

## 8. PICK-UP VERSION OF BLOCK WEAVE BASED ON THREE-WEFT DOUBLE-FACED WEAVE.

With Hidden Weft in Plain Weave

### A. Centre Shed Pick-Up

#### (i) USING A COUNTERMARCH LOOM

Thread (1,2,3,4) repeat. Tie up pedals as in Fig. 305 (a). The sequence is as follows:

Press Pedal 1, pick-up, weave weft A.

Press Pedal 1, pick-down, weave weft B.

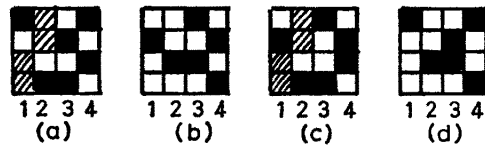


Fig. 305. Pick-up version of Block Weave based on Three-Weft Double-faced Weaves. (a) and (b) Pedal tie-ups for type with hidden weft in plain weave (c) and (d) Pedal tie-ups for type with hidden weft in hopsack

Press Pedal 4, weave weft C (hidden weft).

Press Pedal 2, pick-up, weave weft A.

Press Pedal 2, pick-down, weave weft B.

Press Pedal 3, weave weft C (hidden weft).

#### (ii) USING A COUNTERBALANCED LOOM

Thread (1,2,3,4,) repeat. Tie up pedals as in Fig. 305 (b). Tie top roller to prevent reciprocal movement between front two and back two shafts. The sequence is then exactly as above.

### B. Raised End Pick-Up

Thread (1,2,3,4,) repeat. The sequence is as follows:

Lift 12, pick-up, lower 12, raise 4, weave weft A.

Lift 12, pick-down, lower 12, raise 4, weave weft B.

Lift 24, weave weft C.

Lift 34, pick-up, lower 34, raise 1, weave weft A.

Lift 34, pick-down, lower 34, raise 1, weave weft B.

Lift 13, weave weft C.

---

**With Hidden Weft in Hopsack**

**A. Centre Shed Pick-Up**

(i) USING A COUNTERMARCH LOOM

Thread (1,2,3,4) repeat, and tie up pedals as in Fig. 305 (c). The sequence is as follows:

- Press Pedal 1, pick-up, weave weft A.
- Press Pedal 1, pick-down, weave weft B.
- Press Pedal 4, weave weft C.
- Press Pedal 2, pick-up, weave weft A.
- Press Pedal 2, pick-down, weave weft B.
- Press Pedal 3, weave weft C.

(ii) USING A COUNTERBALANCED LOOM

Thread (1,2,3,4) repeat, and tie up pedals as in Fig. 305 (d). Tie top roller to prevent reciprocal movement between front two and back two shafts. The sequence is then exactly as above.

**B. Raised End Pick-Up**

Thread (1,2,3,4,) repeat. The sequence is as follows:

- Lift 12, pick-up, lower 12, lift 3, weave weft A.
- Lift 12, pick-down, lower 12, lift 3, weave weft B.
- Lift 23, weave weft C.
- Lift 34, pick-up, lower 34, lift 1, weave weft A.
- Lift 34, pick-down, lower 34, lift 1, weave weft B.
- Lift 14 weave weft C.

**PRACTICAL DETAILS**

Warp—6 working e.p.i.

Weft—2-ply carpet wool used threefold for wefts A and B, and twofold or singly for weft C. Use a floating selvage, and start all three wefts from the same side.

**9. PICK-UP VERSION OF THREE-COLOUR BLOCK WEAVE**

**A. Centre Shed Pick-Up**

Thread as in Fig. 306 (a). Two unthreaded ends follow every threaded end. There are of course only two possible sheds, as shown in Fig. 306 (b), but three picks (three different colours) have to be inserted into each of these sheds. The sequence is as follows:

- (1) Raise shaft 1 and lower shaft 2. Fig. 307 (a) shows the central layer of unthreaded ends (eighteen in number) seen from above; for convenience, the ends of

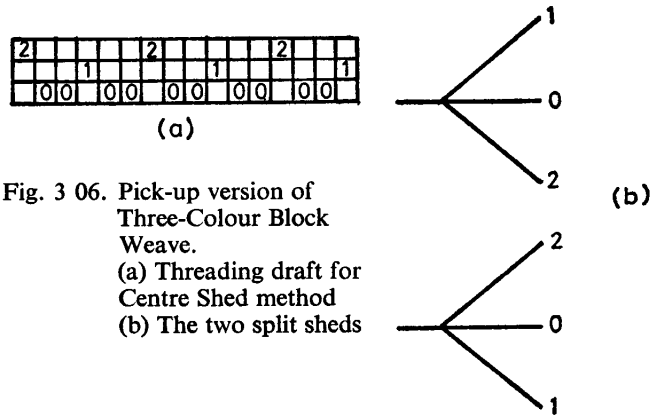


Fig. 3 06. Pick-up version of Three-Colour Block Weave.  
 (a) Threading draft for Centre Shed method  
 (b) The two split sheds

shaft 1 have been omitted. Due to the method of sleying (see Practical Details), these ends are evenly spaced as shown.

Suppose, for simplicity's sake, that the three colours are required to show as in Fig. 307 (b), i.e., the right-hand third of the warp to have colour A on the surface, the central third to have colour B, and the left-hand third to have colour C. As explained (in the section on Three-Colour Block Weave in Chapter 8) in each of these areas one of the wefts shows on the surface, one shows on the back and one lies hidden in the centre, interlacing in plain weave order with the central layer of the warp.

So for weft A, pass pick-up stick from right to left over the first six ends, then make it interlace in plain weave order with the next six ends (under, over, etc.) then pass it under the final six ends. Turn it on its edge and weave weft A. See Fig. 307 (a).

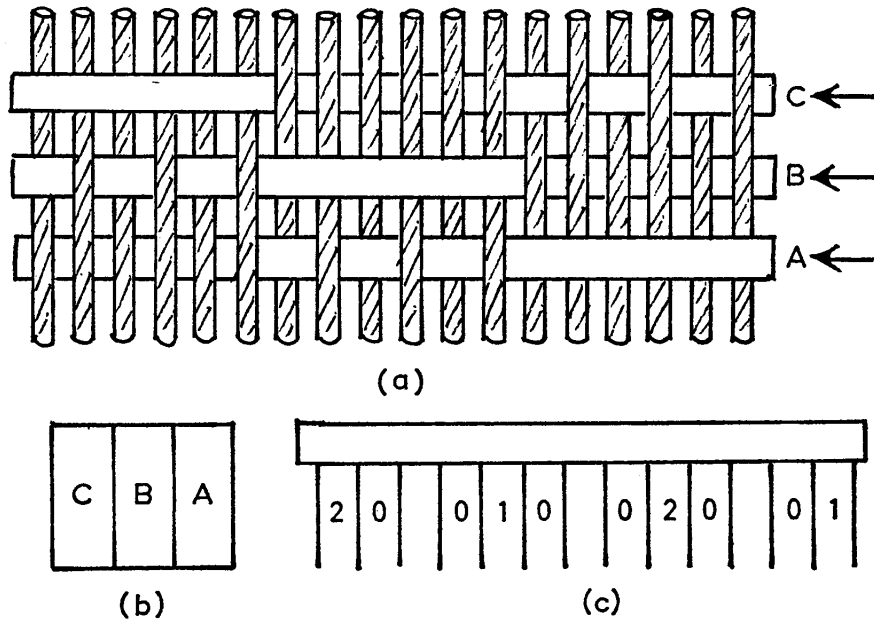


Fig. 307. Pick-up version of Three-Colour Block Weave.  
 (a) View of three picks in central layer of threads  
 (b) Colour arrangement  
 (c) Method of sleying warp

For weft B, pass stick under the first six ends, over the central six ends and interlace it in plain weave order with the final six ends (under one, over one, etc.). Turn it on its edge and weave weft B.

For weft C, start by interlacing it in plain weave order (under one, over one, etc.) with the first six ends, then pass it under the central six ends and over the final six ends. Turn it on its edge and weave weft C.

*Note*—That all the wefts pass from right to left.

(2) Now change the shed, i.e., raise shaft 2 and lower 1. Repeat the above three pick-ups, but wherever, for each weft, the stick interlaces with the central layer, make it do so in the opposite plain weave shed, i.e., over, under, instead of under, over. This is the complete sequence.

Reference to the description and diagrams given for Three-Colour Block Weave will show that for one colour arrangement on the surface there may be several possible ways of arranging the colours on the back. There can of course be no reversal of the colours on the back, because three colours are involved. So some skill and ingenuity is required in manipulating the colours to make both sides of the rug bear an acceptable design.

### **B. Raised End Pick-Up**

Thread (1,3,4,2,3,4) repeat. The sequence is as follows:

Lift 34, pick-up as explained above, lower 34, lift 1, weave weft A.

Lift 34, pick-up as explained above, lower 34, lift 1, weave weft B.

Lift 34, pick-up as explained above, lower 34, lift 1, weave weft C.

Repeat, but lift 2 instead of lifting 1 (and of course use opposite plain weave shed in appropriate parts of pick-up).

In this type of pick-up, wherever the stick is interlacing in plain weave order with a section of the raised ends, its passage can be assisted by forming the appropriate shed, (i.e., by slightly dropping shaft 3 or 4). With a jack loom this will mean using two pedals (one raising 3, one raising 4) for the 34 lift; and of course using two feet. One foot is slightly raised to form the shed for the pick-up stick. If the right foot is raised when the three wefts are travelling to the right, and the left when they are travelling to the left, this will also overcome any confusion about which is the correct plain weave shed for the stick to enter.

### **PRACTICAL DETAILS**

Warp—9 working e.p.i.

Weft—2-ply carpet wool used threefold.

Sley the warp in a reed with 12 dents per inch, as shown in Fig. 307 (c).

*Note*—That the unthreaded ends are in alternate dents, i.e., at 6 e.p.i. and that the threaded ends are in every fourth dent, i.e., at 3 e.p.i. So both sets of ends are evenly spaced.

Begin and finish the threading on a threaded end. All three wefts start from the same side.

### **General Notes on Pick-Up Techniques Described in this Chapter**

(1) From the point of view of experimenting with these techniques, note that five of them are possible on a straight 1,2,3,4, threading.

(2) Note that five of these techniques (including the Three-Colour Block Weave) can be woven on the simplest two-shaft vertical rug loom (using unthreaded ends and Centre Shed Pick-Up).

(3) Pick-up techniques are always slow. Their most economical use is in combination with shaft-controlled blocks. In other words thread the loom to give blocks and only use pick-up occasionally to rob the design of its regularity.

(4) It is simple to convert any shaft-controlled block weave into its corresponding pick-up weave.

Let the lifts for the block weave be:

13, 14, 23, 24  
A B A B

If they are considered in pairs, then it is the raising of shafts 3 or 4 which distinguishes the shed for colour A from that for colour B in each pair. So the pick-up is done with these two shafts raised and the sequence would be

Lift 34, pick-up, lower 34, lift 1, weave weft A.  
Lift 34, pick-down, lower 34, lift 1, weave weft B.  
Lift 34, pick-up, lower 34, lift 2, weave weft A.  
Lift 34, pick-down, lower 34, lift 2, weave weft B.

As another example, let the lifts for the block weave be.

4, 134, 3, 234, 2, 123, 1, 124  
A B A B A B A B

Then the pick-up for the first two picks would be with 13 raised (because it is the raising of shafts 1 and 3 which distinguishes the shed for colour B from that for colour A), and the weft would be inserted with 4 raised. The pick-up for the next two picks would be with 24 raised and the weft would be inserted with 3 raised, etc.

So any new block weave encountered can be converted in this way into a pick-up weave.

**10. PICK-UP METHOD USING A RIGID HEDDLE**

All the pick-up weaves possible on a two-shaft loom, using unthreaded ends and Centre Shed Pick-Up, can also be produced on a specially adapted rigid heddle. This is not a feasible way of making rugs, but it provides a very simple way of exploring the techniques on a small scale.

The rigid heddles are made by blocking the dents in a reed with two lengths of wooden strips. Two of the longer strips put in a dent leave a small central eye, two of the shorter strips leave a large central eye. Some dents are left in their normal state. Fig. 308 (a) shows the various ways these have to be combined for the different pick-up weaves. Each bears the number of the pick-up weave as described earlier in this chapter. Two repeats are shown for each weave.

Set up a warp and thread one end in each dent. When the heddle is raised or lowered, there will be a split shed, see Fig. 308 (b). Whereas the ends threaded in the normal and small-eyed dents change position when the shed is changed, the ends in the large-eyed dents remain in the same central position. It is these ends (which correspond to the unthreaded ends in the methods described previously) which form the layer for the Centre Shed Pick-Up.

The pick-up is carried out on this layer, in the manner described under Centre Shed Pick-Up for each of the five weaves concerned.

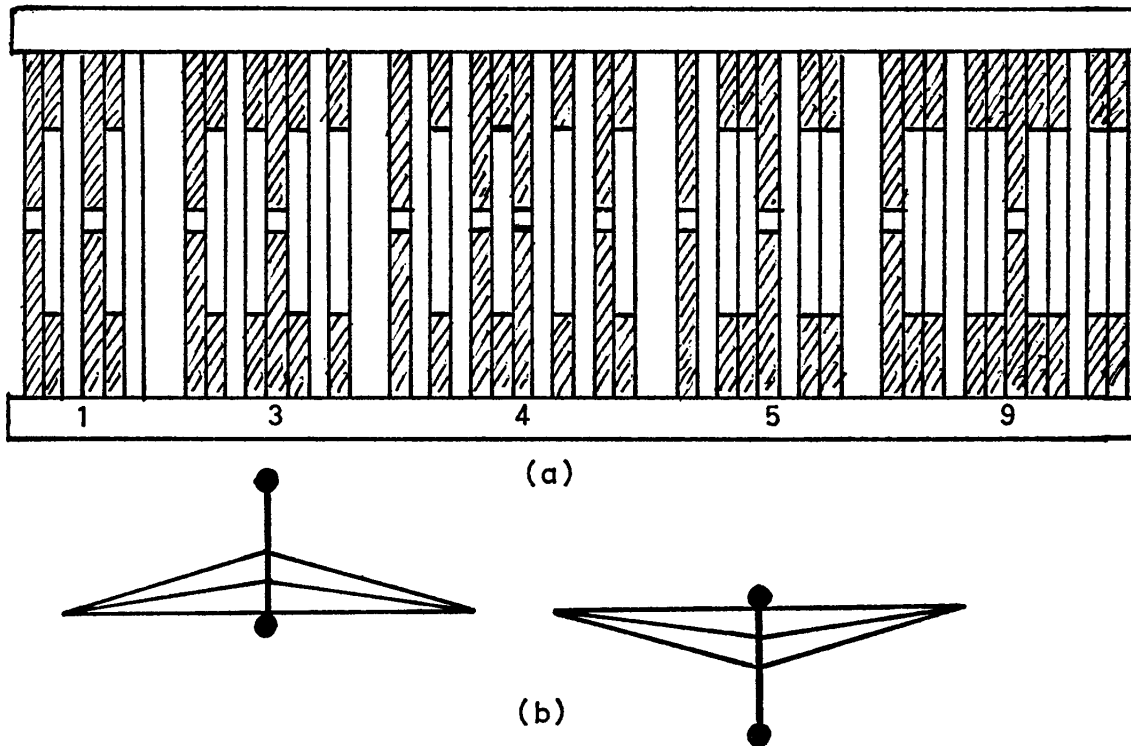


Fig. 308. Centre Shed Pick-up using an adapted Rigid Heddle.  
 (a) Blocking dents for various pick-up weaves  
 (b) The sheds obtained

# 10 · Weft Pile Techniques

---

## INTRODUCTION

The many corduroy pile weaves to be described all stem from an original idea of the late Alastair Morton, R.D.I. This was to set up the loom so that the pile weft alternately weaves and floats for a certain distance all across the width of the rug. The distance over which the weft floats is always the same as the distance over which it weaves. This ensures that the weft is securely held and distinguishes the technique from other less practical methods. The floats are later cut to form the pile; hence it is a cut weft pile technique.

This process can be carried out in many ways and on any loom from a simple rug frame to an eight-shaft loom. There are two basic types, single corduroy and double corduroy, the latter being most used as it has the thicker pile. It is important to consider this as a technique in its own right, not as a time-saving substitute for knotting, or as a 'mock' rya. As will become clear, it has its own restricted but interesting design possibilities. It can give areas of pile and flat weave, it can give variations in pile length, it can give a double-faced pile rug, it can give a block design in two colours; and as all these are achieved by purely mechanical (i.e., loom-controlled) means, they are different in character from similar effects in a hand-knotted rug.

This chapter may serve as an illustration of how a single idea can be extended and varied in many directions, each extension and variation leading to different design possibilities. Many other ideas in this book could be treated in a similar way.

## 1. SINGLE CORDUROY ON NORMAL THREADING

### A. Using Four Shafts

Single corduroy is Alastair Morton's original weave and the seed from which all other corduroy pile weaves have grown.

One and a half repeats of the threading are shown in Fig. 309. However many times the threading is repeated across the width of the warp, always add a half repeat at the end; thus the threading begins and ends with a group on the front two shafts. Three wefts are needed, one ground weft which is thrown in the two plain weave sheds (lifts

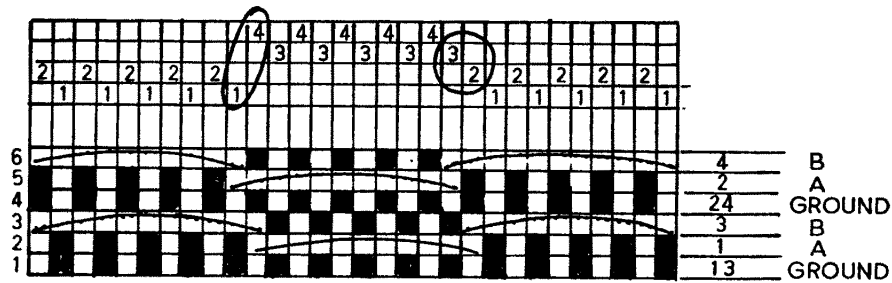


Fig. 309. Single Corduroy on four Shafts. Weave Diagram

13 and 24) and two pile wefts. The ground weft contributes nothing to the pile and is practically invisible in the finished rug.

As shown in Fig. 309, the sequence is:

Lift 13—Ground weft.

Lift 1—Throw pile weft A, from right to left. This pick weaves from selvage to selvage, weaving with the ends on front two shafts and floating over the ends on back two shafts.

Lift 3—Throw pile weft B, from right to left. As will be understood from Fig. 309, this pick stops short of either selvage, so a small portion is left protruding beyond the last raised group of threads on the right.

Fig. 310 (a) shows diagrammatically the stage now reached. Note that where weft A is weaving, weft B is floating and vice versa. So when beaten up they together make a pick of plain weave. The sequence continues:

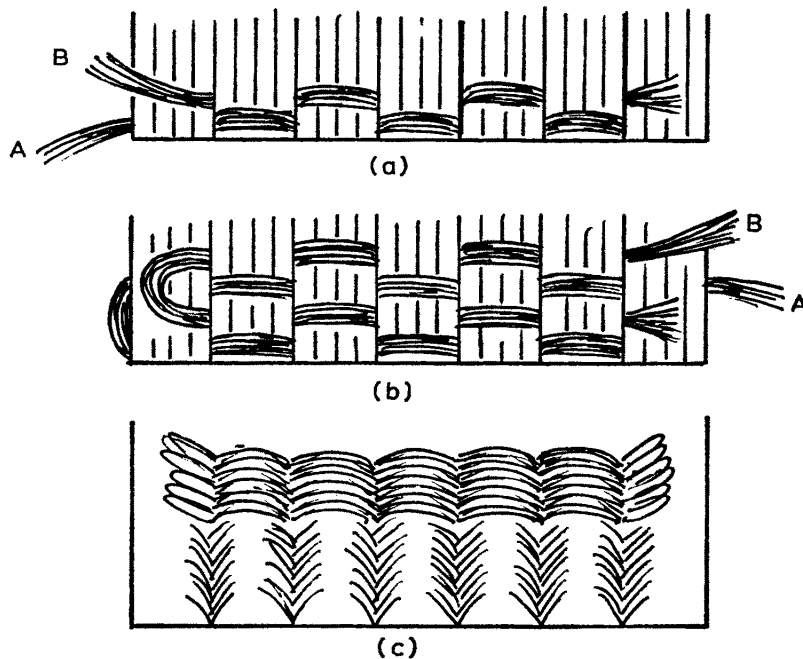


Fig. 310. Single Corduroy on four Shafts. (a-c) Stages in weaving



Lift 24—Ground weft.

Lift 2—Throw pile weft A from left to right. It floats and weaves in almost exactly the same positions as it did before.

Lift 4—Throw pile weft B from left to right. Leave a loop protruding beyond the last raised group of threads on the left. See Fig. 310 (b).

This is the whole cycle. Two picks of pile always follow a ground weft. Weft A always weaves from selvage to selvage; weft B never reaches either selvage and so leaves loops protruding at both sides.

Repeat the sequence several times and the woven rug will be covered with vertical columns of weft floats, with loops at both sides. See top of Fig. 310 (c).

Now cut the floats and the loops in their centres and there will be vertical rows of tufts as shown at bottom of Fig. 310 (c). (Methods of loop cutting are described in detail under Double Corduroy.)

This is the complete process.

*Note*—That the tufts are well spaced out. With a warp setting of 5 e.p.i., they will be 2 inches apart. So Single Corduroy does not give a close pile.

—That the length of pile can be controlled by pulling up the floats after each pile weft shuttle is thrown.

—That if weft A and B are different colours there will be vertical stripes of these two colours on the *back* of the rug, but all the tufts will consist of a mixture of the two colours, as each tuft has half its yarn contributed by weft A and half by weft B.

—Colours can be inlaid in the pile (see under Double Corduroy).

#### PRACTICAL DETAILS

Warp—5 working e.p.i.

Weft—ground—6-ply rug wool.

pile—2-ply carpet wool used sixfold or thicker.

Normal selvage.

In all single corduroys there tends to be a point of weakness in the rug where the tufts spring from the background weave. This can be partly overcome by varying the sleying between each threading unit. If the ends are being sleyed singly in a 5-dents/inch reed, then the ends encircled in Fig. 309 are sleyed together in one dent.

#### B. Using Eight Shafts

A simple block weave is possible if the Single Corduroy threading is extended onto eight shafts. One way to do this is to alternate one and a half repeats on the front four shafts with one and a half repeats on the back four shafts as in Fig. 311 (a). The whole threading could then be Blocks 1, 2, 1, 2, 1.

