

tion 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

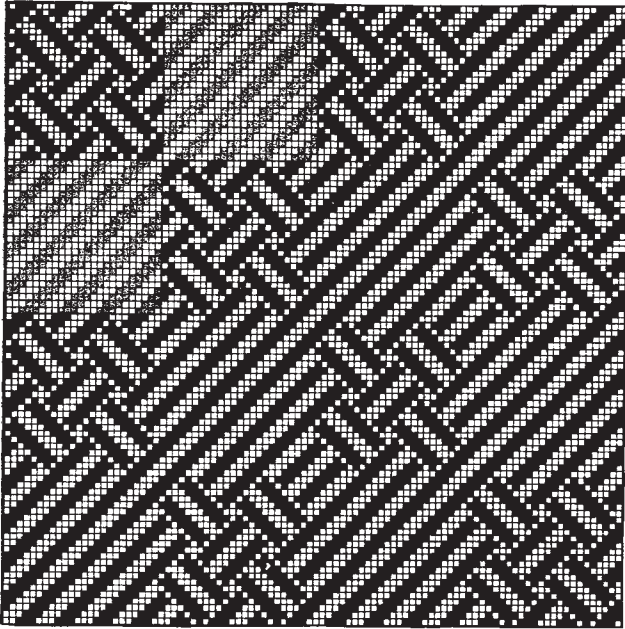


Fig. 3

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,

that we do not always desire the full amount of twist to be inserted in a yarn it would be possible to take up. Frequently other points must be taken into consideration, for instance, the use of the yarn, *i.e.*, texture, weave and finish of the fabric for which it is intended.

This may be the cause why sometimes more twist is inserted in a yarn than is of actual benefit to its strength. Again, in other instances, a less amount of twist, than required to give the fabric the greatest amount of strength possible, will have to be inserted in the yarn, to produce certain effects, finishes, etc., in the woven fabric.

For the proper amount of twist to insert in yarn, the following items play important parts:

the required adhesion, for the strength of the thread. For this reason, the smooth cotton fibre requires a stronger twist compared to the serrated wool fibre.

Another point to be considered, is the amount of moisture in the fibres. As a rule, any lubricant entering between two points of contact, will reduce their adhesion, for which reason, adding an emulsion to the fibres, previously to carding, will reduce the friction amongst the fibres, in turn relying more particularly on the twist to impart strength, compared to fibres handled without a lubricant. At the same time, it must be remembered, that such emulsions increase the pliability of the fibres, in turn, being the cause of a closer application to each other, during twisting. As will be readily understood, the character of the

