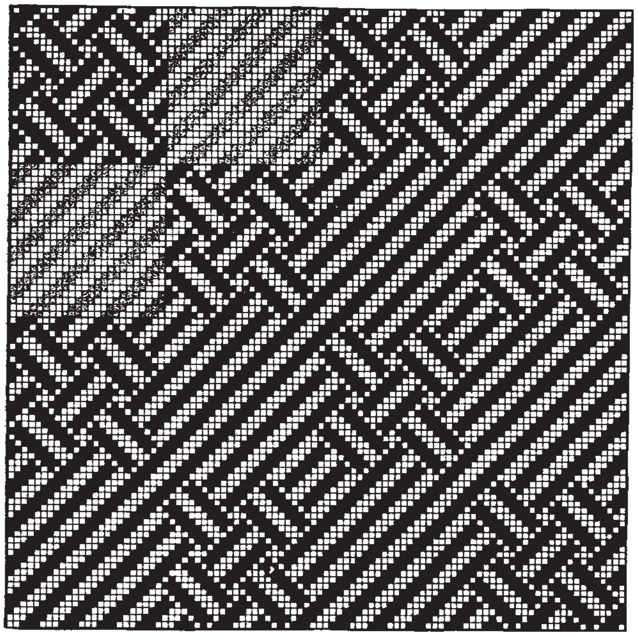

Fig. 3

to be woven with 24 harnesses, fancy draw, on the loom.

Fig. 4 shows us another method for combining these entwining twills with regular twills, the combination in this instance being arranged to form a stripe effect; the foundation weave used being the $\frac{2}{2}$ 4-harness twill.

THE INFLUENCE OF THE TWIST OF THE YARN UPON THE FABRIC.

The fundamental principle of spinning explains that the thread or yarn produced by it, consists in a collection of fibres, laid parallel during the processes the same are subjected to (carding, drawing, combing) previously to the actual spinning, and where then, said fibres, in the condition of roving, by means of twisting them around their axis, are transformed into yarn; warp or filling, as the case may be.

Two points, in connection with this twist, have to be taken into consideration; (*a*) the direction of the twist and (*b*) the amount of twist (*i.e.* turns per inch) inserted.

In connection with the direction of the twist, there are two kinds, *viz:* right and left twist. Which kind we refer to, is regulated by the position in which we consider the yarn? In order to obviate any dispute, the direction of twist is best designated thus: consider a piece of thread placed between the palms of the two hands pointed upwards, one of the ends being held between the thumb and forefinger of the hand which will not be moved. If the right hand, by means of moving it upwards, continues to twist the thread, we then designate such yarn as right hand twist, whereas, if the left hand, by means of moving it upwards, continues to twist the thread, we then call such yarn, left hand twist.

The first, *i.e.,* the right hand twist, is also technically known as warp twist, and the latter, *i.e.,* the left hand twist, as filling twist.

Object of Twist.

If we would subject roving to the least tension, the strand would separate, the fibres composing said roving, sliding on each other until they would separate. At the moment, however, when roving is twisted around its axis, we impart to the same strength, *i.e.,* resistance against breaking. It is not hard to find the reason for this. The resistance which the collection of fibres in the roving or the thread possess against breaking, in either case depends upon the adhesion of the fibres to each other, and consequently the amount of friction amongst the fibres thus produced. This resistance increases with the amount of surface with which the individual fibres come in contact with each other. As long as the fibres, in the shape of roving, possess little, or technically speaking, no twist, the fibres rest more or less parallel. The surface of contact of the fibres amongst each other, in this condition, is then at its lowest point. Inserting twist in the roving, in turn will twist the fibres spirally around each other, consequently increasing the amount of contact between the fibres in proportion to the amount of twist imparted. The amount of frictional resistance for the fibres, in the yarn, at the same time, depends also upon the pressure with which the individual fibres press against each other. Since, by means of twist, on account of the spiral windings, the fibres are shortened in their length, this feature at the same time, results in a stronger pressure of the individual fibres against each other.

Having thus explained that increased twisting will strengthen the yarn, as far as referring to frictional resistance of the fibres, it must at the same time be remembered that this has an end. As soon as the roving receives some twist, every fibre composing the strand is clinched. Continuing this twist, on account of the adhesion of the fibres, will not permit them to slide on each other; the tension on the fibres will remain constant, and in fact produce a certain amount of twist in the same, around their own axis. This tension, if twisting is continued, will become so excessive, that it will over-reach the natural elasticity of the fibres, in turn breaking the thread. This will explain that the amount of twist to insert in a thread, shall never be more than is absolutely necessary.

It will be found difficult to ascertain the proper time when the full amount of twist is inserted in a thread, since there are various factors that play a most important part; again, it must be remembered,