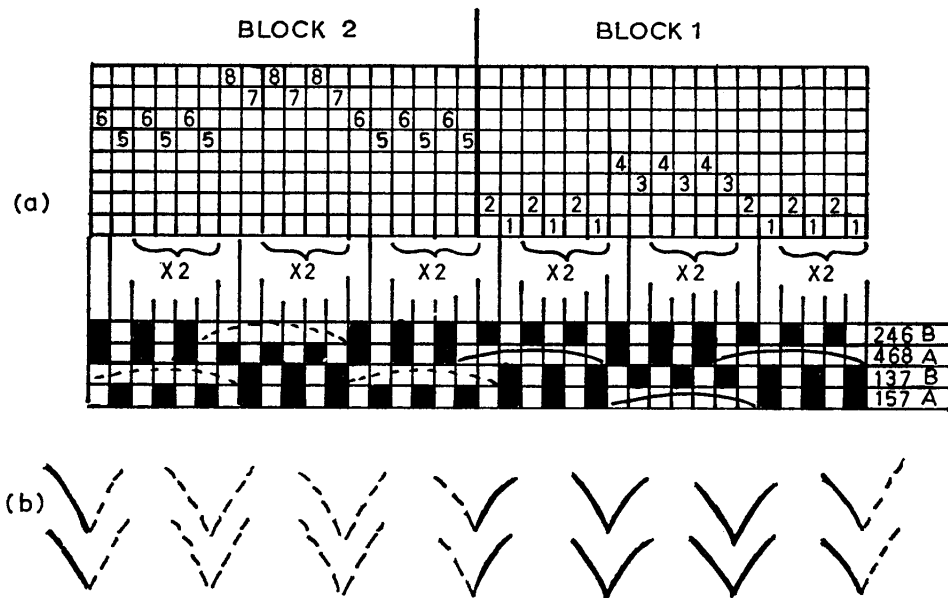


Fig. 311. Single Corduroy on eight Shafts. (a) Weave Diagram (b) Resulting pile

There is no ground weft required because the pile wefts act as the ground weft in the blocks where they are not forming pile. So there are only four lifts and the two pile wefts are used pick-and-pick as shown in Fig. 311 (a).

In the 1st pick, weft A gives a float in the centre of Block 1 (shown by curved line).

In the 2nd pick, weft B gives two floats in Block 2 (shown by curved dotted lines).

In the 3rd pick weft A gives two floats in Block 1.

In the last pick, weft B gives a central float in Block 2.

If this is repeated there will be vertical columns of floats of colour A in Block 1 and of colour B in Block 2. These floats, when cut, will give tufts as shown below, in Fig. 311 (b). Note that there are two solid colour tufts in each block; but at the junction between blocks there is always a tuft of mixed colours. This is typical of blocks in corduroy technique, whether they are shaft-controlled, as here, or inlaid. The two colours used are automatically blended into each other at the block junctions. It is impossible to produce hard colour junctions in a vertical direction; this is something only knotting will give.

Plate 134 shows a rug woven in this way. A colour sequence of (A,A,A,B) has been used between the blocks of colour. This gives floats of colour A everywhere except in the centre of Block 2 (consult Fig. 311 (a) ) where colour B has a single float. The effect of these single floats, when cut, is to give a thin line of colour B joining the blocks of colour B. These lines are just visible in the photograph but are more obvious in Fig. 312. Similar lines could be produced in the centre of Block 1, with (A,B,B,B) or (C,B,A,B) colour sequences. Other variations will occur to the weaver.

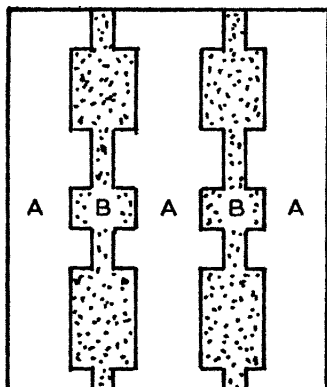


Fig. 312. Single Corduroy on eight Shafts. Variations in blocks by altering colour sequence in wefts

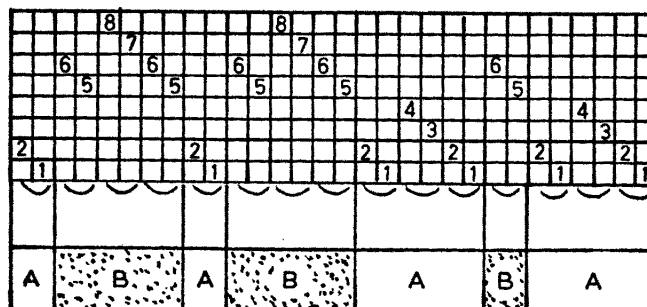


Fig. 313. Single Corduroy on eight Shafts. Alternative threading drafts

#### OTHER THREADING ARRANGEMENTS

(i) There need not be one-and-a-half repeats of the threading in each block. There can be just half a repeat. A threading of this type is shown in Fig. 313 where, for simplicity's sake, each bracketed pair of ends represents a half repeat. The blocks this will give are shown below.

(ii) There can be a whole number of repeats of the threading in each block. In this case the four lifts have to be slightly changed to (157, 135, 468, 248).

#### PRACTICAL DETAILS

Warp—6 e.p.i., alternately double and single in the heald, therefore, 4 working e.p.i.

Weft—2-ply carpet wool used seven or eightfold.

Normal selvage.

Of the four picks in the repeat all except the third reach both selvages. So a separate shuttle is needed for the third pick; this means two shuttles of colour A and one of colour B are needed throughout. As the wefts are so thick and there is no ground weft, this is a very quick type of rug to weave. The floats should be pulled up to increase the length of pile and so offset the wide spacing of the tufts.

## 2. SINGLE CORDUROY USING FOUR-END BLOCK DRAFT

### A. Using Four Shafts

Three repeats of the threading are used in each threading block, see Fig. 314. Several weaves are possible, of which the following two are satisfactory.

## (i) CORDUROY PILE ON CHEQUERED BACKGROUND

The lifts are shown in Fig. 314 (a).

Picks 2 and 3 produce the floats for the pile, weft B.

Picks 1 and 5 produce a weave in which weft A will come to the surface in some areas and go to the back in others.

Picks 4, 6 and 7 are in plain weave. If this weave is continued, it will give a pile of colour B on a background which is in blocks of colour A and colour B. To switch the colours in the blocks, lift 14 instead of 23, in picks 1 and 5. Plate 135 (top) shows a sample with a white pile on a background of black and white checks. Wefts A and C were white, weft B black.

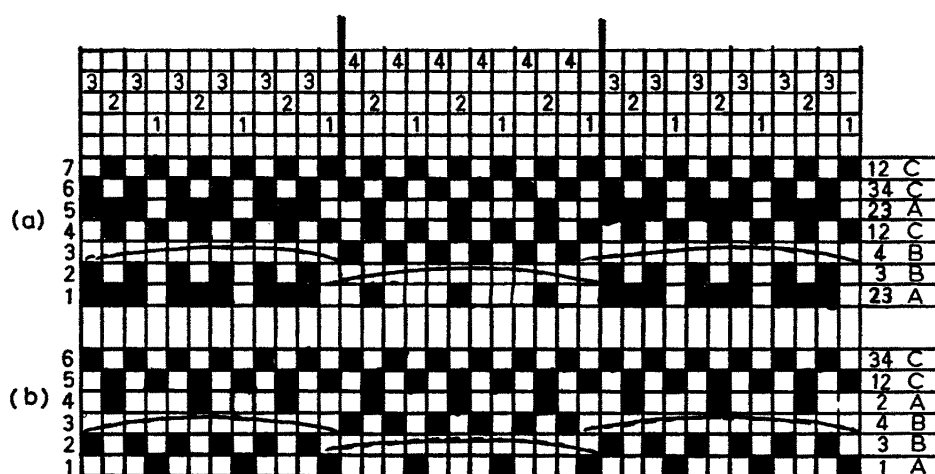


Fig. 314. Single Corduroy using Four-End Block Draft on four shafts. (a) and (b) Weave Diagrams

## (ii) CORDUROY PILE ON BACKGROUND OF ANOTHER COLOUR

The warp is set up as for the previous example and the shafts lifted as in Fig. 314 (b).

Here, in picks 1 and 4, weft A takes an over 3 under 1 course across the whole width of the warp.

In picks 2 and 3, weft B floats to give the pile.

In picks 5 and 6, weft C weaves plain. If well beaten, weft A completely hides the other two wefts, so it is possible to have tufts of one colour springing from a background cloth of a completely different colour. (All three colours appear on the back). Plate 135 (bottom) shows this weave, with weft A, a grey-black mixture, weft B white and weft C black.

Both these photographs illustrate how the tufts of pile appear in very definite warpway lines. This is a characteristic of single corduroy.

## PRACTICAL DETAILS

Warp—5 working e.p.i.

Weft—In both above weaves, A is 2-ply carpet wool used fourfold. B is 2-ply carpet wool used sixfold, and C is 2-ply carpet wool used singly.

### B. Using Eight Shafts

Using eight shafts, a rug with alternating areas of pile and flat weave can be produced.

One complete repeat of the threading is shown in Fig. 315, with Block 1 on the front four, Block 2 on the back four shafts. Thread a whole number of repeats plus half a repeat (i.e., begin and end with a block on front four shafts).

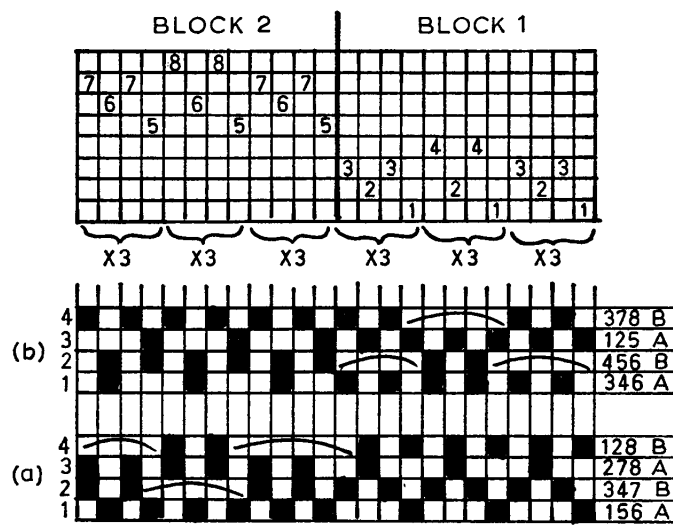


Fig. 315. Single Corduroy using Four-End Block Draft on eight shafts

The problem is to find a weave that will beat down equally in Block 1 and 2. The weave given repeats every four picks and uses two wefts, A and B, pick-and-pick. See Fig. 315 (a). On picks 1 and 3, weft A weaves over 3, under 1 with Block 1, but plain with Block 2. On picks 2 and 4, weft B weaves plain with Block 1, but gives corduroy pile floats in Block 2. *Note:* that the threading is condensed so the floats appear one-third of their real diagrammatic size. Structurally, the net effect of this weave is that a warp end weaving over 2 picks, under 2, alternates with an end weaving over 1, under 3, all across the rug. So there is bound to be a straight fell to the rug. Visually, the net effect is that Block 1 shows floats of colour A predominantly, and Block 2 is covered with long floats, which when cut, give corduroy pile. In Plate 136, weft A is dark grey and weft B is white, but they could perfectly well be the same colour. If two colours are used, the weave has an interesting check pattern on the back.

To change over the areas of pile and flat weave use the lifts in Fig. 315 (b). This has been done in the middle of the photographed sample.

**PRACTICAL DETAILS**

Warp—5 e.p.i.

Wefts A and B have to be the same thickness—i.e., both 2-ply used sixfold.

Use a floating selvage.

When using the lifts in Fig. 315 (b), there have to be two shuttles of weft B, as in pick 2 the weft does not reach either selvage; or one shuttle can be used and the weft repeatedly cut after pick 4.

**3. DOUBLE CORDUROY**

Double Corduroy was developed in an effort to produce a rug with thicker pile than single corduroy. It is the weft pile technique most used by hand weavers. With practice, a 3 foot × 5 foot rug can be woven in two days.

**A. Using Four Shafts**

The threading is shown in Fig. 316; it can be described as ‘6-end overshot blocks in twill order’. It is a threading that can be expanded and contracted. The one in Fig. 316 contains five ends on each shaft in one repeat. Earlier, in Chapter 7, a version with three ends on each shaft was described. There could be any odd number of ends on each shaft.

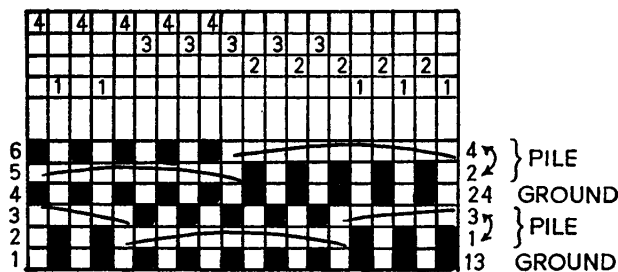


Fig. 316  
Double Corduroy. Weave  
Diagram

Always thread either a whole number of repeats in a rug, or a whole number plus a half repeat. Splitting the repeat in any other way leads to unnecessary complications.

When threading, break the sequence up mentally into five-end groups, i.e., 12121, 23232, 34343, 41414. Always check that there are five ends on each shaft after each repeat is threaded.

As Fig. 316 shows, the lifts are identical with those used in single corduroy. But the

great difference with this threading is that the weft floats in picks 5 and 6 do *not* lie vertically above those in picks 2 and 3. They take up an intermediate position. Upon this staggering of the floats depends the closeness of the pile and many of the design possibilities.

Of the six lifts in the sequence, two are in plain weave and are for the ground weft. The other four lifts are for the pile weft and each consists of a single shaft being raised.

With any of these four lifts, groups of five warp ends are raised at regular intervals across the warp. Between these groups the weft floats. Some of the initial difficulty encountered in weaving double corduroy stems from the four different types of shed these four lifts give. This is further complicated by the fact that the sheds are different for a rug with a whole number of threading repeats and for one with a whole number plus a half repeat.

(i) WITH A WHOLE NUMBER OF THREADING REPEATS

Reference to Fig. 317 shows that—

Lifting shaft 1, gives a pile shed with a warp group raised at both selvages.

Lifting shaft 3, gives a pile shed which has no warp group raised at either selvaige.

Lifting shaft 2, gives a pile shed with a warp group at the right selvaige, but none at the left.

Lifting shaft 4, gives a pile shed with no warp group at the right selvaige, but one at the left.

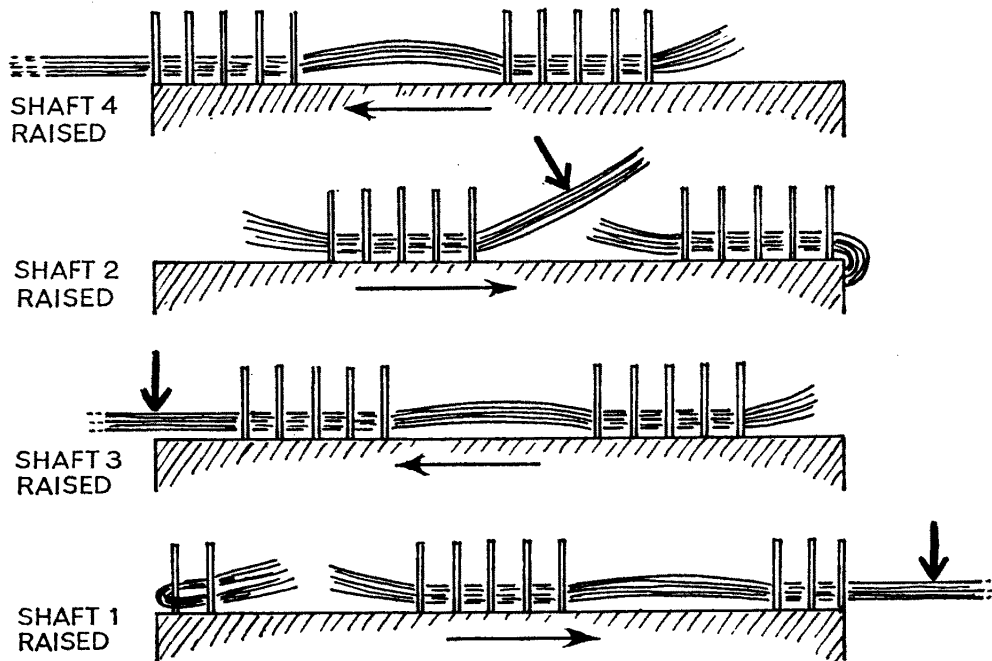


Fig. 317. Double Corduroy. Details of four pile sheds and four pile picks when woven with two threading repeats

Fig. 317 only shows what happens with two repeats of the threading, but the situation is obviously the same however many whole number of repeats are threaded.

Now imagine that a pile weft shuttle were thrown from left to right with shaft 1 up, and then the same shuttle thrown from right to left with shaft 3 up. There will now be a float of weft (arrowed in Fig. 318 (a)), emerging at the right selvage and disappear-

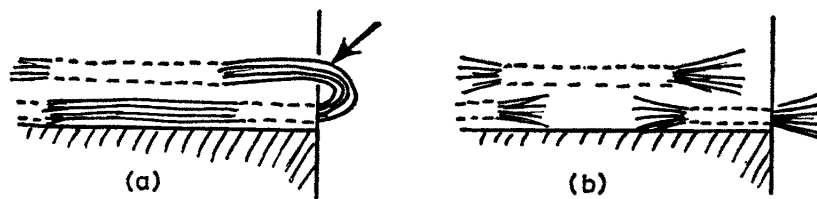


Fig. 318. Double Corduroy. Showing tufts at selvage

ing under the ends on shaft 3. When this is cut, it will give a small tuft protruding from this selvage, see Fig. 318 (b). To avoid this, a certain sequence of shuttle throwing must be followed. It is described below and shown diagrammatically in Fig. 317.

Lift 13—Ground weft, from left to right (not shown in diagram).

Lift 1—Pile weft, from left to right. Start at the left selvage. The neatest way to do this is to leave the end of the weft hanging out in the first space between raised warps at the left, see Fig. 317. Then take a separate piece of weft, half the normal thickness, loop it round the selvage thread and put it into the shed as shown. This only has to be done at the beginning and ending of a rug.

Cut the weft about 4 inches from the right selvage. Cutting points are shown in Fig. 317 with heavy arrows, the direction of the wefts by fine arrows.

Lift 3—Throw shuttle from right to left. This is the shed which reaches neither selvage.

So leave a tail of weft protruding from the extreme right raised warp group and cut the weft about 2 inches beyond the point where it emerges from the warp group on the extreme left.

Lift 24—Ground weft from right to left (not shown).

Lift 2—Tuck in the weft end (cut at end of lift 1) under the first warp group at the right. Throw shuttle from left to right, leaving a tail protruding from the warp group on the extreme left, and cutting weft (as shown) in the space between warp groups nearest right selvage.

Lift 4—Throw shuttle from right to left. Leave a tail protruding from warp group on extreme right. Do NOT cut weft anywhere.

This is the whole sequence. When shaft 1 is lifted to begin the sequence again, the shuttle is already waiting at the left selvage, so it can be thrown straight across. The beginning procedure with half-thickness weft is not necessary.

*Note*—The above sequence has been designed so that the pile weft shuttle is thrown regularly from right to left and back again.



- The weft is cut at every pick except when shaft 4 is lifted.
- After a little practice the weft will be cut at just the right length, so that little is wasted.

(ii) WITH A WHOLE NUMBER OF THREADING REPEATS, PLUS A HALF REPEAT

Referring to Fig. 319, it will be seen that the four pile weft sheds are similar in type to those described above, but they are produced by raising different shafts, i.e., raising shaft 1 in Fig. 319, gives a similar shed to raising shaft 2 in Fig. 317, raising 3 in Fig. 319 gives a shed similar to raising shaft 4 in Fig. 317. So though the sequence of shuttle-throwing and cutting is identical, different shafts are lifted.

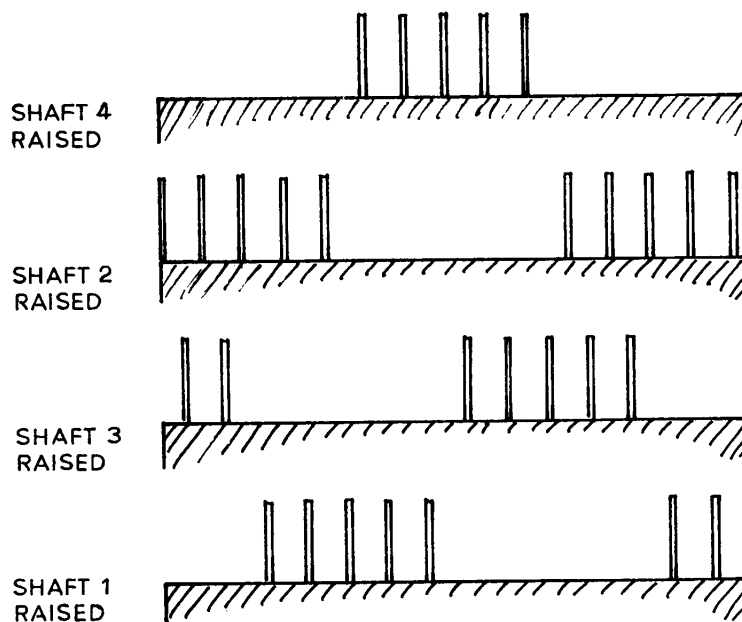


Fig. 319  
Double Corduroy.  
Details of four  
pile sheds when  
woven with  $1\frac{1}{2}$   
threading repeats

- Lift 24—Ground weft, from left to right.
- Lift 2—Pile weft, from left to right. Start at left selvage as described above. Cut at right selvage.
- Lift 4—Pile weft, from right to left. Cut beyond warp group at extreme left.
- Lift 13—Ground weft, from right to left.
- Lift 1—Tuck in end of weft cut when 2 was lifted. Throw shuttle from left to right and cut weft in space between warp groups nearest right selvage.
- Lift 3—Throw from right to left, leaving end protruding at right selvage. Do NOT cut.
- Repeat.

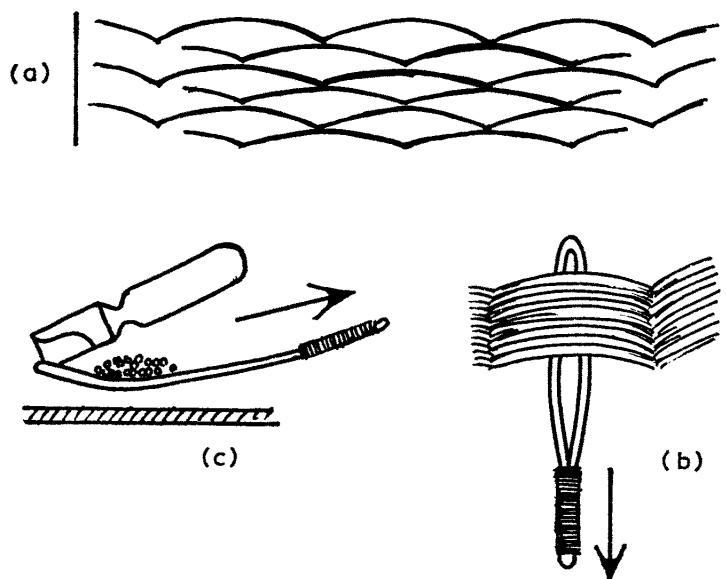


Fig. 320. Double Corduroy. Cutting the floats

So it will be obvious that Fig. 317 can be used as a guide when either type of threading is used. But when a whole number plus half a repeat is used, substitute lift 2 for lift 1, lift 4 for lift 3, lift 1 for lift 2, lift 3 for lift 4.

For either type of threading,

*Note*—The length of pile is controlled as weaving proceeds. If the shortest pile is wanted, simply throw shuttle and beat. If a longer pile is wanted, enlarge the weft floats by hand. Working from the selvage that the shuttle has just left, pull up two adjacent weft floats with the two hands to the required length, then move along one space and repeat. Do this right across the rug. This procedure also controls the tension of the pile weft in the places where it weaves. Remember that the pile will be half the length of the weft float.

The ability to weave a corduroy rug quickly depends largely on the ability to pull up the floats quickly and accurately.

### Cutting Pile

When 2 inches or 3 inches have been woven, the surface of the rug is covered with a series of overlapping weft floats, see Fig. 320 (a). The only way to isolate a vertical column of floats from its overlapping neighbour in order to cut it, is to start at one of the selvages, and then work across to the opposite selvage, cutting each vertical column in turn.