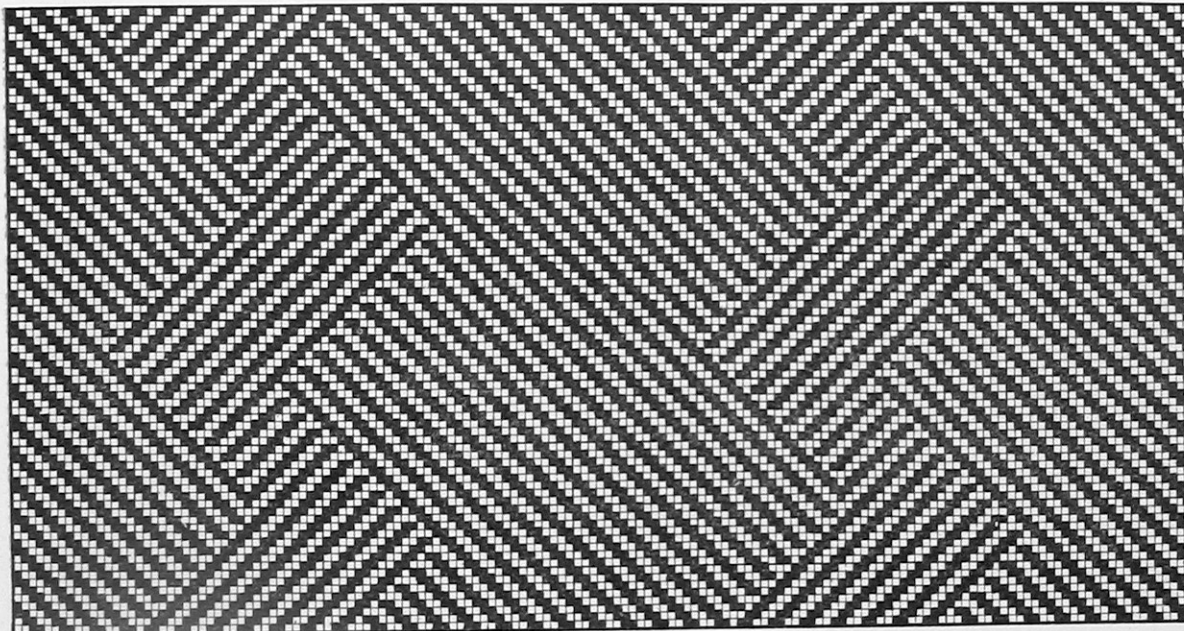


Fig. 4

LENGTH OF STAPLE OF THE FIBRES.

The longer the staples of the fibres, used in the manufacture of yarn, the more points of adhesion during twisting, for which reason the yarn soon reaches its proper point of strength, without having to add excessive twist, to compress the fibres in the thread, so as to increase adhesion among the individual fibres. This explains that as a general rule, yarns made from long bast fibres, as well as our long staples worsted wools, require less twist than a yarn made from clothing wools, shoddy or cotton.

THE COUNT OF THE YARN.

The more fibres composing the roving or thread, the more points of adhesion for the yarn during twisting, for which reason, in this instance, a proportional amount of less twist will be necessary to impart the required strength of the yarn, than if the opposite would be the case.

THE NATURE OF THE RAW MATERIAL.

The smoother the surface of the fibres we deal with, the less the chances for their adhesion, consequently the more twist required in order to produce

emulsion used is a most important item to be considered.

THE USE THE YARN IS PUT TO, *i.e.*, the Character of the Fabric in which it is used.

Warp yarns, as a rule, require the insertion of harder twist compared to filling yarns, for the fact, that during weaving, they are subjected to a strain in producing the shed, as well as resisting chafing and strain, when driving the filling, as inserted in the shed, to the fell of the cloth, work not required of filling yarns, the latter only being subjected to the slight tension of being properly stretched, at the picks, in the shed. The chafing the warp is subjected to during weaving, while passing from the whip-roll to the harnesses, and in turn to the fell of the cloth, is an item why more twist is required, for this system of threads, compared to filling yarn, and for which reason, the warp, in many cases, is either dressed, sized or steamed, in order to reduce friction during weaving, hence chance for chafing to a minimum. This will explain that yarn, which is not treated this way, requires a somewhat harder twist, compared to such as is.

With reference to amount of twist for the filling, we must take more particularly into consideration the wear the fabric is subjected to, *i. e.*, whether the garment is intended to be subjected to excessive wear out-door, under the various climatic changes, snow, rain, dampness, etc., or if the filling only is intended to be used in connection with fabrics where warmth is the main object. For this reason, in connection with overcoatings, like chinchillas, whitneys, montagnacs and similar loose textured fabrics, a slightly twisted filling yarn will be the one to use, whereas a loosely twisted filling, for example, in connection with trouserings would soon be the cause of fibres loosening their hold in the thread, *i. e.*, the garment would soon wear out.