The cutting is most easily done using a wire loop together with scissors or, better still, with a razor blade mounted in a handle. The wire loop is shown in Fig. 321. It is made of stiff wire, about  $\frac{1}{8}$  inch thick, bent as shown and bound with cord at one end to make a handle. This is slid under the column of floats to be cut, i.e., the column nearest one of the selvages, see Fig. 320 (b).

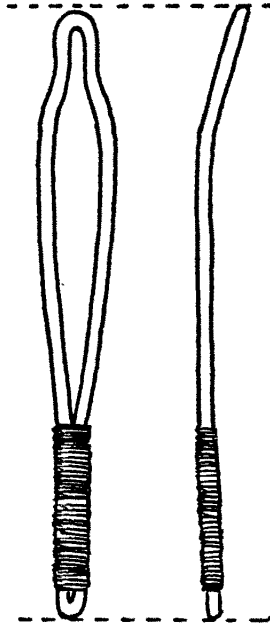


Fig. 321  
Double Corduroy. Wire loop  
for cutting floats

With scissors—Cut through the centre of the floats.

With a razor blade mounted in handle—put the tip of the blade in the wire loop where it projects beyond the last float, and pull both blade and wire loop in the direction of the arrow. Fig. 320 (c) shows this in side view.

In both these methods, raise the loop as far as possible above the ground weave. This puts the floats under tension so making them easier to cut and also lessens the chance of either cutting instrument nicking the ground weave.

*Note*—As the wire loop is slid under each column of floats, it should be forcibly moved from side to side. This helps to isolate these floats from those that overlap it, and helps the weaver to judge the centre of the float for cutting. If the loop will not move freely from side to side, this is a sure indication that an odd thread was left uncut in the previous column.

So the sequence of movements is:

Slide loop under floats.

Move side to side.

Cut.

Slide loop under next set of floats, etc.

It only takes a matter of seconds to cut all the floats across the rug. It does not save time to weave a greater amount (say 5 inches) before cutting, as it is very difficult to manipulate the loop under so many floats.

If no wire loop is available, slide the index and middle finger of left hand under the column of floats from the far side (i.e., first pass them under the last-woven float). Open the fingers and with scissors cut the floats stretched tight between them.

Always cut after a plain weave pick, as this holds the pile weft firmly in place for the cutting. When all the loops have been cut, bang the rug with the hand to make the newly formed pile stand up. Then with sharp long-bladed scissors trim the pile level. This requires some skill as the scissors must be kept parallel with the surface of the rug and their tendency to dip downwards be overcome. It is a good idea as each portion of the rug passes from the breast beam to the knee bar, to give a final trim to the pile which is here hanging downwards and so displaying any discrepancies in length. As the weaver increases in competence, less and less trimming will be needed.

### **Weft Joins**

Joins in the pile weft are made in the centre of a float (as in inlay, see later).

Joins in the ground weft are made by overlapping and bringing the two ends up into the pile. So no darning-in of weft is ever necessary (except at the very beginning and finishing of the ground weft). This contributes to the speed of the method.

### **PRACTICAL DETAILS**

The warp setting and weft thickness depends on the length and closeness of pile required. Two typical examples are given:

#### *Short Close Pile*

Warp—6 e.p.i., single in heald, therefore 6 working e.p.i.

Weft—Ground, 6-ply rugwool.

—Pile, 2-ply carpet wool, used sixfold.

#### *Long, More Shaggy Pile*

Warp—6 e.p.i., alternately double and single in head, therefore 4 working e.p.i.

Weft—Ground, 6-ply rug wool.

—pile, 2-ply carpet wool used ninefold, or thicker.

Thicken the selvage ends in both types by starting with one treble and two double ends, as shown by the healds' eyes in Fig. 322 (a). If the corduroy was of the first type the next heald to the left will contain a single end, if of the second type a double end. Fig. 322 (b) shows how these selvage ends are sleyed in a reed with either 6 or 4 dents per inch.

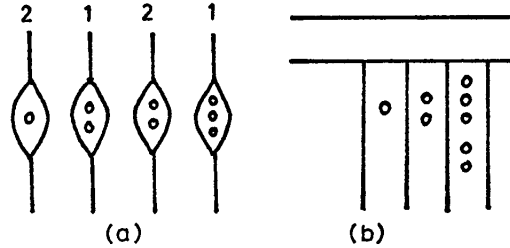


Fig. 322. Double Corduroy. Doubling and trebling of ends at selvage

If a large corduroy rug is to be made by weaving strips and then sewing them together, the threading has to be slightly altered at each selvage. This is to maintain the even spacing of the vertical columns of tufts across the joins between strips.

Fig. 323 shows at A the threading of the right-hand strip. Its last group is cut short by two threads and becomes 4,1,4. At C is shown the threading of the left-hand strip, whose first group is reduced by three threads, to become 1,2. However many intervening strips there may be, they will all have a threading as at B. This has both its first and last groups reduced.

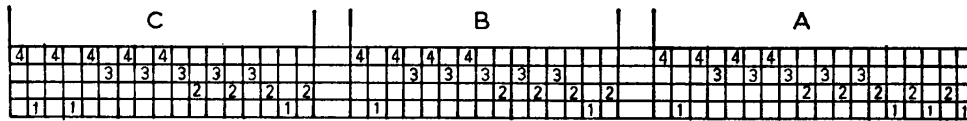


Fig. 323. Double Corduroy. Variations in threading when weaving strips to be sewn together

When sewn together, the 4,1,4, from one strip combines with the 1,2, from the next strip to make up a normal five-end group, and thus the tufts will be evenly spaced.

*Note*—That in Fig. 323 only one repeat of the threading is given for each strip. There would naturally be many repeats and only the first and/or last repeat would be reduced as shown.

**Variations in Double Corduroy**

(i) COLOUR

(a) *Warpway Stripes*

In the descriptions so far given, it has been assumed that only one pile weft has been

used. But interesting things happen when two pile wefts of different colours are used in various sequences.

Consider the floats made by one repeat of the lifting sequence, as shown in Fig. 317. These are shown in Fig. 324 (a), the number over each float being that of the shaft lifted to give that float. When these are cut, they will give the seven tufts, shown in Fig. 324 (b). Now it is obvious that if, say, a black weft had been thrown when shafts 1 and 3 were lifted and a white weft when shafts 2 and 4 were lifted, the tufts will be alternately black and white. And if this sequence is continued, warpway lines of the two colours will result, as shown in Fig. 324 (c).

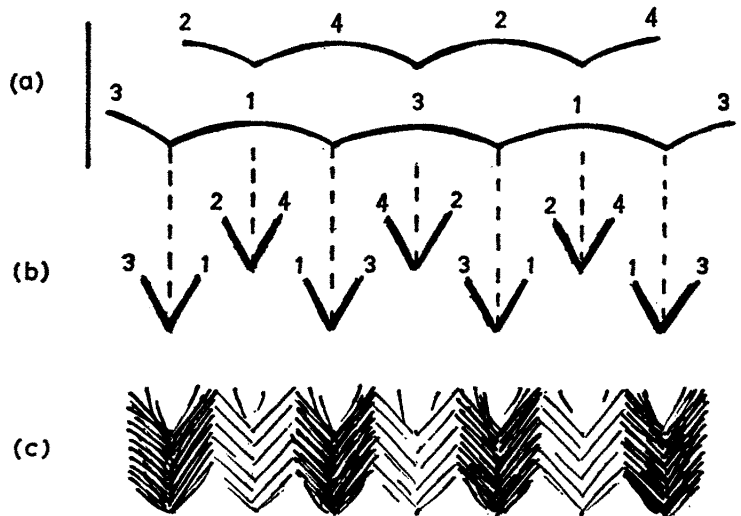


Fig. 324. Double Corduroy. Production of warpway stripes on the pile

*Note*—That these lines appear with simple shuttle throwing; they are inherent in the technique and so are one of the features to be exploited in corduroy rug design.

The stripes described are of equal thickness and they were obtained with an (A,A,B,B) colour sequence.

With a sequence of (A,B,B,B), stripes of solid B colour will alternate with stripes of an A-B mixture.

With a sequence of (A,A,A,B), stripes of solid A colour will alternate with stripes of an A-B mixture.

If the varying sequences are used successively as shown diagrammatically in Fig. 325, then elongated triangular shapes can be produced. These are seen in the photograph of a black and white double corduroy rug, Plate 137.

Because two shuttles are involved in various orders, the details given in Fig. 317 for one shuttle do not apply. There is in fact, a different sequence of actions for each

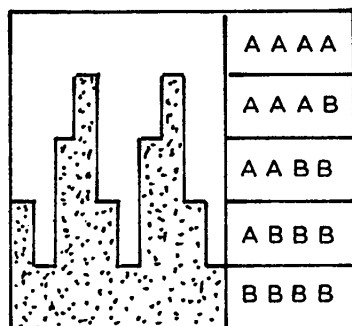


Fig. 325  
Double Corduroy. Varying widths of warpway stripes by varying weft sequences

of the three colour sequences, (A,A,A,B), (A,A,B,B), and (A,B,B,B). When these have been mastered together with the ability to move from one sequence to another, there are no more technical difficulties.

*AABB Colour Sequence*—(warp threaded with whole number of repeats)

Lift 13—Ground weft, from left to right.

Lift 1—Pile weft A, from left to right, cut at right selvage.

Lift 3—Pile weft A, from right to left, cut at left selvage.

Lift 24—Ground weft, from right to left.

Lift 2—Start weft B at right selvage with half thickness weft, and throw shuttle to left, cut as in Fig. 317.

Lift 4—Throw weft B to left. Do NOT cut.

Lift 13—Ground weft, from left to right.

Lift 1—Tuck in the cut end of weft A at right selvage and throw shuttle of A to left. Cut few inches beyond left selvage.

Lift 3—Throw shuttle of A to right. Cut.

Lift 24—Ground weft, from right to left.

*Note*—That the shuttle of B is waiting at left selvage. The shed with shaft 2 lifted (the one that normally follows) cannot be used, as it has no warp group raised at left selvage. So reverse the order of the picks and:

Lift 4—Throw shuttle B, from left to right. Cut.

Lift 2—Throw shuttle B, from left to right. Do NOT cut.

This is the complete cycle.

*Note*—There are eight pile picks in this cycle not four.

—Lifts 2 and 4 can always be reversed if it makes the weaving simpler (as above). This also applies to lifts 1 and 3. The arrows in Fig. 316 are meant to indicate this interchangeability. As in neither of these pairs of lifts does one pick overlap the other, the weave is identical whether the order is normal or reversed.

- The two consecutive picks of weft B always go in the same direction—either both to the right or both to the left.
- A floating selvage is necessary.

*AAAB Colour Sequence*—(with whole number of threading repeats)

When there is only one pick of B to every three of A, it is easiest to put this in the shed with shaft 3 lifted, because this shed reaches neither selvage. So the sequence could be:

- Lift 13—Ground weft, from left to right.
- Lift 1—Weft A, from left to right, but do NOT cut.
- Lift 3—Weft B. Cut.
- Lift 24—Ground weft, from right to left.
- Lift 2—Weft A, from right to left, cut at left.
- Lift 4—Weft A, from right to left, do NOT cut.

The sequence is more complicated if, from the point of view of the design, the single pick of B is required elsewhere; e.g., in shed with shaft 2 lifted. Thus:

- Lift 13—Ground weft, from left to right.
- Lift 1—Weft A, from left to right. Cut.
- Lift 3—Weft A, from right to left. Cut.
- Lift 24—Ground weft, from right to left.
- Lift 2—Weft B, from left to right. Do NOT cut.
- Lift 4—Weft A, from right to left. Do NOT cut.
- Lift 13—Ground weft, from left to right.
- Lift 1—Tuck in end of A left hanging out at right selvage, throw shuttle of A from left to right, and cut it in the space between warp groups nearest right selvage. At this point neither the shuttle of A or a tail of A is protruding from either selvage.
- Lift 3—Weft A, from right to left. Cut.
- Lift 24—Ground weft, from right to left.
- Lift 2—Weft B, from right to left, and cut.
- Lift 4—Weft A, from right to left, and do NOT cut.

The shuttle of weft A is now back at left selvage ready to begin the cycle over again.

*Note*—That by substituting A for B, this also shows how to carry out the (B,B,B,A) colour sequence.

- If the above manœuvres are understood (and this can only really be done on the loom), the reader will be able to work out any other permutations of two or more colours for himself.



—That there must never be a weft float passing from selvage into the rug as shown in Fig. 318 (a). If there is, then some mistake has been made.

See under Inlaying Colours for an alternative way of weaving these colour sequences.

(b) *Mixing Two Colours*

A simple way of mixing two colours, A and B, in the weaving is to have a shuttle of each colour and weave them so that their floats appear in twill lines, see Fig. 326 (a). It is obvious that when these are cut each resulting tuft will have half its yarn from shuttle A and half from shuttle B, see Fig. 326 (b).

A colour sequence of (A,B,B,A,B,A,A,B) produces this twill arrangement. It is a very easy sequence to weave, as it involves less cutting than usual. In fact it is the simplest two colour sequence.

Lift 13—Ground weft.

Lift 1—Weft A, from right to left. Do NOT cut.

Lift 3—Weft B, from right to left. Cut.

Lift 24—Ground weft.

Lift 2—Weft B, from left to right. Do NOT cut.

Lift 4—Weft A, from left to right. Cut.

Lift 13—Ground weft.

Lift 1—Weft B, from right to left. Do NOT cut.

Lift 3—Weft A, from right to left. Cut.

Lift 24—Ground weft.

Lift 2—Weft A, from left to right. Do NOT cut.

Lift 4—Weft B, from left to right. Cut.



(a)



(b)

Fig. 326. Double Corduroy.  
Mixing two colours

*Note*—That in this sequence a weft coming out at the selvage is never cut.

(c) *Inlaying Colours*

In what has been described so far the pile wefts run from side to side of the rug. But it is perfectly possible to interrupt the normal pile weft and inlay a weft of another colour in its place. So blocks and motifs of one colour can be woven on a background of another colour. Fig. 327 shows this diagrammatically. Floats of a light-coloured weft are inlaid in the centre of a rug which consists mainly of a dark-coloured weft.



Fig. 327. Double Corduroy. Inlaying area in centre of rug

The junction between background weft and inlay weft is naturally in the centre of a float. The following sequence is a convenient one, as both shuttles keep up a left to right, right to left sequence, and each shuttle is used for two consecutive picks, thus avoiding the bother of repeatedly changing shuttles in a pick-and-pick sequence. It applies to a warp with a whole number of threading repeats. See Fig. 328 (a) where background weft is shown as black, inlay weft as white.

Lift 13—Ground weft.

Lift 1—Background weft, from left to right, leaving an empty space in the centre. Cut it at right selvage as normally done.

Inlay weft, from left to right, filling the empty space.

Lift 3—Inlay weft, from right to left, weaving only where required in the centre.

Background weft, from right to left, filling in the empty spaces on either side. Cut, as this shed reaches neither selvage.

Lift 24—Ground weft.

Lift 2—Tuck in pick of background weft at right selvage and throw background weft from left to right to meet it, cut it in space between warp groups nearest right selvage.

Inlay weft from left to right.

Lift 4—Inlay weft from right to left.

Background weft from right to left.

Repeat.

*Note*—If the inlay area is very small, it is simplest to wind the yarn in a finger hank and just pass this under the raised warp groups where required.

—An inlaid block can never have hard vertical edges; there will always be two rows of tufts, in which background and inlay colour are mixed, interposed between the inlay area and background. These are shown by arrows in Fig. 328 (b) which represents a cross-section of the rug whose weaving is shown in Fig. 328 (a). An inlaid block can naturally have hard horizontal edges.

The width of an inlay area can be increased very gradually by altering only one of the picks in the sequence at a time. But this is complicated by the four positions the wefts lie in.

The dotted line down the centre of Fig. 328 shows the midline of the inlay area. It will be seen that whereas the inlays in the lower two picks are centred over this area, the inlays in the upper two picks are off-centre, one being to the left, one to the right. The difficulty can best be explained by describing the steps required to increase this inlay area in a symmetrical manner.

(1) When shaft 3 is lifted, inlay white weft under 3 instead of 1 warp group, i.e., the weft stretches further to left and to right, the other three inlays remaining the same. This will increase the width of the area by two white tufts (see Fig. 328 (b))

where there are five white tufts). In other words the two mixed tufts which flank the inlay area will move out one tuft.

(2) With shaft 2 lifted, inlay weft under one more warp group to the right and with shaft 4 lifted, inlay weft under one more warp group to the left. This will have exactly the same effect as the first move, i.e. the area increases in size by one tuft to right and one tuft to left.

(3) With shaft 1 lifted, inlay weft under four ends instead of two; i.e., the weft again stretches further to left and to right.

These are the three stages, which are repeated.

Apart from inlaying large areas, the technique can be used for smaller effects. A colour a little different from the main colour can be inlaid in very small amounts in odd places, to give variety and interest to the whole. Inlay can be used in conjunction with warpway stripes to break their regularity. See Plate 138 where the thick black lines are the result of inlaying black where white would normally be.

*Note*—The difference here between knotted and corduroy technique. The smallest unit in the former is a knot which appears as a spot; the smallest unit in a corduroy rug is a length of weft inlaid under one warp group and the two ends of this appear as two spots.

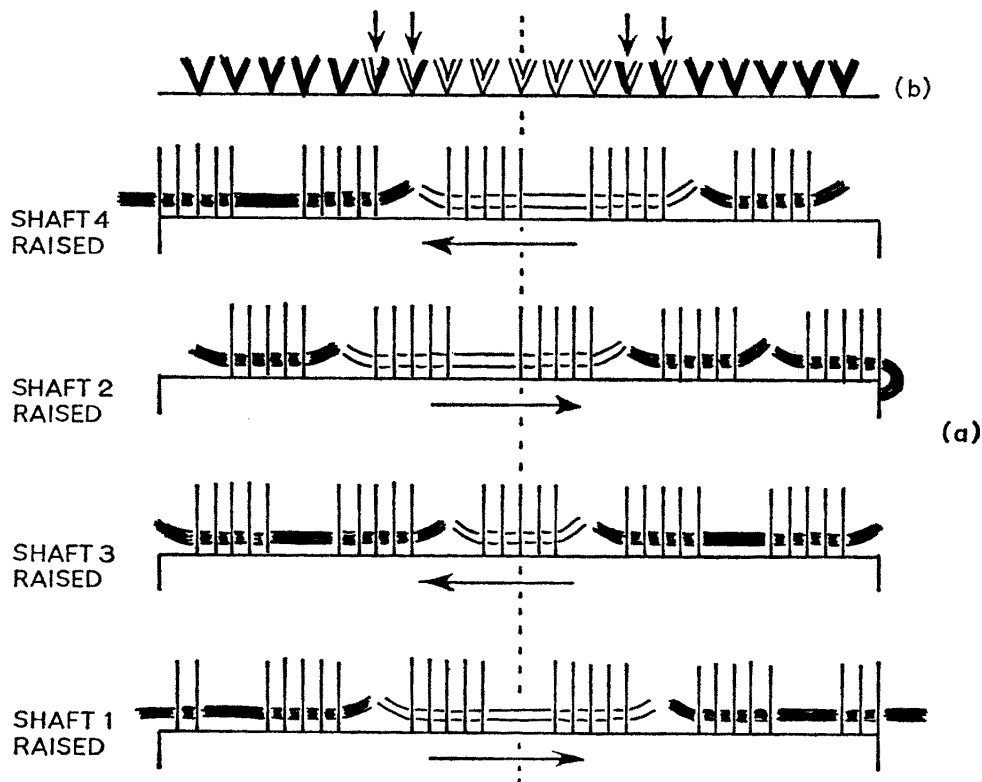


Fig. 328. Double Corduroy. (a) Details of four picks when inlaying (b) Cross-section of inlaid area

Sometimes it is essential to have a single spot of colour in corduroy (e.g., at the point where two angled stripes meet, see later). Fig. 329 shows how this is done. Half thickness pieces of background and inlay weft (dotted line) are linked together and then inlaid under a warp group.

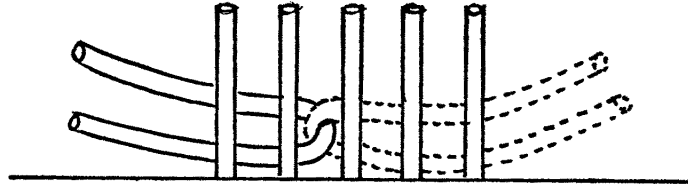


Fig. 329. Double Corduroy. Producing a spot of colour

The inlay principle can be used as a simpler way of managing the varying two-colour weft sequences than those already described. One weft, A, weaves normally (i.e., exactly as in Fig. 317). Where the colour sequence demands the other weft, B, this is inlaid but over as long a distance as possible, i.e., it stops just short of either selvage where colour A takes over. Because weft B never reaches the selvage it cannot confuse the normal shuttle sequence.

The advantages of this method are that the selvage is neater, as no floating selvage is necessary, and that it makes any conceivable colour sequence easy to weave. The drawbacks are that the wefts have to be cut more than usual and that the colour sequences are slightly altered close to each selvage.

## (ii) PILE LENGTH

So far the description has concentrated on obtaining a level even pile. But the pile length can be altered either in the weaving stage (by pulling up the weft floats in varying degrees) or in the cutting stage (by cutting floats off-centre) or by a combination of these two methods. The effects produced in these simple (almost mechanical) ways, add a great deal to the possibilities of corduroy technique, especially when combined with two colours as explained below.

### (a) Alternate Long and Short Tufts

If two consecutive pile picks are pulled up to give long weft floats and the next two pulled up to give short floats, and this is repeated, the situation shown diagrammatically in Fig. 330 (a) is reached. When these are cut in the normal way, the result will be as shown in Fig. 330 (b), tufts with alternate long and short pile. The long pile tufts will stand up as narrow ridges running the length of the rug.

It will be obvious that this type of pile will modify in an interesting way any warp-way stripes in two colours.

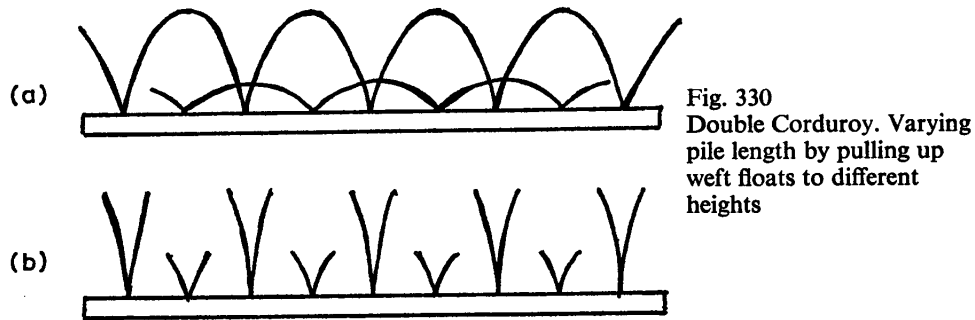


Fig. 330  
Double Corduroy. Varying  
pile length by pulling up  
weft floats to different  
heights

(b) *Cutting Two Adjacent Floats at Once, i.e., 'Double Cutting'.*

Because the vertical columns of weft floats overlap, it is easy to slide the wire loop under two adjacent columns. Starting at the right selvage, ignore the first column of floats (which is the one normally cut for a level pile) and insert the wire loop into the next available opening. This is marked X in the cross-section view in Fig. 331 (a). In this position, the wire loop will not be able to move from side to side as it did with normal cutting. Cut with scissors or razor. It will be obvious from Fig. 331 (a), that of the two columns of floats which are thus simultaneously cut, the right-hand one is cut to the left of centre (giving long pile) and the left-hand one is cut to the right of centre (giving short pile). If this is continued right across the rug, the net effect will be as shown in Fig. 331 (b), i.e., every tuft consists of long and short pile in equal amounts.

*Note*—As two columns are cut at once, there is only half as much cutting with this method.

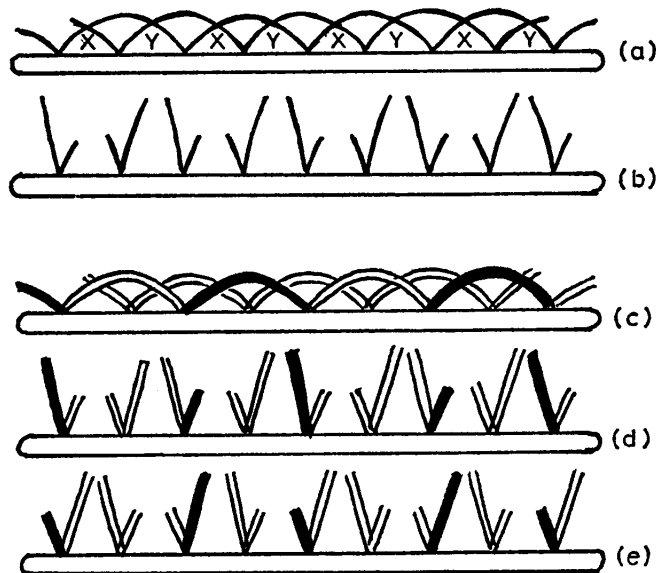


Fig. 331  
Double Corduroy  
(a-b) Varying pile length by  
inserting wire loop  
differently  
(c-d) Combining above with  
colour sequence of  
(A,A,A,B)

When the rug is newly-woven or has just been shaken, this cutting tends to give warpway lines of short and long pile (as suggested by Fig. 331 (b) ). But the general effect when the rug is in use is of an uneven shaggy pile, which has a more luxurious look than a level pile rug, although containing exactly the same amount of wool. This uneven character can be increased by sometimes cutting as described, and sometimes inserting the loop one opening to the right, marked Y in Fig. 331 (a).

These two positions for double cutting give interesting results when combined with two colours in an A,A,A,B, sequence. Fig. 331 (c) shows the cross-section where B is black and A is white. If these floats are cut in the X positions, then tufts appear as in Fig 331 (d). The long black pile will show on the surface of the rug, but the short black pile will be almost completely hidden. So the effect will be of thin warpway stripes of black on a white background, but at twice the normal distance apart. If the floats are cut in the Y positions, the tufts appear as in Fig. 331 (e). Where there was a short black tuft there is now a long tuft and vice versa; so the thin warpway stripe of black will appear in the intermediate position. Plate 139 shows these two positions of the black stripes clearly.

An interesting development is the production of twill lines in the pile. These result quite automatically from a combination of the two positions of double cutting with varying colour sequences in the pile weft.

A warp is threaded with a whole number of repeats plus three quarters of a repeat. This is so that the colour effects can be centred on the rug. There are four stages, in whose description the normal plain weave picks have been omitted for clarity's sake.

Stage 1: Lift 1—Weft A  
Lift 3—Weft B  
Lift 2—Weft A\*  
Lift 4—Weft B

Start double cutting to the left of the first tuft at the right selvage (i.e., in the Y position as described above), and continue all the way across the rug.

Stage 2: Lift 1—Weft A  
Lift 3—Weft B  
Lift 2—Weft B  
Lift 4—Weft A\*

Start double cutting to the left of the second tuft in from the right selvage, i.e., in the X position.

Stage 3: Lift 1—Weft B  
Lift 3—Weft A  
Lift 2—Weft B  
Lift 4—Weft A\*

Double cut as in Stage 1

Stage 4: Lift 1—Weft B  
Lift 3—Weft A  
Lift 2—Weft A\*  
Lift 4—Weft B

Double cut as in Stage 2.

Each stage can be repeated as many times as desired, and then cut, before moving on to the next stage. The angle of the twill naturally depends on this number of repeats.

*Note*—That the cuts are always made where a column of weft A loops overlaps a column of weft B loops.

—That if in the four picks with asterisks the colour is changed from A to B, the twill lines will appear thinner.

—That repeating any of the stages many times will give warpway stripes of equal thickness. These stripes will be twice the width of those obtained by normal cutting.

The rug in Colour Plate 111 shows twill lines produced in this way. Note that the lines have been confined to the centre of the rug by inlaying the appropriate wefts.

### (c) Cutting Floats Off-Centre

Another development is to insert the wire loop normally (i.e., under one column of floats at a time), but to cut the floats either to the right or to the left of their midpoints.

Starting from the right selvage, cut the first two columns to right of centre and next two columns to left of centre and continue thus all the way across the rug. These cuts are shown diagrammatically in Fig. 332 (a); Fig. 332 (b) shows the resulting tufts,

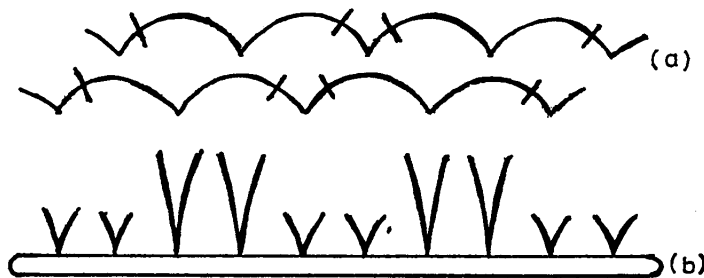


Fig. 332. Double Corduroy. Varying pile length by cutting floats off-centre

two short alternating with two long. So this will give warpway ridges but of twice the scale of those obtained by method (a). The cutting is very simple and just as quick as normal cutting. The wire loop is inserted, moved from side to side and then pushed hard over to the right or left as required and the cut made in that position.

Starting from the right selvage the positioning of the cuts, described above was—to right, to right, to left, to left.



III. Corduroy rug with wool pile showing twill lines produced by double cutting, see page 416



Diagonal ridges, can be produced by varying this sequence thus:

- right,right,left,left, (repeat ad lib)
- right,left,left,right, (repeat ad lib)
- left,left,right,right, (repeat ad lib)
- left,right,right,left, (repeat ad lib)

The angle of the diagonal ridge will depend on how many times each of the above four sequences is repeated. If the sequence is reversed the diagonal will lie in the opposite direction. Ridges appearing as chevrons, diamonds, curves can all be cut on this principle. See Plate 140.

*(d) Combining Long and Short Floats with Off-Centre Cutting*

This method is a little more complicated, but enables the weaver to produce broad ridges of long and short pile. The sequence is as follows:

Lift 1—Pull up weft so that the floats are alternately very large and very small (and tight), see Fig. 333 (a). One way to do this accurately, is to pull up the floats to the normal extent and then go across pulling up every other float, taking in the slack from the intermediate ones.

Lift 3—Pull weft up normally.

Lift 2—Pull up weft as for lift 1, to give alternately large and small floats.

Lift 4—Pull weft up normally.

The floats will now look as in Fig. 333 (b), i.e., two columns of large floats, two of small and four of normal ones.

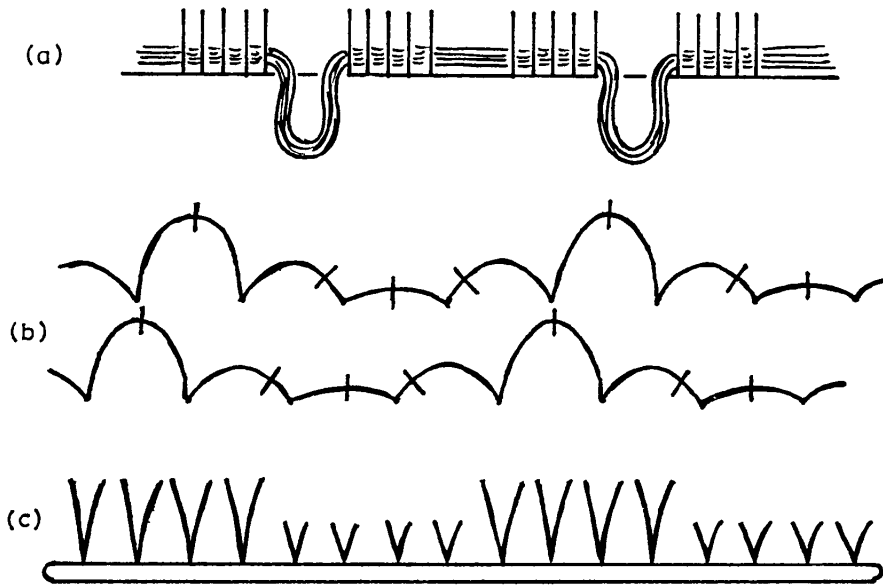


Fig. 333. Double Corduroy. Varying pile length by combining off-centre cutting with floats of different lengths

Now cut the extra large and extra small floats centrally, but cut the normal floats to right or to left of centre according as they lie to the right or left of an extra large float. If they lie immediately to the right then cut to the right of centre, etc., see Fig. 333 (b). So starting from the right-hand side in Fig. 333 (b) the cutting sequence will be:

centre, centre, to right, to right, centre, centre, to left, to left

and this will be repeated all across the rug. Fig. 333 (c) shows that this will give four short pile tufts alternating with four long pile tufts. So the rug will show warpway ridges twice the width of those obtained in method (c). As in that method, these warpway ridges can be made to lie obliquely.

The above four methods will give an idea of the range of possibilities in this aspect of corduroy technique. By extension or combination of these methods, the possibilities are further increased. Their use with two colour effects has only been touched on and is another large field for exploration.

### (iii) THREADING DRAFT

#### (a) *Shortening or Extending Whole Draft*

It was mentioned at the beginning of this section that the threading draft could be shortened or extended, by diminishing or increasing the ends in each overshot block. If shortened, the vertical lines of tufts will be closer together, but the pile weft will weave for a shorter distance and so be less securely held.

If lengthened, the vertical lines of tufts will be further apart and the pile weft will be more securely held, as it will weave for a longer distance.

The pile can be the same length in both cases, because its length is controlled by the weaver's hands as the floats are pulled up.

#### (b) *Extending One Block in Draft to give Areas of Pile and Flat Weave*

The draft is made up of four overshot blocks. If any of these is considerably increased in size, while the other three remain unchanged it will lead to extra large floats in certain areas of the rug.

In Fig. 334 (a), the threading has been altered by increasing the block on shafts 3 and 4. This gives rise to long floats when the other two shafts viz. 1 and 2 are lifted. These extra long floats are cut in the weaving to avoid wastage of yarn. When the normal floats are cut, there will be tufts as shown in Fig. 334 (b), i.e., there is a flat area opposite the threading block of increased size. All that has been done structurally is to increase the width of the small area of flat weave that normally lies between two adjacent columns of tufts.

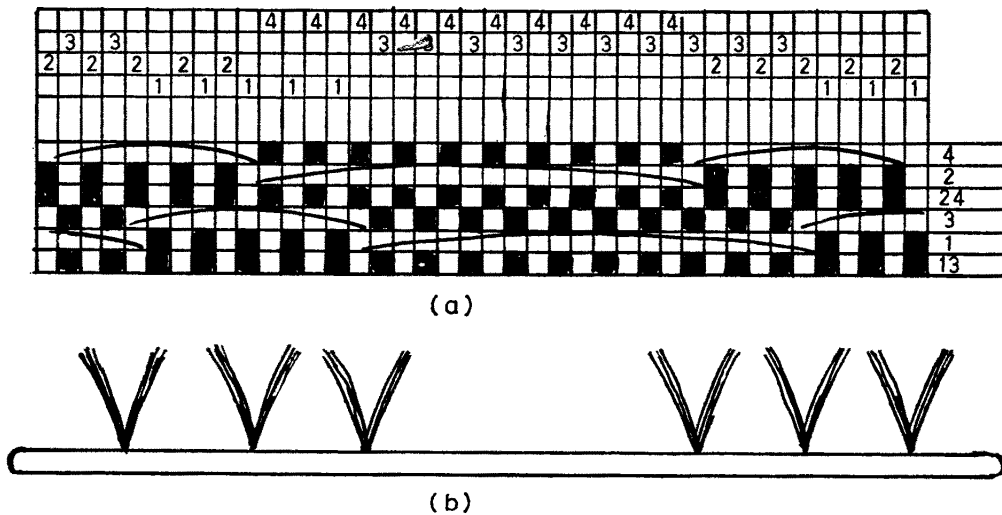


Fig. 334. Double Corduroy. Extending one overshoot block in threading draft.  
 (a) Weave Diagram (b) Resulting tufts

By this means blocks of pile and flat weave of any desired width can be woven. As the positioning of these blocks is shaft-controlled, they naturally cannot be altered during the weaving of a rug.

(c) *Pointed Draft giving Long and Short Pile*

The pointed draft shown in Fig. 335 (a) (worked out by Pat Tindale) has forty ends in a repeat. Each shaft carries ten ends, these ends appearing as a single group on shafts 1 and 3, but as two 5-end groups on shafts 2 and 4. It is due to these features that two lengths of pile are produced. Fig. 335 (a) shows the weave plan, with normal length floats when shafts 2 and 4 are lifted, but double length floats when shafts 1 and 3 are lifted. These are shown in a cross-section of the rug in Fig. 335 (b).

It will be apparent that the arrangement of floats calls for a different method of cutting. Starting from the right selvage, insert the wire loop in the position marked X in Fig. 335 (b). It goes under a column of normal floats which is itself straddled by (and partly hidden by) a column of long floats. Both these sets of floats are then cut together. The wire loop then moves to the right and slides under a column of normal floats and cuts them (position Y in Fig. 335 (b)). Moving to the right it repeats its first manoeuvre, i.e., cuts a set of long and normal floats together, and so on across the rug. The resulting pile is shown in Fig. 335 (c); a long tuft is always flanked by two normal tufts.

It will be obvious that this method can be combined with two pile wefts, i.e., the long pile could be a different colour from the short pile.

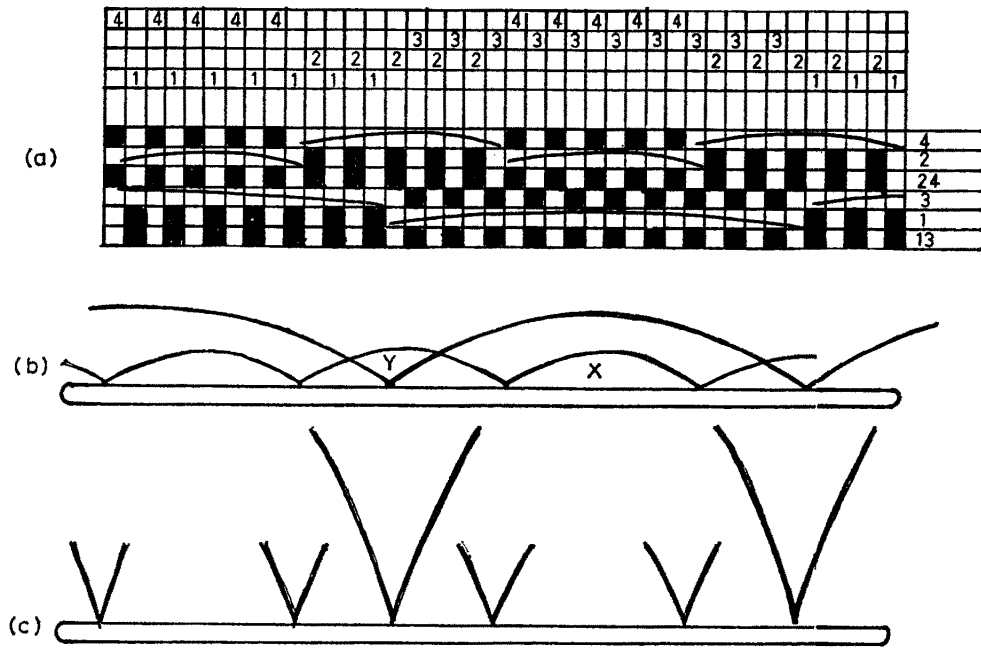


Fig. 335. Double Corduroy. Using pointed threading draft to give long and short pile

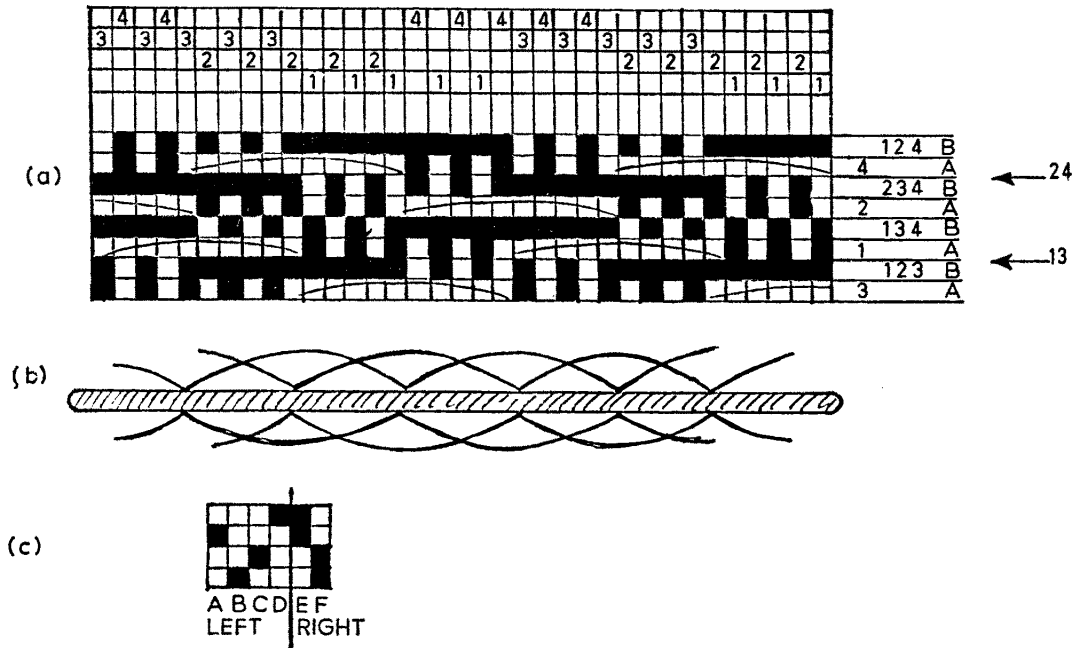


Fig. 336. Double-faced Corduroy. (a) Weave Diagram (b) Cross-section (c) Pedal tie-up

---

**(iv) DOUBLE-FACED CORDUROY**

It is obvious that if lifting one shaft at a time gives weft floats on the face of the rug, lifting three shafts at a time will give comparable floats on the reverse of the rug. Thus raising shafts 1, 2, 3, and 4, gives weft floats in four positions on the front and raising shafts, 123, 234, 341 and 412 gives similar floats on the back. The problem is to combine these two sequences in some order that gives a soundly constructed double-faced weave.

The lifts and weave plan of one solution are seen in Fig. 336 (a). The face floats are shown by curved lines as usual, and the reverse floats occur whenever there is a row of filled squares on the point paper. Both face and reverse floats are inserted in a broken twill order. Fig. 336 (b) shows a cross-sectional view.

The weave is quite sound as it stands, without any plain weave, but if two plain weave picks are inserted as shown by the arrows to the right, it will be further strengthened. This is a case where the weaving is simplified if the threading repeat is split in an abnormal way. In fact it is best to use a whole number of repeats plus threequarters of a repeat (i.e., end at left selvage with a group on shafts 3 and 4, as shown in Fig. 336 (a)). This enables a shuttle sequence to be established in which back and front pile wefts move in a regular and related manner. If shuttle A holds the face pile weft and shuttle B holds the reverse pile weft, the sequence is:

Lift 3—Shuttle A to the right. Cut.  
Lift 123—Shuttle B to the right. Cut.  
Lift 1—Shuttle A to the right.  
Lift 134—Shuttle B to the right.  
Lift 2—Shuttle A to the left. Cut.  
Lift 234—Shuttle B to the left. Cut.  
Lift 4—Shuttle A to the left.  
Lift 124—Shuttle B to the left.

Both wefts have to be started at the left selvage in the normal way (using half thickness wefts as described before), at the beginning of the rug; thereafter they are only cut as indicated.

Even if the rug is to be the same colour both sides, a separate weft is necessary for front and back pile picks.

There are some problems dealing with the reverse pile picks.

(a) The weft floats cannot be pulled up in the normal way; but if the fingers are pushed through the warp, they can control the size of the floats adequately.

(b) Cutting the back floats. All the floats are left uncut on the back of the rug. When the rug is taken from the loom, stretch it, back side uppermost on a table or nail it to the floor and cut all the loops in this position.

## PRACTICAL DETAILS FOR DOUBLE-FACED CORDUROY

Warp—5 working e.p.i.

Weft—2-ply carpet wool, used ninefold.

With a countermarch loom, ten pedals (two for plain weave) will be needed. With a counterbalanced loom use a direct tie-up and both feet. A neat method of tying up a jack loom is shown in Fig. 336 (c). The four left pedals are controlled by the left foot, the other two by the right foot. The sequence then is:

	<i>Shafts lifted</i>	—	<i>Pedals used</i>
	3	—	A
	123	—	A+F
→	1	—	B
	134	—	B+E
	2	—	C
	234	—	C+E
→	4	—	D
	124	—	D+F

Plain weave, A+B and C+D, can be inserted where shown by arrows.

## (v) COMBINATION WITH OTHER PILE TECHNIQUES

(a) *Knotted Pile*

Pile can be knotted into the warp at any point, either to give additional colour or additional thickness of pile.

(b) *Cut Pulled-up Loops*

It may have occurred to some readers that the structure of corduroy pile could be exactly duplicated (though more slowly) by pulling up weft loops and cutting them. If the corduroy pile in Fig. 337 (a) and the pulled-up loops in Fig. 337 (b) are cut as shown, they will both give the identical result, viz. the pile in Fig. 337 (c). So these two methods of pile production are well suited to be combined.

Probably the most interesting application of this idea is to pull-up the loops half-way between the normal corduroy tufts. If this is combined with pile wefts in two colours, the resulting warpway stripes, already described, can be made to lie obliquely, see Plate 138. (The same structure can be achieved with eight shaft corduroy—see later.) Fig. 338 shows the four stages in this process and these will be described in detail.