The character of the face of the finished fabric is also of importance, since if a smooth, clear face is required, a harder twisted yarn is desired, whereas if the fabric is to carry a napp, it will not be advisable to twist the filling harder than necessary, in order to permit a ready raising of the napp, on the gig or napper, whereas hard twisted yarn would not permit this ready raising of the napp, and when then the required napp only could be raised (but, at the same time, in an inferior quality) by weakening the threads, *i. e.*, tentering the fabric. This point must be carefully taken into consideration, in connection with mills manufacturing cloakings, beavers, etc. Another point to be taken into consideration, is the fact, that in connection with woolen fabrics and where a soft pliable handle is required for the finished fabric, the same is either lost, or only partially obtained by the finisher, provided he receives a fabric structure in which a harder twisted yarn was used than was necessary, for which reason, in connection with such fabrics, especial care must be given to the twist of the yarn, more particularly the filling, *i. e.*, that only that amount of twist, necessary to produce the required strength to the fabric, is used. In connection with smooth clear fabrics, and where the weave is distinctly seen, the tighter the interlacing of the threads in such fabrics, the less amount of twist necessary to be used, compared to loosely interlacing weaves, in order to produce the necessary strength to the fabric. In connection with fabrics where the warp forms the face of the fabric, like warp satins, twills or diagonals, warp rib effects, corkscrews, etc., and where the filling rests, respectively, either, more or less, on the back, or in the centre of the structure, *i. e.*, is kept away from the face, then a less amount of twist can be used for the filling, in this way, greatly adding to the softness of the character of the fabric.

At the same time, the character of the machinery used for imparting the twist, will be worthy of consideration, for instance, compare the same count of cotton yarn, spun respectively, either on the mule or on the ring frame, and where in the first instance, on account of the nature of the spinning process, a slightly less twist will be necessary, compared to similar yarn spun on the ring frame, which has to withstand the strain of the traveler, as well as difference in the spinning process, compared to that of the mule.

(To be continued.)

RIBBONS, TRIMMINGS, EDGINGS, ETC.

(Continued from Page 151, Vol. VII.)

Producing Figures in Smooth Ribbons.

SKETCH: The first to be done by the designer is to prepare, on drawing paper, a sketch, actual size, as he wants the design to appear in the fabric. The designer, besides having a talent for drawing (sketching) must at the same time possess a clear understanding of the principles of fabric structure, single cloth, as well as 2 or more ply cloth, in all its varieties. He must know how to judge quality and counts of yarns as well as fabric textures; have taste for proper color combinations, to produce pleasing effects, *i. e.*, he must have a thorough knowledge of the manufacture of ribbons in all their varieties.

TO TRANSFER SKETCH ON POINT PAPER.

After the sketch has been made, ascertain the proper dimensions the latter has to cover on your point paper, after which transfer the heavy ruled squares of the point paper, in proper proportions reduced, on your sketch. If, for example, the fabric is to be constructed with an even texture for warp and filling and calls for 64 warp threads in its width (not taking any selvage into consideration) and we use 8 x 8 point paper, said 64 warp threads then call for 8 heavy ruled squares. In this case, divide the width of your sketch into 8 uniform parts and over-rule your sketch, *warp ways*, with 7 lines, each line representing one of those heavy ruled lines (lengthways) on your point paper. Next square-off sketch lengthways, corresponding to dimensions used previously widthways, producing in this way, an over-checking of the sketch, corresponding to those heavy ruled over-checks you see on the point paper.

Next transfer sketch in outlines, either with charcoal or pencil, upon your point paper, being guided in this work by the squares on your sketch and the heavy ruled squares on your point paper. Be careful to use a good free-hand in drawing, so as to reproduce a nice outline to the design on the point paper. Next paint in the figure effects of the design with a good vermilion, using a brand of water paint which will permit washing point paper clean in case of a mistake.

HOW TO CALCULATE THE PROPER POINT PAPER TO USE.

Since in connection with smooth faced, figured ribbons, the design on your point paper represents an exact enlargement of the design in the ribbon, the proportion of the warp threads to the picks in the ribbon (*i. e.*, its texture) must correspond to the rows of squares representing warp threads and picks, respectively, on the point paper. This is the reason why point paper is met with in the market in all varieties of light rulings inside the heavy square; for instance, we meet paper ruled 8 x 6, 8 x 7, 8 x 8, 8 x 10, 8 x 12, 8 x 16, etc., the difference between the ruling indicating the difference in warp and filling texture in the fabric.

Consequently, when calculating which ruling of point paper to use, we must first ascertain the texture of the ribbon, since the proportion of warp threads