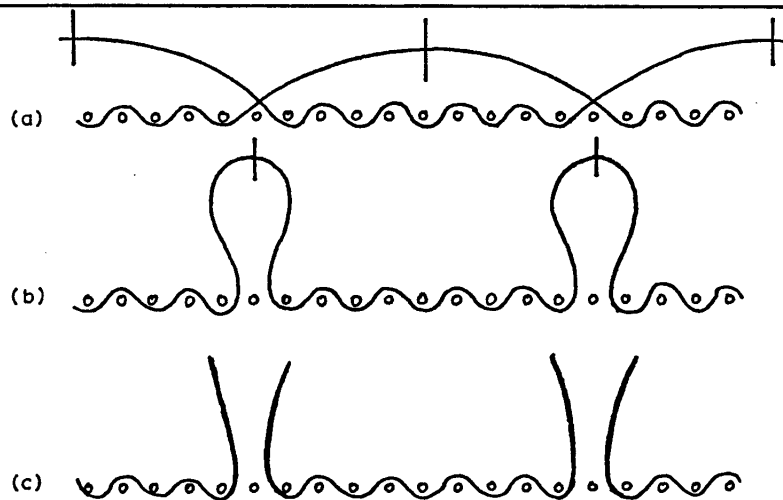


Fig. 337. Double Corduroy. Comparison of pile given by corduroy method and by cutting pulled-up loops

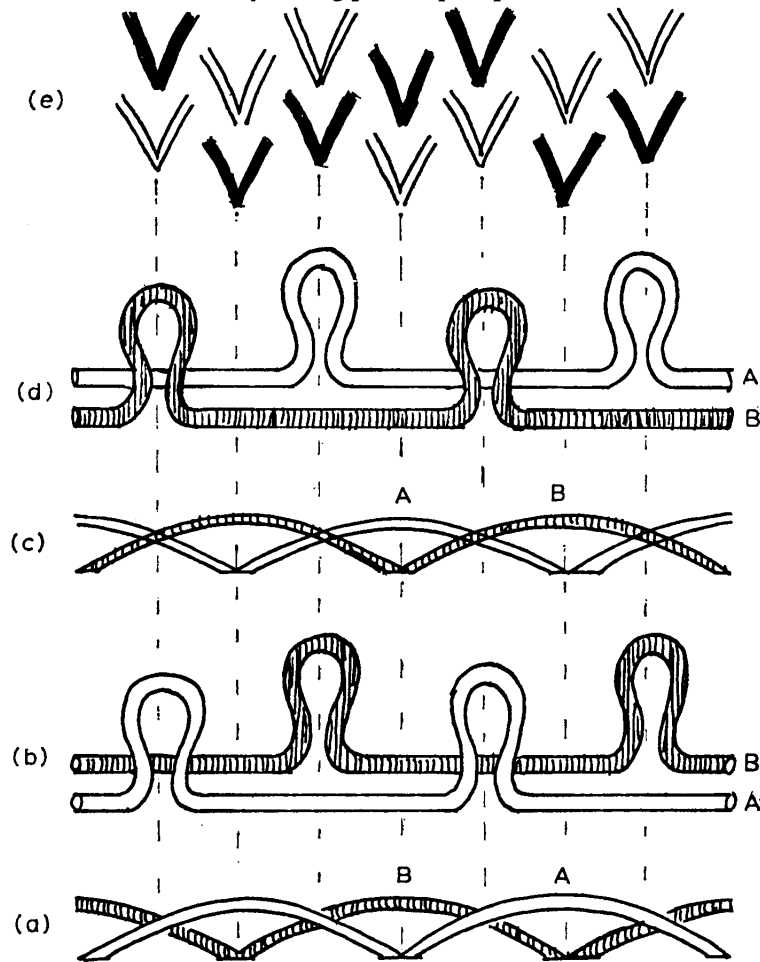


Fig. 338. Double Corduroy. Combining cut pulled-up loops with corduroy pile to give oblique colour stripes

**Stage 1.** See Fig. 338 (a)

- Lift 13—Ground weft.
- ↳ Lift 3—Pile weft, colour A. (White).
- ↳ Lift 1—Pile weft, colour A.
- Lift 24—Ground weft.
- ↳ Lift 4—Pile weft, colour B (Black).
- ↳ Lift 2—Pile weft, colour B.

This is the normal sequence to give warpway stripes. Repeat this, say, three times. Arrange it so that after the final repeat the wefts run from selvage to shuttle (i.e., that there are no cut ends hanging out), and so that one shuttle is at the right selvage, and one at the left. This may involve reversing the order of the pile picks, hence the arrows above.

**Stage 2.** See Fig. 338 (b)

Lift 13—Ground weft.

Then in same shed, throw pile weft A and pull up loops. The loops are pulled up one warp interspace to right or left of the points from which spring the corduroy floats of the same colour. If pulled up to right, the stripes will incline upwards to right, if pulled up to the left, then to the left. See Fig. 339 from which all ground wefts have been excluded for clarity. The last repeat of four pile picks, two of A and two of B are shown, together with weft A in the plain weave shed.

Now the warp interspaces from which spring the colour A corduroy floats are labelled with an O. So the loops are either pulled up in the interspaces to the right

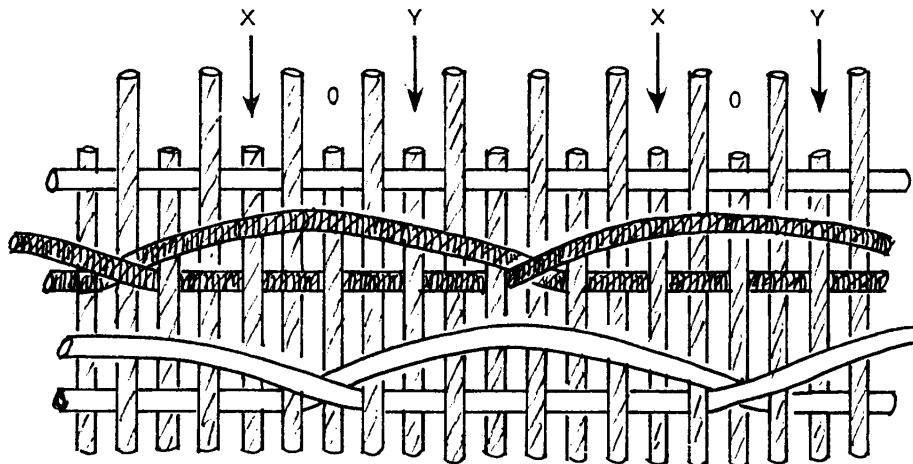


Fig. 339. Double Corduroy. Showing position for pulling up loops in relation to corduroy pile picks



(arrowed Y) or in the interspaces to the left (arrowed X). Or, if converging oblique lines, as in Plate 139, are wanted, then some of the loops are pulled up to left and some to right. In Fig. 338 (b) the loops are pulled up to the right.

Lift 24—Throw ground weft.

In same shed throw colour B and pull up its loops exactly halfway between the A colour loops. This is shown in Fig. 338 (b).

Repeat three times.

**Stage 3.** See Fig. 338 (c)

Lift 13—Ground weft.

Lift 1—Colour B.

Lift 3—Colour B.

Lift 24—Ground weft.

Lift 2—Colour A.

Lift 4—Colour A.

Repeat three times.

This is the corduroy sequence again but with colours reversed (see Fig. 338 (c)). As B is the last colour used in Stage 2 and the first used in Stage 3, there are two consecutive picks of B at the junction between these stages. End exactly as in Stage 1, with shuttles at opposite selvages and no weft ends hanging out.

**Stage 4.** See Fig. 338 (d)

Lift 13—Ground weft.

In same shed, throw colour B and pull up loops one warp interspace to right of points from which spring the colour B corduroy floats.

Lift 24—Ground weft.

In same shed throw colour A and pull its loops up half-way between B's loops.

Repeat three times.

This is the whole sequence, which can be repeated over and over again. When floats and loops are cut, tufts as shown diagrammatically in Fig. 338 (e) will be the result, forming black and white stripes running obliquely up to the right.

*Note*—Cut each stage as it is completed. It is easiest to cut the loops with scissors.

—Each stage can be repeated as often as wanted. Repeating each three times gives an approximate 45° slant to the stripes.

The thick black lines in Plate 138 were achieved thus:

In Stages 1 and 3 (corduroy sequences), by inlaying black weft, where white would normally go, in appropriate places.

In Stages 2 and 4 (pulled-up loop sequences), by pulling up black loops twice as close together as normal and pulling up no white loops in these areas.

It will be seen that this is quite a free way of designing in oblique stripes, as the direction of the angle can be altered at will. Although corduroy on eight shafts gives a much faster way of producing oblique stripes, it lacks this freedom.

**B. Using Five Shafts**

A corduroy can be woven on a five-shaft extension of the Spot Weave threading. The closeness of the tufts makes it a double corduroy, but this closeness is achieved without overlapping of the weft floats. The pile wefts weave for about the normal length (passing under six raised warp ends) but float for less than the normal distance (passing over only five ends instead of eleven). So the floats have to be well pulled up by hand to give a reasonable pile length.

The details are shown in Fig. 340 (a). Two plain weave picks with ground weft are followed by two pile picks labelled A and B. Then two more ground weft picks are followed by another two pile picks, C and D, in different positions.

The positioning of the four weft floats in the above repeat leads to interesting effects when two colours are used.

If, as shown in Fig. 340 (a), pile picks A and C are black and pile picks B and D are white, the resulting tufts would be as the top line in Fig. 340 (b). Continuing this

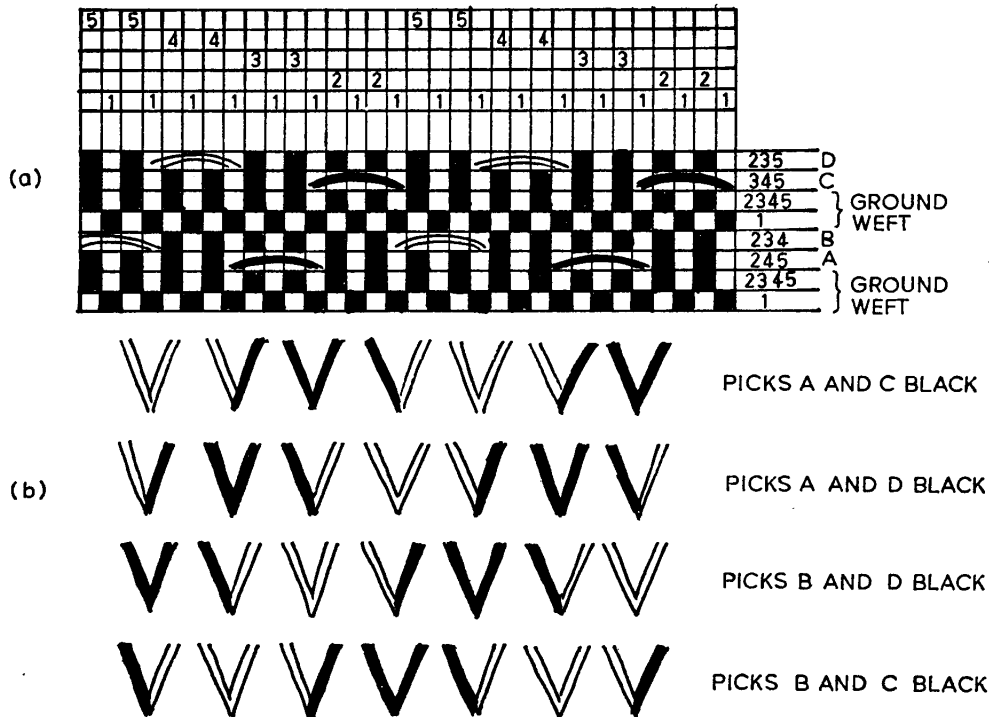


Fig. 340. Double Corduroy. Using a five-shaft draft.

(a) Weave Diagram

(b) Colour of tufts with different weft sequences

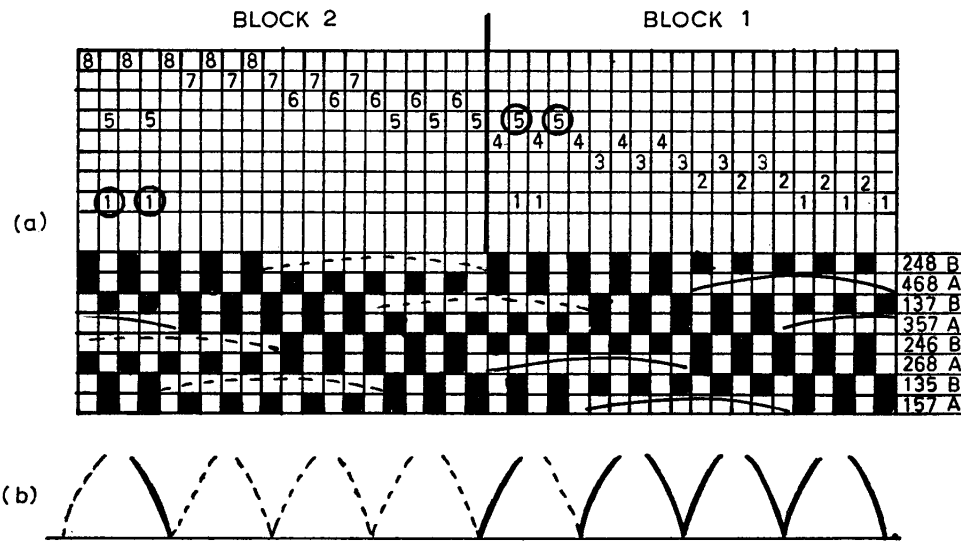


Fig. 341. Double Corduroy. Using eight shafts to give Single-Faced Block Weave.  
 (a) Weave Diagram  
 (b) Colour of tufts

sequence gives warpway stripes of black and white. But note how they differ from the normal four-shaft corduroy warpway stripes. Here there is a tuft of mixed colour interposed between each solid colour tuft. This makes the stripes appear wider and less clear-cut. See Plate 141 at bottom.

As Fig. 340 (b) shows, there are three other positions the black and white stripes can take up, depending on which two picks are black and which two are white. If these positions are used in sequence, the stripes will naturally lie obliquely, inclining up to the right or left, see Plate 141 (top).

It will be seen from Fig. 340 (a) that all the pile picks lie in sheds related to one of the ground weft sheds—viz. that given when shafts 2, 3, 4 and 5 are lifted together. It is only the two picks of ground weft with shaft 1 lifted that counter and lock these sheds. This leads to some untidiness at the selvages as the thick pile wefts are always entering and leaving the same shed and so passing over or under two ends. A floating selvage is of course necessary.

#### PRACTICAL DETAILS

Warp—6 e.p.i., alternately single and double in heald, therefore 4 working e.p.i.

Weft—Ground—6-ply rug wool.

—Pile—2-ply carpet wool used ninefold.

### C. Using Eight Shafts

#### (i) BLOCK WEAVE

##### (a) *Single-Faced*

The normal double corduroy threading is entered on the front four shafts and repeated ad lib to form the first block, the same threading is then entered on the back four shafts and repeated for the second block. See Fig. 341 (a). Where one block runs into the next, thread on the encircled shafts, i.e., end Block 1 on 4,5,4,5,4, instead of 4,1,4,1,4, and end Block 2 on 8,1,8,1,8, instead of 8,5,8,5,8. Alternate the two blocks across the warp, ending on the same block as the one that starts the threading.

As with the single corduroy block weave, there is no ground weft and the two coloured pile wefts (A and B) are used alternately. Fig. 341 (a) shows the lifts and the resultant weft floats. The tufts given by the latter are shown below in Fig. 341 (b).

*Note*—There are two tufts of mixed A and B colour at the junction between the blocks.

- The narrowest possible blocks (i.e., one threading repeat on front four shafts and one on back four shafts as in Fig. 341 (a) ) give only two tufts of colour A, two tufts mixed, then two tufts of colour B.
- Threading more than one repeat will increase the number of single-colour tufts, but not the number of mixed-colour tufts.

#### PRACTICAL DETAILS

Warp—4 or 5 working e.p.i.

Weft—2-ply carpet wool used ninefold.

The tufts are separated from each other in the warp direction by the thickness of the pile weft not forming tufts in that area. So the pile tends to be thin. This can be partly countered by pulling up the floats well and so giving a good length of pile.

##### (b) *Double-Faced*

This block weave has corduroy pile on both sides, the colours reversing on the back. So each of the two wefts has to form floats on the face in one block and on the reverse in the other block. Fig. 342 (a) shows the lifts and weave plan, and Fig. 342 (b) shows a cross-section with the resulting tufts. Where there is a colour A tuft on the front, there is a colour B tuft on the back and vice versa. Where there is a mixed colour tuft on one side, there is also a mixed colour tuft on the other side. As might be imagined, the shuttle sequence is a little complex and it is given in detail below. The sequence works best if the final repeat of Block 1 at the left edge of the rug ends on the 3,4,3,4,3, group, not the 4,1,4,1,4, group as is normal. So there is threequarters of a threading repeat at the left selvage.

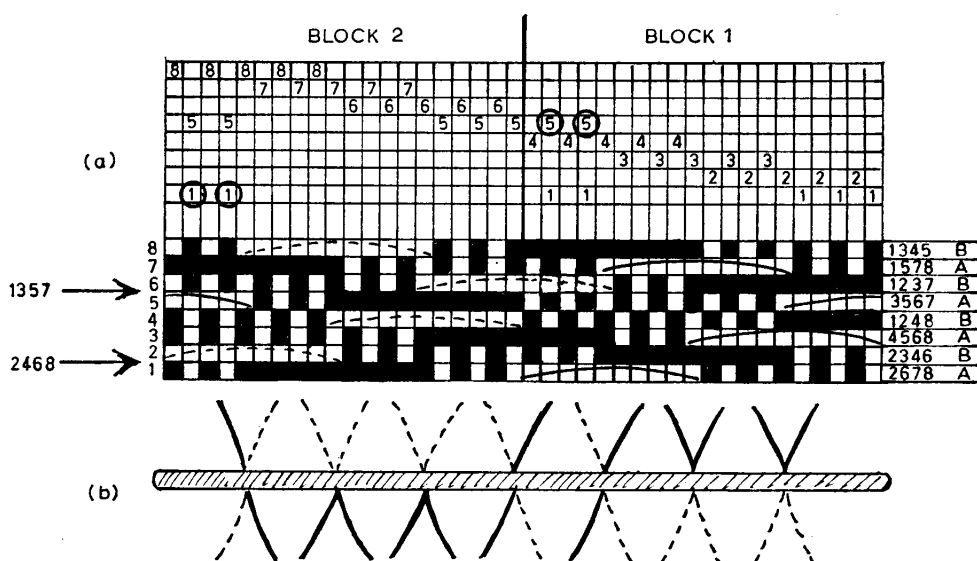


Fig. 342. Double Corduroy. Using eight shafts, to give Double-Faced Block Weave.  
(a) Weave Diagram. (b) Arrangement of tufts on two sides of the rug

Lift 2678—Weft A, from right to left. Start in normal way at right selvage. Cut at left.

Lift 2346—Weft B, from right to left. Start similarly at right selvage. Cut at left.

Lift 4568—Weft A, from right to left. Do NOT cut.

Lift 1248—Weft B, from right to left. Do NOT cut.

Lift 3567—Weft A, from left to right. Cut at right.

Lift 1237—Weft B, from left to right. Cut at right.

Lift 1578—Weft A, from left to right. Do NOT cut.

Lift 1345—Weft B, from left to right. Do NOT cut.

If this is followed exactly no floating selvage is necessary.

*Note*—There is no ground weft. But as shown by the arrows in Fig. 342 (a) a plain weave pick can be inserted (with shafts 2468 raised), between picks 1 and 2 and another (with shafts 1357 raised) between picks 5 and 6.

The tie-up for a countermarch loom is given at Fig. 343 (a). This would have to be altered if at any point in the design one colour all the way across on the face, with another colour all across on the reverse were wanted. With a jack loom the tie-up

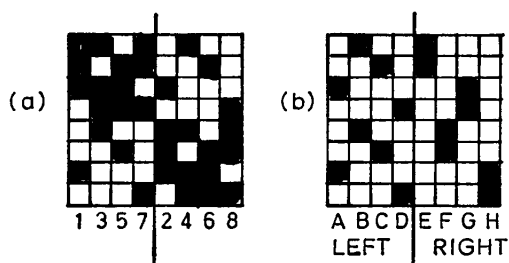


Fig. 343  
Double Corduroy. Pedal  
tie-ups for weave in Fig. 342

given in Fig. 343 (b) will do both these things. The left foot uses the four left pedals, the right the four right pedals.

The sequences are:

For block weave:

A+E  
A+F  
B+G  
B+H  
C+G  
C+H  
D+E  
D+F

For one colour all across on back and on front:

A  
A+E+F  
B  
B+G+H  
C  
C+G+H  
D  
D+E+F

#### PRACTICAL DETAILS

Warp—6 e.p.i., alternately 4 single and 1 double in heald, therefore 5 working e.p.i.

(This fits in well with the threading, which is in five-end groups)

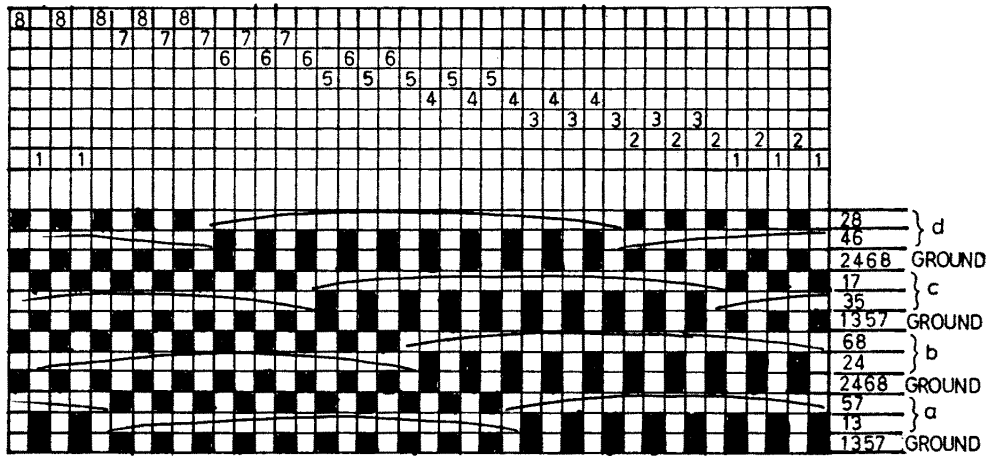
Weft—2-ply carpet wool, used ninefold.

#### (ii) TWILL CORDUROY

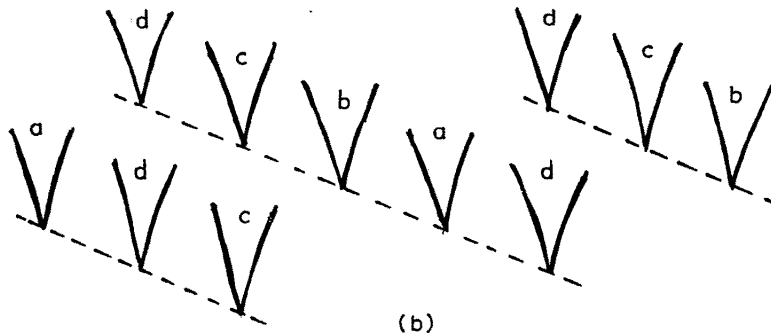
With four shaft corduroy, the tufts resulting from wefts thrown with shafts 1 and 3 raised, alternate in position with the tufts from wefts thrown with shafts 2 and 4 raised, i.e., there are only two positions for the tufts to emerge. If the threading is extended onto eight shafts as shown in Fig. 344 (a), there are four possible positions for the tufts. The threading repeat includes forty ends, five being on each shaft.

The lifts and resulting weave plan are shown in Fig. 344 (a). As in normal corduroy, a ground weft in plain weave is always followed by two pile weft picks. These pairs of pile picks have been labelled a, b, c and d in Fig. 344 (a). Fig. 344 (b) shows the resulting tufts similarly labelled; i.e., tuft, a, is the result of pile picks, a.

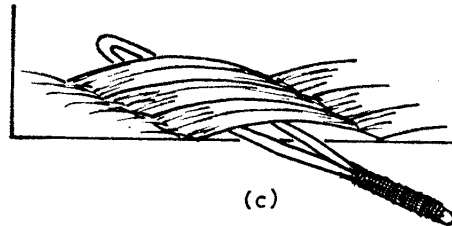
*Note*—That each pile weft weaves for twice the normal distance, therefore it is very securely held.



(a)



(b)



(c)

Fig. 344  
Twill Double Corduroy.  
(a) Weave Diagram  
(b) Arrangement of tufts  
(c) Cutting floats at an angle

- That it also floats for twice the normal distance, therefore it tends to give a long pile.
- That there is twice as much distance in a warp direction between one float and the next float in a similar position. Therefore the tufts are twice as much separated, warpway, as normal. The long pile (mentioned above) helps to make up for any resulting sparseness of tufts.

Now if pile wefts a,b,c,d were all different colours, the result would be warpway stripes of these four colours. This is one obvious possibility, but more interesting things can be done by using only two colours in different sequences.

The four positions of the tufts are exactly analogous to the four positions of the weft floats in a 2/2 twill. From this it follows that all the colour and weave effects obtainable with a 2/2 weft-face twill are also obtainable with twill corduroy.

These effects will naturally be on a far larger scale in corduroy and some of the more intricate ones will be blurred by the length of pile. But they all are possible, and so this is a very large field for exploration.

Plate 142 shows the two simplest colour sequences used in 2/2 twill, viz. (A,A,B) and (A,B,B). When applying these colour sequences to twill corduroy, remember that A or B, signifies 'two consecutive pile picks of A or B', since it needs two pile picks to make one tuft. So the colour sequences are really twice as long as written.

### Cutting the Pile

This can be done normally starting at one selvage, and sliding the wire loop under each vertical set of floats, in turn. Or the wire loop can be slid at an angle under an oblique set of floats as shown in Fig. 344 (c). The latter method can be started anywhere, not necessarily at a selvage. It is probably easier to cut the loops centrally with the normal method.

#### PRACTICAL DETAILS

Warp—6 working e.p.i.

Weft—2-ply carpet wool used seven or eightfold.

The threading can be reduced to twenty-four ends (three on each shaft) as shown in Fig. 345. The only effect this has is to draw the tufts closer together in the weft direction. So it is more suitable if a short dense pile is wanted.

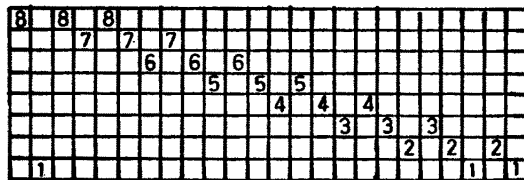


Fig. 345  
Shortened form of Eight-Shaft  
Double Corduroy threading

### (iii) HALF CORDUROY

This is called Half Corduroy on analogy with half-rya and half-flossa techniques, which combine areas of flat weave with areas of pile.

The details are shown in Fig. 346. The threading is as for twill corduroy. The lifts and weave plan show that as usual one ground weft is followed by two pile wefts.

The floats are shown by lines. Floats produced when only one shaft is lifted are



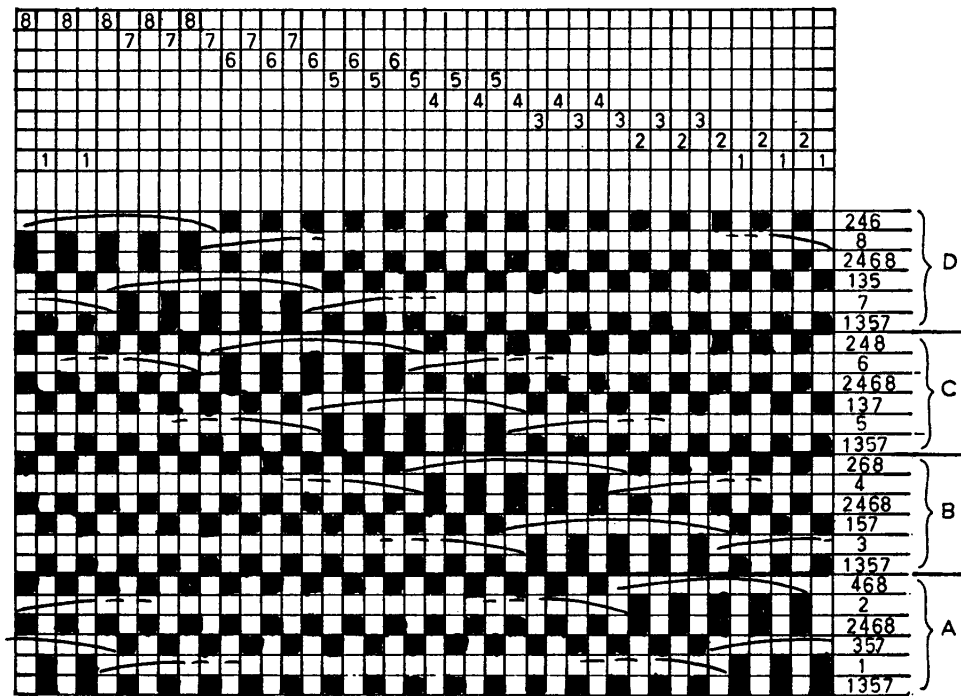


Fig. 346. Half Corduroy. Weave Diagram

exceedingly long and so are cut, during weaving, to save yarn. These are shown terminating in dotted lines.

The lifts have been grouped in sixes and, for convenience, labelled A, B, C and D. Each of these groups is a self-contained unit and can be repeated any number of times. The groups can follow each other in any order. If the weave were used exactly as shown, i.e., A,B,C,D, repeat, it would give alternating stripes of pile and flat weave which slope up to the left. They could be made steeper by weaving 2A,2B,2C,2D. The stripes could be made wider with the following sequence

- (A,B) × 2 or 3 or 4
- (B,C) × 2 or 3 or 4
- (C,D) × 2 or 3 or 4
- (D,A) × 2 or 3 or 4

Alternating checks of pile and flat weave result from repeating A many times, then C many times.

A pointed threading draft will vary the slope of the stripes across the warp. Using a D,C,B,A, sequence will reverse the slope of all the stripes. In other words it behaves just like a twill.

**PRACTICAL DETAILS**

Warp—6 e.p.i., alternately double and single in heald, therefore 4 working e.p.i.

Weft—Ground—6-ply.

Pile—2-ply carpet wool used ninefold.

Use a floating selvage.

The flat weave parts of a corduroy are usually not weft-face, due to the great thickness of the weft. So the warp is almost bound to show. To avoid it appearing as spots, use a warp of the same general colour as the weft.

#### **4. OTHER WEFT PILE TECHNIQUES RELATED TO CORDUROY**

##### **A. Inlaid Fleece or Other Long Fibre**

Fig. 347 shows one of the ways that short lengths of fleece or other material can be inlaid in a plain weave shed, leaving their ends hanging out to form a pile. Each piece is passed under six raised ends, and overlaps the preceding piece as shown. An odd number of plain weave picks then follow (only one is shown in Fig. 347). Pieces are laid in again, using the same shed as before, but this time the inlay position is shifted two ends to one side. This results in the pile appearing in the intermediate position.

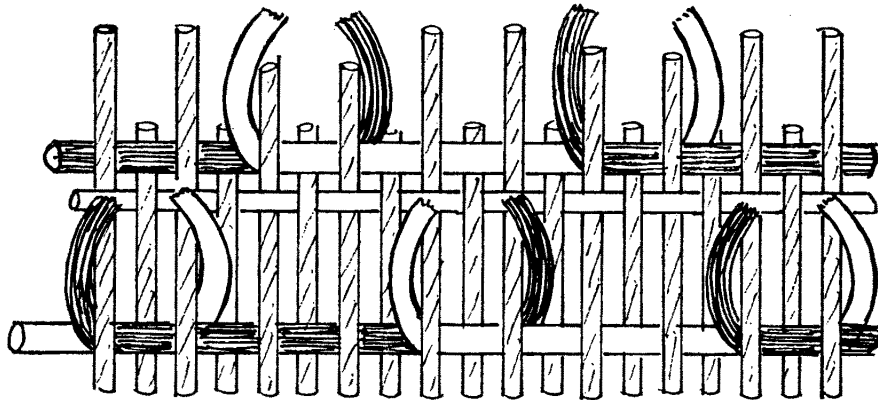


Fig. 347. Producing pile by inlaying short lengths of yarn

As each piece is laid in by hand, there is ample opportunity for varying colour sequences. If the pieces laid in are alternately of two colours, and the colours are made to shift sideways in each succeeding inlay pick (as do the black pieces in Fig. 347), then twill lines of the colours will be produced. At a less mechanical level, pieces can be inlaid to give blocks and motifs exactly as with inlay corduroy.

The structure of this technique is almost exactly similar to five-shaft corduroy and in fact the latter was derived from this technique.

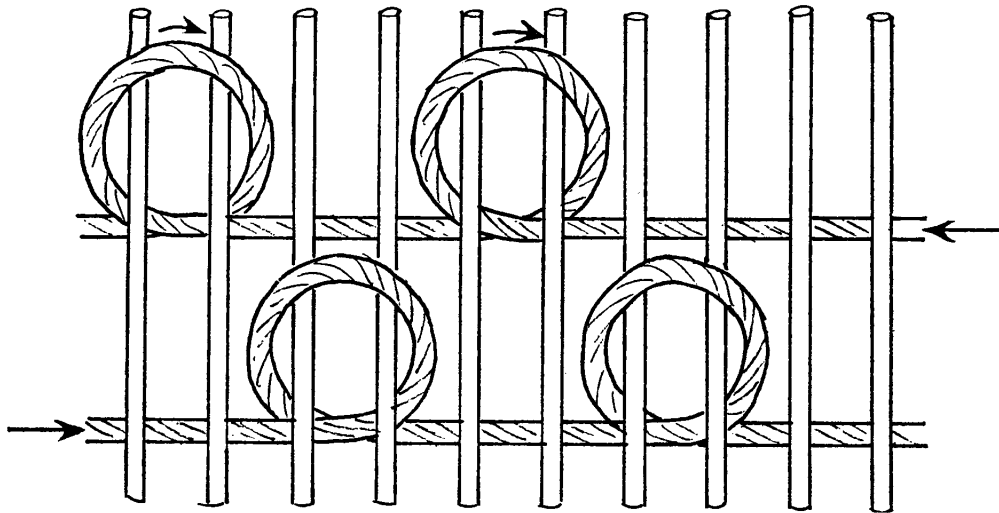


Fig. 348. Method of wrapping loops to be cut for pile

### B. Cut Wrapped Loops

(i) An exactly similar structure to the preceding can be produced with a continuous weft as shown in Fig. 348. The technique is a modification of wrapped loops (see Chapter 6). With a shed open, the weft is passed forwards, under six raised ends, and backwards over two ends, forwards under six, backwards over two, etc. An odd number of picks of plain weave follow (not shown in Fig. 348). The looping is then repeated but, in this row, bring the weft out in the intermediate positions, so that the loops are staggered as shown. The loops are cut to give the pile.

(ii) An alternative method gives a structure very like normal double corduroy, except that no plain weave ground weft is required. In this the weft is passed forwards under ten raised ends and backwards over five, and this is repeated all across, see Fig. 349. The shed is then changed and the weft returns in a similar manner but making loops in the intermediate positions. The loops are cut to give pile.

*Note*—There are two thicknesses of the weft in both sheds, all the way across the warp. This is very obvious in the upper row in Fig. 349.

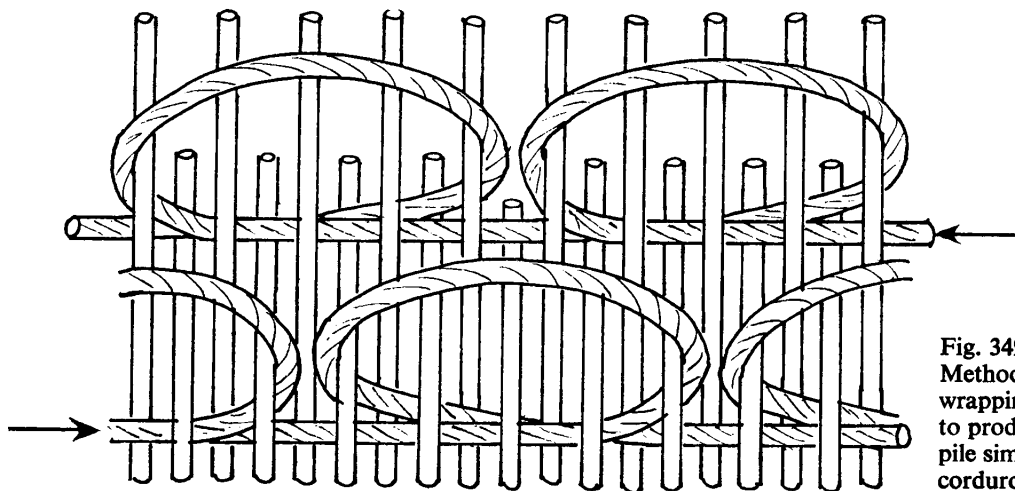


Fig. 349  
Method of  
wrapping loops  
to produce cut  
pile similar to  
corduroy

Fig. 350 (a) shows the way to begin and end a weft, so that this double thickness is preserved right up to the selvage. Fig. 350 (b) shows how the weft is carried up from one row to the next in order to preserve this double thickness. Naturally if two colours are used in alternate rows it is simpler to begin and end each row as in Fig. 350 (a).

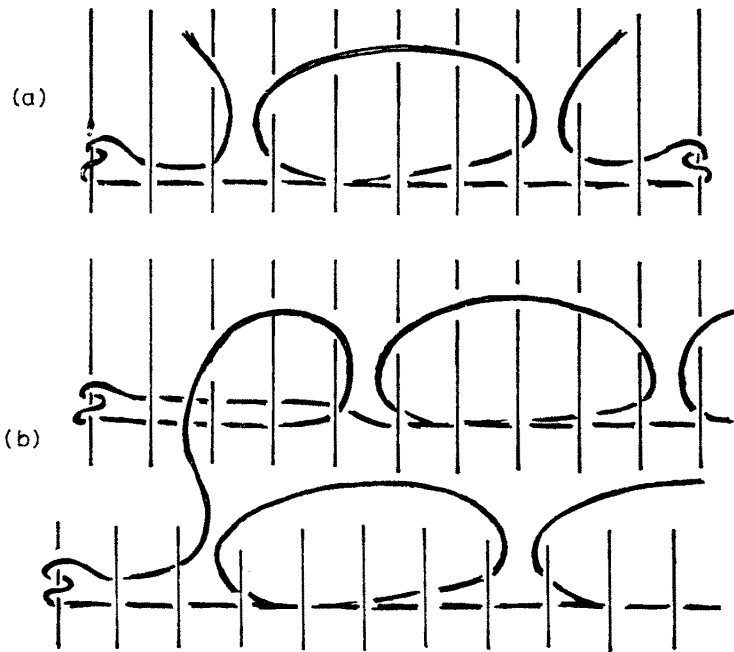


Fig. 350  
Method of starting and finishing a row and jumping up from one row to the next when using wrapping technique shown in Fig. 349.

There are other possible arrangements of the loops. For instance, they could be made in twill order (in which case all the 2/2 twill colour and weave effects are possible—see Eight-Shaft Twill Corduroy), or in broken twill order or arranged as in twill on opposites. The technique is slow but very free. The absence of a plain weave weft makes it very simple to use.

#### PRACTICAL DETAILS

As these methods only need the two plain weave sheds, they can be carried out on the simplest looms or rug frames. Warp settings of from 4–6 working e.p.i. are suitable, with weft consisting of 2-ply carpet wool used six to ninefold.

#### C. Using Stick and Leash Loom

This is an application of single corduroy to a shaftless loom or frame, in which the two plain weave sheds are obtained by alternately pulling leashes forwards and twisting a shed stick on edge. So it can be performed on very primitive equipment.

Leashes are generally tied to a leash-rod, so that all the ends they encircle can be raised at once. But for this technique they are tied up in bundles of five leashes, so pulling up a bundle raises five ends. There should be an odd number of such bundles in the width of the rug.

The odd-numbered bundles have been labelled A, and the even-numbered ones B, in Fig. 351. A ground weft and two pile wefts (1 and 2) are necessary.

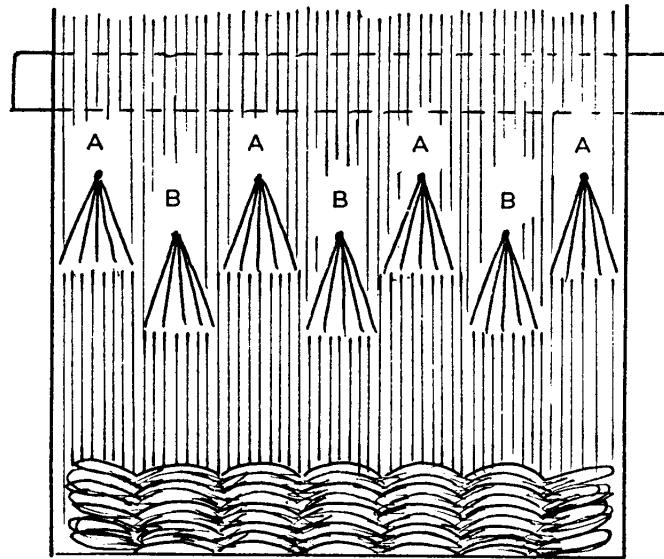


Fig. 351. Weaving Corduroy on a stick and leash loom

Start by weaving in plain weave, alternately twisting the stick and pulling up *all* the leashes for the two sheds. End with a pick in the leash shed, then the sequence is:

Pull A leashes only, and throw pile weft 1, start it at one of the selvages in the normal way. Note that it is lying in a normal corduroy shed, i.e., weaving for some distance then floating for the same distance.

Pull B leashes, throw pile weft 2. This pick floats where the previous one wove and vice versa. It reaches neither selvaige.

Twist stick—ground weft.

Pull A + B—ground weft.

This sequence is repeated, pile weft 1 always weaving from selvaige to selvaige, pile weft 2 never reaching either selvaige. The latter leaves small loops at each side as in single corduroy. Pull up the floats to the required size.

The floats and side loops are shown at the bottom of Fig. 351, and they are cut to form the pile.

All other details of this technique are as for Single Corduroy.

## 11 · Warp-face Rugs of all Types

---

### INTRODUCTION

The warp-face technique has traditionally taken lowest place in the hierarchy of rug weaving methods. This is chiefly due to the fact that, when such a rug is woven in plain weave on the traditional two-shed rug loom, the design is limited to warpway stripes. But wherever hard-wearing properties have been the chief consideration, the warp-face technique has been chosen and used with success. Thus even today it is seen in the fabric for Bedouin tents, for carpet and storage bags and for simple, peasant rugs.

The technique is little used by present-day rug weavers, but when woven in non-traditional materials (e.g., mohair) and in weaves other than plain weaves, it has a great deal to offer. In addition, the speed at which a warp-face rug grows on the loom (with maybe only three picks per inch), commends it highly to professional rug weavers.

Whereas in weft-face rugs, the closely packed weft hides the widely spaced warp, in a warp-face rug it is the closely-crammed warp that completely hides the weft. This would suggest that a piece of weft-face plain weave rug could be turned through a right angle, making weft into warp and vice versa, and then be used as a guide from which to make an exact copy in warp-face technique. But this overlooks an important fact. It is impossible to weave a warp-face rug with the warp ends as close together as are the weft picks in a weft-face rug. With warps so closely set, shedding would be impossible. So the warp has to be opened to a setting that is practical and the consequent loss of weight in the rug made up by using a very heavy weft. Thus the warp-face warp bears some relation to the weft-face weft, being merely set differently; but the warp-face weft differs markedly from the weft-face warp, being far heavier.

Making these adjustments, almost every weft-face weave in which the wefts travel from selvage to selvage can be woven as a warp-face technique. So the field is large and awaits the weaver who learns the simple process of converting weft-face to warp-face.

## 1. GENERAL TECHNICAL DETAILS

### A. Warping

Making the warp is designing the rug. Any colour stripes or changes in yarn will run the whole length of the rug, only being modified by the weave structure. So as much care and thought must go into this stage as goes into the selection of wefts when weaving a weft-face rug. If a block weave is to be used, this demands special sections in the warp in which two colours alternate, end-and-end. (See later.) No extra ends are needed at the selvages. The warp will be very bulky and should be made in 6 inch wide sections if a warping board or mill is being used.

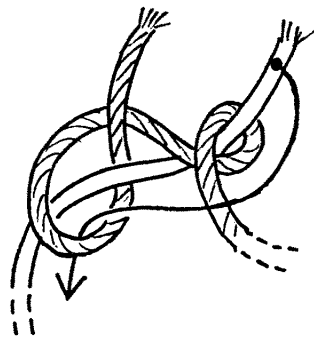


Fig. 352  
A double weaver's knot

Knots should be avoided in the warp, especially with a slippery worsted yarn (such as belting yarn or mohair). Where knots are unavoidable, tie one of the double weaver's knots as a normal weaver's knot is bound to work loose in the weaving. Fig. 352 shows a simple one.

### B. Beaming

Again due to its bulk, the warp presents problems in the beaming stage. If wound on normally with occasional warp sticks, the threads at either edge are bound to slip and spread when the full weaving tension is applied. Four large headless nails driven into the beam at each edge of the warp will prevent this from happening. Place the two sets of nails at exactly the correct distance apart, see Fig. 353 (a). A more professional way is to use two circular flanges of wood or metal which can be slid along the beam to the required positions and fixed. If the warp sticks are placed up against the nails, as shown in Fig. 353 (b), then the pull of the warp during weaving cannot shift them.

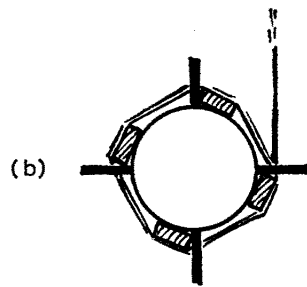
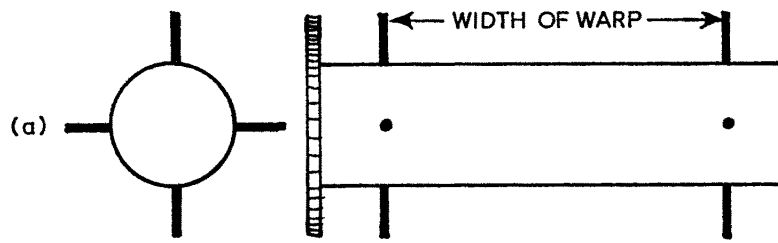


Fig. 353.  
Warp-face Rugs. Method of preventing the warp spreading on the beam

**C. Drawing-In**

The unit of warp that is drawn through one heald may be one very thick yarn, or two, three or four thinner yarns. In either case, the healds must have large eyes (so string healds are preferable to wire) and a special threading hook will have to be improvised. The unit of warp is not doubled or trebled at the selvage.

**D. Number of Shafts Used**

With the warp settings suggested, shedding will be found almost impossibly difficult if only two shafts are used for plain weave, and especially if the yarn has tough, protruding hairs. So the threadings shown in Fig. 354 (a), which spread the ends over four, six, or eight shafts should be employed. In all these, plain weave results from raising

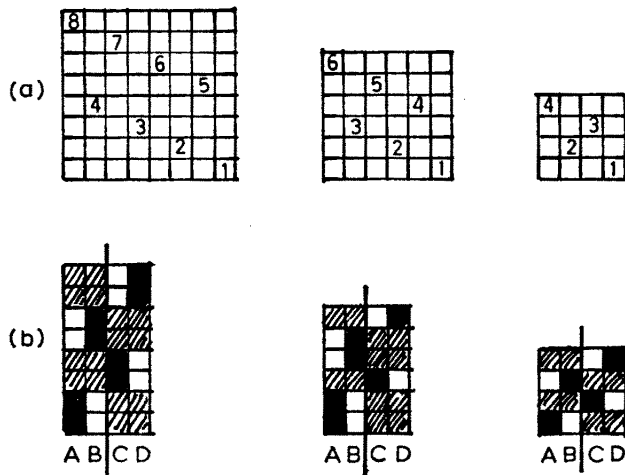


Fig. 354  
Warp-face Rugs.  
Threading drafts and pedal tie-ups



alternately the back two, three or four shafts and the front two, three or four shafts. These threadings reduce the motion between adjacent shafts normally found with straight drafts. Other weaves can be similarly spread over all the available shafts.

### **E. Sleying**

The choice of reed is a compromise. In order to clear the shed between picks, it would be ideal to have one warp unit in every dent. But the warp unit would probably stick in such a narrow dent, and moving the batten would be very difficult. So in order to have an easily-swinging batten, as many warp units as possible should go in a dent, e.g., three or four.

Two units in a dent is the usual compromise. Sley the selvage as the rest of the warp.

### **F. Tying to Front Stick**

If 2 inch wide strips of warp are tied as with weft-face weaves, the knots will be impossibly bulky. So tie strips  $\frac{1}{2}$  to  $1\frac{1}{2}$  inches wide. Trim the warp ends after the knots are tied, to avoid an unequal build-up when the knots reach the cloth beam.

### **G. Pedal Tie-Up**

To make the shedding easier with plain weave, have two pedals responsible for each shed. Then using two feet, press first one then the other, so that the actual shedding is divided into two actions.

The pedal tie-ups for a countermarch loom are shown in Fig. 354 (b). Remember that a filled square means a pedal-to-lower-lam tie, an empty square means a pedal-to-upper-lam tie, and a shaded square means no ties. The same plans can be used for jack looms if the shaded squares are disregarded. A four-shaft counterbalanced loom is tied as shown, again disregarding the shaded squares.

The left foot controls pedals A and B, and the right C and D. So one shed is obtained by pressing first A, then C; the other by pressing first B, then D. If the batten is swung after pressing A and again after pressing C, the shed should be clear.

### **H. Batten**

The batten should be weighted as heavily as possible because a warp-face rug requires the hardest beat of any type of rug. In a weft-face weave, the batten has to force a slack weft between relatively rigid and widely spaced warp ends. But with a warp-face weave, the batten has to force a thick, tight weft as far as possible between closely-set warp ends.

In a weft-face rug, the beat-up is cumulative, i.e., the batten still exerts a compressing effect on picks about  $\frac{1}{2}$  an inch from the fell. This is absent with a warp-face rug, where the batten only affects the actual pick it is driving home, and maybe the previous one.

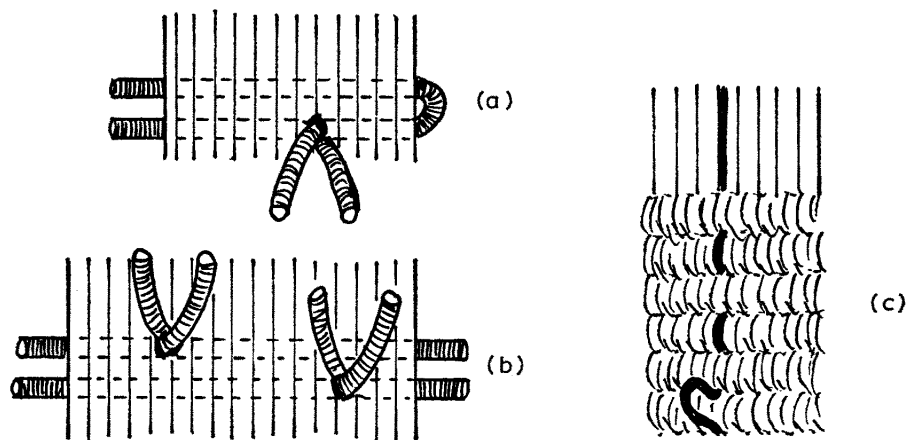


Fig. 355. Warp-face Rugs. (a) and (b) Beginning and joining wefts. (c) Correcting a loose end

### I. Weaving

As the warp is closely set, it only requires two or three picks to space the ends out beyond the front stick. The Double Twined Edge is now worked across and the rug proper begins.

To start the weft, split it into two halves. Bring one half out of the shed about 3 inches from the selvage, in the space between two raised warp units. Take the other half around the selvage thread, back into the shed and bring it out in the same warp interspace as above, see Fig. 355 (a). In other words, the two halves do not overlap, as in a weft-face rug. In fact, if they did overlap they would make an obvious bulge in the weave. These ends naturally cannot be darned down a warp end; as they are firmly held by the closely set warp, it is perfectly safe to cut them off flush with the rug's surface.

Weft joints are made similarly with no overlap, see Fig. 355 (b).

There is no tendency for a warp-face rug to become narrower during weaving, so a temple is never necessary. In fact, if the weft is laid in loosely, the rug may increase in width. The weft should run straight from selvage to selvage at a tension sufficient to restrain this tendency of the closely set warp to spread. The best way to achieve this is the following:

Throw shuttle from right to left. Leave a loop of weft at the right selvage.

Beat once to clear the shed. Draw the loop of weft into the shed by pulling on the weft at the left selvage; at the same time force the shed wide open at the right selvage with the right hand. The returning loop of the weft can then be correctly adjusted for tension and position. This is practically impossible, if the weft is simply thrown and beaten in one operation as with weft-face rugs.

Beat again.

With the batten still against the fell of the rug, change the shed in two stages (first pedal A, then pedal C).

Open the shed. If it sticks anywhere, ease it open with the hands, working between the batten and the shafts.

Push batten away and throw shuttle from left to right, leaving a loop of weft at the left selvage, as above. Beat. Adjust loop. Beat again.

This is the complete sequence of weaving a plain weave warp-face rug.

If, for any reason, an individual end becomes loose (e.g., caught by the shuttle), draw the slack down into the woven rug for a few inches, with the help of a needle point, see black end in Fig. 355 (c). Then darn the loop sideways into the weft.

Remember that as weft joins are so simple, it is best to use lightly filled shuttles which will easily negotiate the slightly troublesome shed.

Occasionally examine the back of the rug to make sure that there are no long warp floats. With a close-set warp, a small fault on the back of the rug gives no sign of its presence on the front.

After the final pick, repeat the Double Twined Edge and then cut the warp an inch or so beyond it.

## **2. WARP-FACE RUGS IN PLAIN WEAVE**

### **A. Colour Blending**

As the warp generally consists of several yarns used as one, the colour blending and colour plying ideas described for weft-face rugs can be used to add variety and richness to the warp.

### **B. Tied and Dyed Warps**

The warp can be tied and dyed in two main ways.

#### **(i) IN HANK FORM**

This produces a haphazard mixture of two or three colours, as was used in some Peruvian warp-face weaves.

#### **(ii) IN WARP FORM (See Fig. 356)**

Make the warp on a frame, so that it can be stretched out full length though not necessarily full width. Insert a cross at both ends of the warp as it is being made. Bind the warp with thick cotton yarn where the dye is to be excluded, see Fig. 356. The crosses can be made use of during the tying. Thus, if, in one area, only the even-numbered ends are tied, it will produce a block of end-and-end cross stripes.

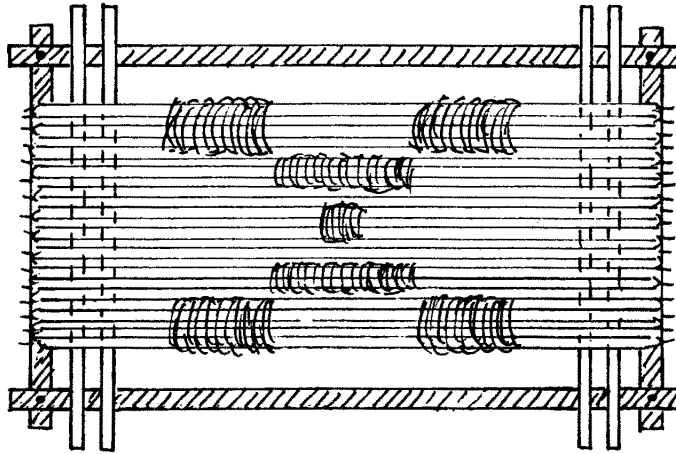


Fig. 356. Warp-face Rugs. Tie-dyeing warp on a frame

Tie both crosses and insert a string in the loops at both ends of the warp. Remove the warp from the frame and dye.

When dry, raddle and wind onto the warp beam of the loom. Only untie the binding cotton at the last moment, i.e., as the warp passes through the raddle, to avoid shifting of the warp threads.

Weave normally.

### C. Warpway and Weftway Stripes and Spots

Three design elements are available when a two colour warp is used.

(i) Warpway stripes, produced by a group of at least two ends of one colour in the warp.

(ii) End-and-end cross stripes, produced by two colours used end-and-end (i.e., alternately), in the warp.

(iii) Spots, produced by a warping order of (A,B,B) repeat, or (A,B,B,B) repeat.

These will be recognized as the three elements produced with two colours in weft-face plain weave. If Plate 8, illustrating the latter, is turned on its side, it will show combinations of these three elements possible in warp-face weave. Note that end-and-end stripes in warp-face correspond to pick-and-pick stripes in weft-face. Plate 143 shows a section of a warp-face rug using all three elements.

### D. Combining Thick and Thin Wefts

Wefts of different thicknesses can be used to vary the texture of the rug. It will be found that one weft has to be about three times as thick as the other, to make the

difference apparent. One way to achieve this is to use a single shuttle, throwing one pick in a shed for the thin weft, but three picks in a shed for the thick weft (carrying the weft round the selvage thread at the end of the first and second picks).

When combined with a warp consisting of two colours, end-and-end, something very like a block weave can be produced.

Make a warp with, say, black and white, end-and-end. At certain points when threading, reverse the colour sequence by threading one of the colours in two consecutive healds.

Now open a plain weave shed and the raised threads will be black in some sections, white in others, the junctions between these sections being the points in the threading where the colour sequence was reversed. With the opposite shed open, the colours in these sections will naturally reverse.

Fig. 357 shows a small section of such a warp.

In the first shed, at the bottom, the eight raised ends consist of four black at the right and four white at the left. Throw a thick weft in this shed. In shed 2, in which the colours of the raised ends are reversed, throw a thin weft.

Repeat these two picks. The net effect is that shown in the lower part of Fig. 357; the right half of the warp is predominantly black, the left predominantly white.

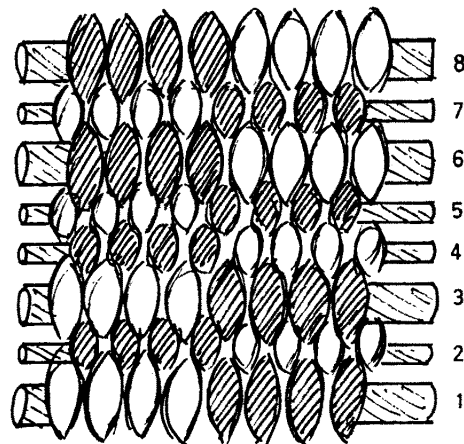


Fig. 357  
Warp-face Rugs. Effect of using  
thick and thin wefts

In shed 5, which, according to the sequence, should contain a thick weft, throw a thin weft. This reverses the weft sequence, so that in the next four picks, the thick yarn lies in the opposite shed to that used in the first four picks, the same applies to the thin weft.

The effect of this switching of wefts is that, in the upper part of Fig. 357, the predominant colours are reversed, the right half now being white, and the left black. It will be obvious that the colours of these blocks will be reversed on the back of the rug. This type of weaving can be combined with areas in which both wefts are of equal thickness, so that end-and-end cross stripes are produced.

The technique is sometimes used in a plain weave structure, which has a predominant warp, but is not entirely warp-faced. In this case the weft's colour does contribute to the surface pattern. It can be a half-way stage between the two warp colours, which will lessen the contrast between the blocks, or it can be black or white which will emphasize one of the blocks. Rag strips are a popular weft for this technique.

### E. Bringing Spots of Weft to the Surface

If in either of the plain weave sheds, the shuttle is floated over one raised warp unit, there will be a spot of weft showing at this point. Such spots can be moved sideways in successive sheds so that they join to form lines, or only put in alternate sheds in an end-and-end stripe, see Plate 144. However used, there will be a corresponding warp float on the back. This is best avoided by using two shuttles, each carrying half the normal thickness of weft. One is thrown normally from selvage to selvage, the other is thrown in the same shed but floats over warp units where spots are required. Fig. 358 (a) shows a section through such a shed. The normal weft is shown black, and the

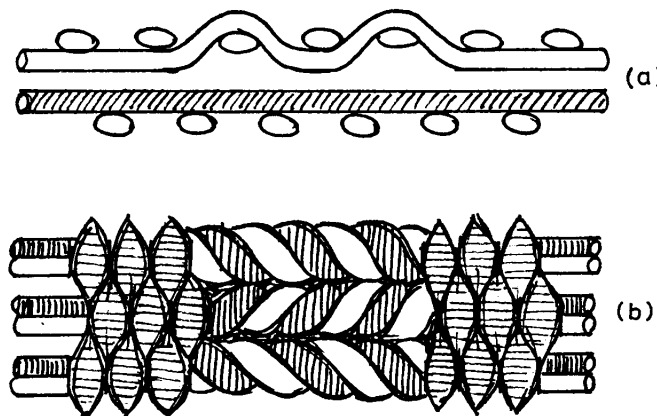


Fig. 358. Warp-face Rugs

- (a) Cross-section showing the bringing of spots to the surface  
 (b) Combining weft twining with warp-face plain weave

spotting' weft is shown white. If the wefts are of two different colours, this gives the possibility of spots in two colours. Whichever weft is not floating as a spot lies in the normal shed and prevents the warp float at the back of the rug.

The same idea can be applied to other weaves. See Plate 145 where in three places the weft has floated over two adjacent ends in a warp-face twill weave. As the weft floats follow the direction of the twill, they have the effect of replacing the warp twill lines with weft.

This technique has no weft-face counterpart.

**F. Combining Warp-Face with Weft Twining**

Apart from a finish for warp-face rugs, weft twining can be used decoratively within the rug. A row, or rows, of twining from selvage to selvage not only alters the texture, but is one of the few ways of obliterating the warp stripes and introducing a new colour to the surface of the rug.

A further development is to introduce areas of weft twining on a background of warp-face plain weave.

Wind two shuttles using weft of half the normal thickness. Put both shuttles into a plain weave shed and bring them out of the shed at the same point. Then close the shed, and twine for a distance on the flat warp, using the two wefts on the shuttles as the two twining elements. Re-open the plain weave shed and put the two shuttles back into it, to emerge at the opposite selvage or at another point where a twined motif is required.

As Fig. 358 (b) suggests, any of the two-colour weft twining patterns can be introduced, if the two shuttles carry different coloured wefts. Plate 146 (top) shows a small sample in which one of the wefts was the same colour as the warp, so only the lighter colour shows in the twining area. The two wefts have been twined to give concentric diamonds. The warp in this sample was 6-ply rug wool set at 12 e.p.i., and the twining wefts (which embraced two warp ends between each half turn) were each of 2-ply carpet wool used fourfold.

A drawback that this technique shares with the following one results from the lack of warp take-up in weft twining. As there is considerable warp take-up in the surrounding warp-face weave, inequalities of tension develop quickly. So the twined areas must be small or alternated in some way so that the inequalities cancel each other out.

**G. Combining Warp-Face with Weft-Face**

This technique was developed by Violetta Thurstan in the Amria rug industry at Burg el Arab, Egypt. The principle is the same as for the last technique.

Use a weft a quarter to a third of the normal thickness. Carry it in a plain weave shed to the edge of the area which is to be weft-face, see Fig. 359. Then weave it across this area going over and under groups of warp ends. There may be two or three ends in a group, thus the working e.p.i. in the weft-face area are reduced from, say, 12 (the number in the warp-face area) to 6 or 4, and this reduction enables the weft to cover the warp. At the far side of the area, enter the weft into the normal plain weave shed, and carry it to the selvage.

Take it round the selvage thread, re-enter it into the same shed, as far as the weft-face area. Then weave it across this area again, but in the opposite shed, then enter the normal plain weave shed. Repeat these two picks, with the result that the warp-face

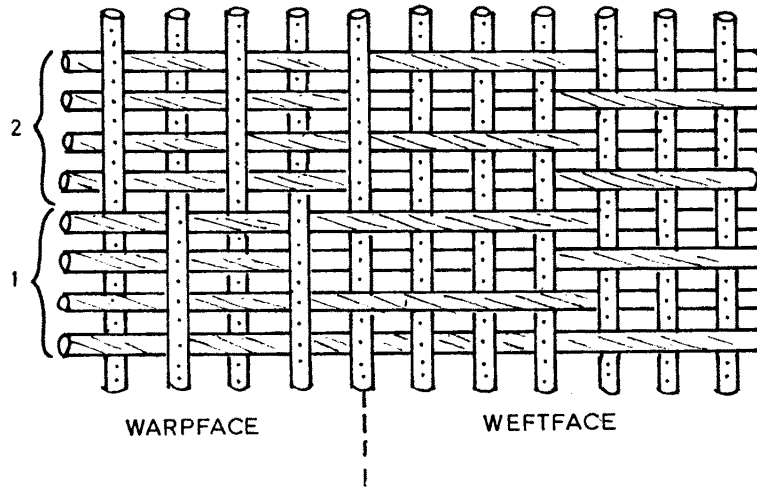


Fig. 359. Warp-face Rugs. Combining weft-face and warp-face plain weave

areas now have four picks in one shed, thus giving them their full thickness of weft, and the weft-face area has four picks in successive sheds. These two weaves should beat down the same amount.

Repeat the above four picks, but with the opposite plain weave shed in the warp-face area.

The position now reached, which constitutes one whole repeat, is shown very diagrammatically in Fig. 359. The warp-face area is to the left, with four picks in each of the two sheds (bracketed), the weft-face area is to the right with eight picks in successive sheds.

The outline of the weft-face area can be changed after every four picks, and this has been done in the motif shown in Plate 146 (bottom), but it can only shift three ends or a multiple of three ends at a time.

The weave can be made much easier if the warp is threaded so that the special sheds for the weft-face area can be obtained by raising shafts. Fig. 360 shows such a shreading with the lifts and weave plan.

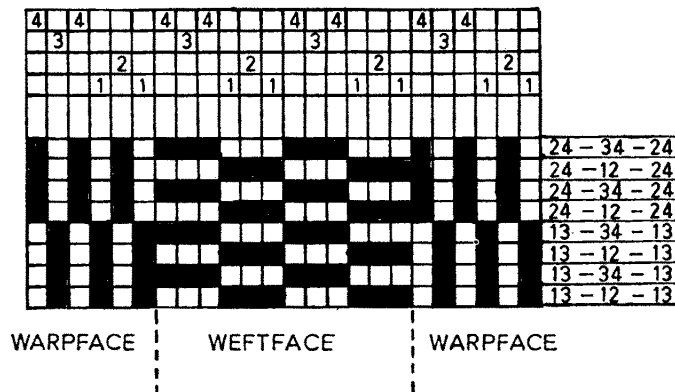


Fig. 360. Warp-face Rugs. Weave Diagram showing method of combining weft-face and warp-face plain weave



Starting at the bottom of this diagram, pick 1 is woven thus.

Lift 13, carry the weft to the edge of the weft-face-area and bring out to the surface.

Lift 12, carry the weft across the weft-face area and bring it out.

Lift 13, carry the weft to the selvage.

The other picks follow in a similar way, using the lifts given.

Any of the two shuttle patterns can be woven in the weft-face area.

## H. Two Pick-Up Techniques Related to Plain Weave

### (i) BEDOUIN SAHA TECHNIQUE

The saha is a dividing curtain in a Bedouin tent. It, and even the tent material itself, is often decorated with stripes of elaborate warp patterning. The technique used is the exact counterpart of the weft-face technique, called Skip Plain Weave, see Chapter 4.

It is carried out on the simplest of looms by the Bedouin women, and can be woven on any loom that gives the two plain weave sheds.

Set up a warp using two colours. Treat the two yarns (hand-spun goathair and cotton in the case of the Bedouin) as a single unit, both in warping and threading. So two yarns, one of each colour, goes in each heald. Sley the warp twice as close as is normal, because this is a form of double weave. No reed is necessary if a narrow sample is being woven. In the following weaving sequence, the yarns will be assumed to be black and white.

Open shed. The raised ends will consist of pairs of black and white threads. Pick up on a stick one thread out of each of these pairs, according to the pattern desired, i.e., pick up black where black is required, white where white is required. In Fig. 361 the white has been picked up from pairs 1, 2, 5 and 6, and the black from pairs 3 and 4. Turn the pick-up stick on its edge and carry the weft across in this picked-up shed.

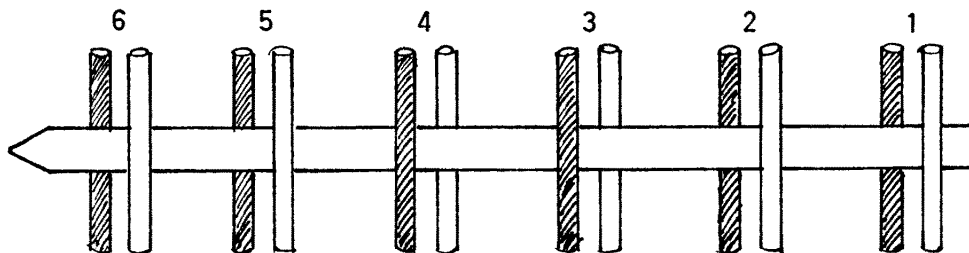


Fig. 361. Warp-face Rugs. Method of picking up in Saha technique

The threads not picked up (i.e., the white in the black areas of the design, and vice versa) drop to the back as warp floats.

Beat, and repeat the process with the opposite shed.

If no batten is used, beat with the shuttle in the opposite shed. To avoid twisting of the yarns in a pair, always pick up the black of a pair to the left of the white.

The design limitations found in Skip Plain Weave naturally apply here, i.e., use small motifs, or break up large units, to avoid overlong warp floats.

Structurally, this is a one-weft double cloth (see next section) in which the back cloth is left unwoven.

Plate 147 shows part of a saha. Motifs based on oblique lines will be seen to predominate. They come very easily to the technique; the stick merely moves its pick-up sequence one thread to the left or right in each successive shed.

This technique was developed for rugs by Violetta Thurstan in her Amria Rug Industry. These rugs were predominantly in normal warp-face plain weave but had perhaps lengthwise stripes in the saha technique. The problems of tension when such a rug was rolled onto the cloth beam did not arise, as they were woven on horizontal ground looms.

The technique can, of course, be woven in a less primitive way using four shafts. The warp is then made black and white, end-and-end, and threaded singly in the healds, using a straight draft. The two sheds for pick-up are obtained by raising shafts 12 and 34. Use a direct tie-up.

This method has three advantages:

(1) There is no tendency for adjacent black and white yarns to twist around each other in pairs.

(2) Areas with all one colour across the width of the rug can be woven by lifting, say, shafts 1 and 3 alternately for black to appear, and shafts 2 and 4 alternately for white to appear.

(3) The pick-up can be greatly aided by slight movements of the pedals. For instance, for the shed with shafts 1 and 2 raised, two feet are used on the appropriate pedals. Then, when picking up a white area, slightly drop the black ends out of the way, by releasing pressure on the relevant pedal; and do similarly for a black area.

#### (ii) ONE-WEFT DOUBLE CLOTH

This is a very ingenious development of the saha technique, by which the warp floats at the back are also woven, so that a completely-reversible two-colour design is possible. It is known from early finds in Peru and Egypt, where a piece dated about A.D. 400 was unearthed. Until recently it existed as a technique for weaving camel girths in the Sudan. It can be perfectly well woven on any two-shed loom, but the description that follows is for a four-shaft loom.

Make a warp with black and white, end-and-end. Thread it straight on four shafts, black on shafts 1 and 3, white on shafts 2 and 4. Sley twice as close as in normal warp-face.

For one colour all across the rug, lift the shafts thus, 1, 123, 3, 134, giving black on the surface, and 2, 124, 4, 234, giving white on the surface.

For areas of pick-up, use the following sequence.

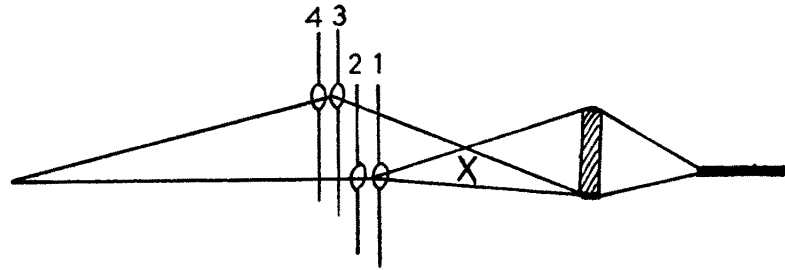


Fig. 362. Warpface Rugs. Side view of shed in One-Weft Double Cloth

Lift 12. Pick up colours as described for the saha technique. Turn stick on its edge. Throw weft from right to left, leaving the stick on its edge in this shed.

Lift 34. Fig. 362 shows a side view of the shed obtained. Return the weft from left to right in the small lower shed marked 'X'. The latter may need to be enlarged with another stick turned on its edge. Remove the pick-up stick and beat in the last two picks.

Pick up the second row of the design, still with shafts 3 and 4 raised. Turn the stick on its edge. Throw the weft from right to left, leaving the stick on its edge in this shed.

Lift 12. Again, there will be a small lower shed, through which the weft is returned to the right. Remove pick-up stick and beat.

Repeat this sequence.

*Note*—There are two picks for each change of shed.

—As this is a warp-face double weave, only one weft is necessary, its colour being immaterial. It is the interchange of warps from front to back that creates the design; the weft takes an unchanging course. So the pockets between back and front cloths are only sealed along horizontal colour junctions, not vertical. This makes it a far simpler structure than normal plain weave double cloth.

### I. Practical Details for Warp-Face Rugs in Plain Weave

(i) Using 2-ply carpet wool as warp.

Use three threads as one (i.e., make the warp from three cones or tubes) and treat this treble thread as the unit in warping. A setting of from 10 to 12 treble ends per inch is suitable. The weft can be 6-ply carpet wool used three- or fourfold, or thick cotton or horsehair, or hemp of comparable thickness.

(ii) Using 6-ply rug wool as warp.

Though 6-ply rug wool may well contain exactly the same amount of yarn as three 2-ply threads, it has to be set at 12 e.p.i., at least, because it does not cover the weft as efficiently.

(iii) Using Belting Yarn and Mohair as warp.

Being more compact yarns, these do not cover the weft as well as carpet wool, so a

higher warp setting is necessary, e.g., 48 e.p.i., treble in a heald, therefore 16 working e.p.i. These two types of yarn can be brushed during weaving to raise a pile, using either an old blunted pair of carders, or a specially made brush with very long, flexible wires and two handles. (See list of suppliers at end of book.)

Only raise the pile when the warp is under tension; so do it when a section has been woven and the warp is about to be turned on. It is very easy to over-raise mohair and weaken the yarn. Plate 148 shows the length of pile that can be raised with safety on a black and white mohair warp-face rug. Colour Plate IV shows a brushed warp-face rug of dyed mohair.

A good weft to give solidity to warp-face rugs in this section is 2-ply horsehair used threefold.

The traditional American warp-face rug, sometimes known as a drugget, was a lighter textile than those described above. It often had a warp of 2-ply handspun woollen yarn, set at 20 to 30 e.p.i., with a weft of a variety of materials, such as woollen yarn, rags and such.

If the Double Twined Edge is worked with 6-ply rug wool, then the group of warp ends embraced in each movement should consist of two treble ends of 2-ply carpet wool, or two ends of 6-ply rug wool, or three treble ends of belting yarn or mohair, when the above warp settings are used.

### **3. WARP-FACE RUGS WITH DISCONTINUOUS WARPS**

The weft-face techniques described in Chapter 5 (meet and separate, and kilim) all depend on wefts that do not pass from selvage to selvage, but weave within a small area, i.e., discontinuous wefts. So to convert them into a warp-face structure involves either knotting together lengths of different coloured warp yarn so that they weave into a predetermined pattern, or the infinitely more painstaking Peruvian method of warp interlock. In the latter, a series of horizontal scaffolding wefts were first stretched on a frame and then between them, small one-colour warps were wound, each interlocking with the warp at either end of its own allotted area, and each being placed according to a design. These small warps were then woven, presumably with a needle, to carry the hidden weft from selvage to selvage. Neither method is a feasible one today for the weaving of rugs.

### **4. WARP-FACE RUGS WITH RAISED SURFACE DECORATION**

The various techniques described in Chapter 6, i.e., soumak, weft looping, weft chaining and knotted pile can all be carried out on a warp-face plain weave background. Soumak and pile knots are best worked on the raised ends of a shed, not on the full thickness of warp. This is how the knotted motifs are worked on the warp-face Turkoman tentbands. In this way, if they are built up in blocks, there is no need for compensatory plain weave picks between the blocks.

## 5. WARP-FACE RUGS IN MULTISHAFT WEAVES

### A. Converting Weft-Face Weaves into Warp-Face Weaves

(i) If both warp and weft take a similar course through the fabric, the conversion is simple. Thus in plain weave, both elements take an over 1, under 1 course; in 2/2 twill they take an over 2, under 2 course. When such a weave is turned through a right angle (making warp into weft and vice versa), the structure is identical, though in the case of a twill, the diagonal line will slope in the opposite direction.

All such weaves repeat on the same number of ends and picks, so their minimum weave plan will always be a square. For weaves of this type, e.g., plain weave, plain weave double cloth, hopsacks and many twills, the weaving directions are identical for warp-face as for weft-face, and the conversion is simply a matter of using different yarns and different settings. 2/2 twill is taken as an example.

#### *2/2 Twill*

All the colour and weave effects described in Chapter 7 for 2/2 weft-face twill, can be produced in a 2/2 warp-face twill. Where for instance, in a weft-face rug, the weft colour sequence is (A,B,A,B,A) repeat, the identical colour sequence is used in the warp. Because the warp of a warp-face rug is never as close as the weft in a weft-face rug, the effects will not be as clear cut.

Naturally, many different colour sequences can be combined in the same warp, and Plate 149 shows the different character that can be given to warpway stripes by using this idea.

The warp should be set a little closer than for warp-face plain weave. The weave is very suitable for rugs, being heavy and flexible and the shedding is easier than with plain weave.

Two interesting warp-face weaves can be arrived at by combining the lifting sequences of two twills.

#### *(a) Combining 3/1 and 1/3 Twill*

The lifts are 123, 2, 234, 3, 341, 4, 412, 1. If the warp is threaded straight on four shafts and each shaft carries a different coloured end, these colours will appear as four cross stripes. Both sides of the rug will be identical.

#### *(b) Combining 3/1 and 2/2 Twill*

The lifts are 123, 12, 234, 34, 341, 41, 412, 12. This gives a twill surface on both sides of the rug, but one shows longer floats than the other.

(ii) If warp and weft take dissimilar courses through the weave, and this applies to all block weaves and double-faced weaves, the conversion is a little more complex. It requires a small amount of work on point paper.

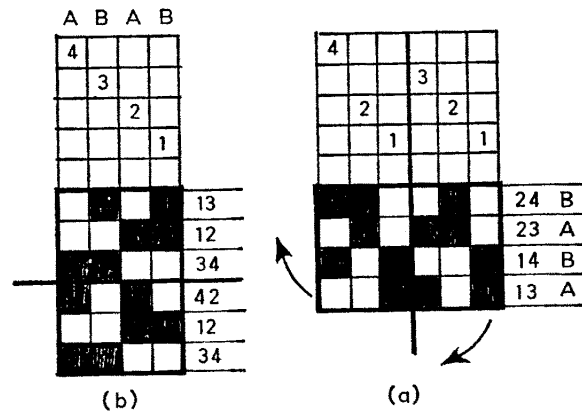


Fig. 363. Converting a weft-face Block Weave into a warp-face Block Weave

Fig. 363 illustrates this process of conversion. At (a) is shown the minimum threading, weave plan and lifts for the simplest block weave. The weave plan is turned through a right angle (see arrows), and is shown in its new orientation at (b). This weave plan is then analysed. The weave is seen to be on four ends, all of which behave differently in their passage through the weave. So the threading is a straight draft on four shafts. This is written down above the weave plan. The four ends are coloured A, B, A, B, to correspond to the weft colour sequence in Fig. 363 (a). It is now simple to work out the six lifts that will give this weave, and these are written at the right, opposite the relevant pick.

Now, the right-hand half of the weft-face weave plan, represented one pattern block (threaded 1,2,3) and the left-hand half the other pattern block (threaded 1,2,4). And each of these blocks could be extended in the weft direction by repeating either 1,2,3, or 1,2,4, in the threading.

So the bottom half of the warp-face weave plan similarly represents one pattern block, and it can be extended in the warp direction by repeating the three lifts, i.e., 34, 12, 24, as often as desired. The top half represents the other pattern block, and it can also be extended at will in the warp direction by repeating the three lifts, 34, 12, 13, as often as desired.

So the warpway dimension of the blocks depends on how often the two sets of three lifts are repeated. Naturally, the blocks will appear only where the warp has two colours, end-and-end, so their weftway dimension depends on the extent of this colour arrangement in the warp.

The following general rules will be seen to apply to this example.

(a) The number of different lifts needed for the weft-face form of the weave becomes the number of different shafts for the warp-face form, and vice versa. For example an eight-shaft weft-face weave needing four different lifts becomes a four-shaft warp-face weave needing eight different lifts.

(b) The total number of lifts in the lifting sequence (often different from the above, as one or more lifts are repeated) of the weft-face form, become the total number of ends in the threading repeat of the warp-face form.

(c) As a corollary to the above, when a lift is used several times in the lifting sequence of the weft-face form, there will be a corresponding shaft used the same number of times in the threading repeat of the warp-face form.

(d) The weft colour sequence in the weft-face form, becomes the warp colour sequence in the warp-face form.

It will be understood from this example that sometimes a weave impossible in one form becomes possible when converted. Thus a weaver with only a four shaft loom, can convert an eight-shaft weave needing four lifts into a four-shaft weave needing eight lifts.

## **B. Block Weaves**

In the field of block weaves, an interesting fact emerges. In their weft-face form, many block weaves have a feature in common and this is that they need only four lifts with an (A, B, A, B) colour sequence. So in their warp-face form, all these block weaves can be woven on a warp threaded (1,2,3,4) having sections with an (A, B, A, B) colour sequence. Alternatively, the warp could consist entirely of two colours, end-and-end, but with periodic changes in the colour sequence from (A, B, A, B) to (B, A, B, A) and back again. Both faces of the rug would then be completely covered with a counterchange arrangement of blocks. With a warp set up in either way, the following lifts will give the warp-face forms of six weft-face block weaves.

### *(a) Warp-face Form of Block Weave Using Three-End Block Draft*

Lift (34, 12, 24,) repeat, for Block 1.

Lift (34, 12, 13,) repeat, for Block 2.

See Plate 150.

### *(b) Warp-Face Form of Block Weave Using Four-End Block Draft*

Lift (34, 24, 12, 24,) repeat, for Block 1.

Lift (34, 13, 12, 13,) repeat, for Block 2.

*(c) Warp-Face Form of Block Weave Using M's and O's Draft*

Lift (34, 23, 14, 12,) repeat, for Block 1.  
 Lift (34, 14, 23, 12,) repeat, for Block 2.

*(d) Warp-Face Form of Block Weave Based on Straight Three-Shaft Draft*

Lift (34, 24, 12,) repeat, for Block 1.  
 Then lift 13, before changing to next block.  
 Lift (24, 12, 13,) repeat, for Block 2.  
 Then lift 34, before changing to next block.  
 Lift (12, 13, 34,) repeat, for Block 3.  
 Then lift 24, before changing to next block.  
 Lift (13, 34, 24,) repeat, for Block 4.  
 Then lift 12, before changing to next block.

Note that the four lifts which 'link' between blocks, correspond to the four 'linking ends' in the weft-face version. See Plate 151.

*(e) Warp-Face Form of Block Weave Using Six-End Block Draft*

Lift (34, 24, 34, 12, 24, 12,) repeat, for Block 1.  
 Lift (34, 13, 34, 12, 13, 12,) repeat, for Block 2.

*(f) Warp-Face Form of Block Weave Using Single-End Spot Draft*

Lift (24, 34, 24, 13, 24, 12,) repeat, for Block 1.  
 Then lift 24, before changing to the next block.  
 Lift (13, 12, 13, 24, 13, 34,) repeat, for Block 2.  
 Then lift 13, before changing to the next block. See plate 152.

In all these block weaves, it will be found that the weft on the reverse shows through on the face, far more than it does in the weft-face form. This is because in the latter, the two wefts involved slide one behind the other when beaten up, the face weft almost completely obscuring the back weft. Although the structure is identical in the warp-face form, this sliding cannot take place to any extent between adjacent warp ends.

In their weft-face form, the warp settings of these weaves were varied according to the length of weft float. A comparable adjustment is made in their warp-face form, a thinner weft being used in the weaves with a long warp float. This enables more picks to be woven to the inch and so reduces the length of the warp float.





IV. Warp-face rug with brushed surface, mohair warp and horsehair weft, see page 452

### C. Pick-Up Weaves

It will be noticed that all the lifts in the block weaves are those of plain weave and 2/2 twill. As the warp in the relevant sections is of two colours, end-and-end, each plain weave lift will raise all the ends of one colour. It is the occurrence of one or other of these two plain weave lifts (once or several times) in the lifting sequence, that generally determines which colour comes to the surface in which block.

Thus in the weaves (a), (b) and (e) above, the lifts for both blocks will be seen to be identical, except for the substitution of 13 for 24 and vice versa. So the pick-up method for these three weaves must involve producing a composite shed which in part is that produced by raising 13 and in part that produced by raising 24.

Taking the first block weave above as an example, begin by lifting (34, 12, 24) repeat. Assume that the warp is so threaded that this brings a white block to the surface. Where the pick-up is to begin, stop after the pick with 12 raised.

Lift 24. This raises all white ends. Put a flat stick into this shed, but pass it over the raised white warp ends wherever black is wanted on the surface according to the design, i.e., wherever the two warp colours are to be counterchanged. Leave the stick in the shed close to the fell of the rug, and lower 24. Lift 13. This raises all the black ends. Pass a narrow rod *under* the raised black ends, wherever the previous stick floated *over* the white ends. Make sure the stick and rod are involved with the same number of ends, e.g., three, in Fig. 364. This pick-up is naturally done between the first stick and the reed. Lower 13.

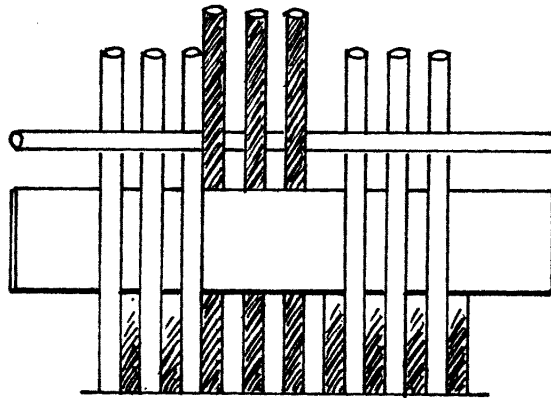


Fig. 364. Warp-face Rugs. Method of obtaining pick-up shed with a stick and a rod

These two pick-ups have now to be combined onto one stick. Twist the first stick on edge and pull the rod as close to it as possible. Pass another flat stick into the very small shed under the rod. Withdraw the first stick and rod, and turn the second flat stick on its edge. This gives a plain weave shed, in parts of which black ends are raised and in other parts of which white ends are raised.

Throw shuttle across in this shed, withdraw stick and beat.

Lift 34, weave normally from selvage to selvage.

Lift 12, weave normally from selvage to selvage.

Lift 24, repeat the above pick-up sequence.

Lift 34, weave normally from selvage to selvage.

Lift 12, weave normally.

This is the whole sequence, which is then repeated.

Note that in this and other warp-face pick-up weaves, the pick-up is only done when either a lift of a 13 or 24 occurs in the normal lifting sequence for the block weave. In the above example, there is one pick-up for every two normal picks. So warp-face pick-up is fast when compared with weft-face pick-up, in which some form of pick-up is necessary for every pick woven.

In the sample shown in Plate 153, and woven exactly as described above, only nine actual pick-ups were needed to produce the diamond which is about 6 inches long.

Due to the lack of contrast between the two block areas, motifs have to be large to register. The fine intricate detailing possible with weft-face pick-up would be lost here.

Although block weaves and pick-up weaves have been dealt with in some detail, all the other weft-face multishaft weaves can be similarly converted. See Plate 154, for instance, which shows a Six-Shaft Shadow Weave woven as a warp-face structure. Some will create problems in their warp-face form. For instance, a weft-face weave with several wefts interlacing in such a way that their take-up varies, is simple to weave. But in its warp-face form, this will mean varying warp take-up and so two or more warp beams will have to be used. So in some cases the conversion is not worthwhile. But in all cases, converting weft- into warp-face gives the weaver a great deal of insight into the weave structures involved.

## 12 · Rugs in which both Warp and Weft contribute to the Surface

---

### INTRODUCTION

Between the two extremes of warp- and weft-face structure, there are many structures some with predominant warp, some with predominant weft and some with an equal setting of warp and weft; and there are infinite gradations between these categories. With few exceptions, they share one characteristic, and that is, the use of stiff thick wefts (and sometimes warps) to make up for the solidity given by completely warp- and weft-face construction.

Such materials are

Coir (coconut fibre)

Sisal

Seagrass yarn

Rope

Raffia

Unspun hemp, jute or flax

Heavy cotton and jute yarns

Rayon tow

Long-stem plants, e.g., rush (which can be plaited)

Grasses

Due to the character of these materials, the textile produced comes into the category of floor-mats, rather than rugs.

### 1. EQUAL WARP AND WEFT SETTING

Into this group come mats woven industrially of coir and sisal. Warp and weft are identical, or almost so, and the weaves employed are hopsack and a variety of twills. A common coir matting is woven in its natural colour in 2/1 twill, the warp floats being on the top side of the mat as used. Sisal, which dyes excellently, is often used as warp and weft in more complex structures, e.g., colour and weave effects in sixteen-shaft twills. It is not a field much entered by the handweaver, as a specialized loom and warping technique is needed for such thick unyielding yarns. See Fig. 12 in Chapter 1

for a possible method of handling these yarns. But the handweaver may well design prototypes for industrial production. As the mats are simply normal cloth weaves much magnified, the design possibilities are similar to those in normal weaving.

Plate 155 shows an experimental piece with coir and sisal warp crossed by seagrass and jute weft in a hopsack weave. Plate 156 shows a piece with plastic tubing warp and seagrass weft interlacing in 2/2 twill.

Honeycomb and plain weave double cloth are two weaves that give a structure of such thickness that it is possible to make a practical rug of this type using wool as warp and weft.

Plate 157 shows a honeycomb-woven sample using 6-ply rug wool for both warp and weft (six ends and six picks per inch). The textile is thick and resilient, but the long warp and weft floats restrict its use somewhat.

Plate 158 shows a plain weave double cloth sample. The 6-ply rug wool warp is set at 12 e.p.i. and the weft is the same material used double. It is a simple four shaft draft, so the weave is a series of weftway stripes, between each of which the back and front warps interchange. The complexity of the design is due simply to the arrangements of the three colours in the warp.

## 2. WITH PREDOMINANT WEFT

This is the biggest group. All the wefts listed above can be woven into very interesting mats with a suitable warp.

The difficulty is that successive picks of such materials do not bed down with each other; due to their incompressibility, each lies separate and rod-like in its shed. So the warp has either to be very rigid itself and hold the wefts in place by that rigidity or very elastic and grip each pick so that it cannot shift.

An example of the former is seen in Plate 159 where a warp of plastic-covered wire (set at only 2 e.p.i.) weaves with a weft partly of a similar material but predominantly of seagrass.

Cotton is the most-used elastic warp. A 7/7s cotton yarn, or twine of similar thickness, can be set at 3 double to 3 quadruple ends per inch. Even with such an open setting (which is the minimum feasible one) the hard wefts cannot be used alone; however tightly they are beaten there will still be a gap between picks, unless one or more picks of some softer yarn are interposed. Plate 161 illustrates this point; a warp of 7/7s cotton is crossed by plaited rush and dyed coir. Between these materials are varying numbers of picks of a yarn similar to the warp. Because in this case there are always an odd number of these picks, it is always the same warp ends that float over the surface of the rush and coir, giving marked vertical lines. The same effect is seen in Plate 160 which shows a mat woven of dyed black sisal and unspun jute across a black and white striped cotton warp. The soft weft is here black cotton. Notice how the striped warp forms lozenge shapes of solid colour in the woven edge.

With an even number of intervening picks, alternate warp ends float over the stiff wefts. This effect is seen in Plate 162, where two picks of thick cotton lie between every pick of rayon tow, flax, and delustrated rayon.

Plate 41 shows wrapped loops of coir yarn on a sample consisting of unspun jute, coir, jute and cotton yarn. The warp is of cotton.

Plate 163 shows a more complex weave. A striped cotton warp, grouped into sections of 8 ends on the front two shafts, and 8 ends on the back two shafts, is crossed by seagrass that passes over and under these groups. The other weft is the same as the warp yarn and interposes two picks of plain weave after each of the seagrass picks.

### *Practical Points*

#### *Selvages*

Because the thick stiff wefts have to be carried up from pick to pick, the selvages are a problem in this type of mat, and they never have the neatness found in weft-face and warp-face rugs. But assuming the weft striping to be in some regular sequence, the unevenness of the selvage should at least be a consistent one.

A decision has to be made about the distance a weft can be carried up at the selvage. If the picks of one weft are, say,  $1\frac{1}{2}$  inches apart, then its loops at the selvage are practical; but a wider spaced weft would be begun and finished each time it appears. This applies especially to materials like unspun jute and rayon tow, which quickly become hairy and untidy at the selvage. These considerations may influence the design to be woven.

If several weft materials are passing round the selvage, always place the thicker on the outside.

#### *Weft Joins*

It is difficult with some materials, e.g., plaited rush, to make weft joins invisible. In all cases taper the two wefts to avoid extra thickness at the point of the overlap.

## **3. WITH PREDOMINANT WARP**

Strictly speaking, some of the weaves in Chapter 11 on warp-face rugs come under this heading (e.g., the block weaves) as the weft showed slightly.

Plate 164 shows a spaced warp matting sample. The warp is of bleached and natural hemp, end-and-end, and the weft of rope, coir, unspun jute and raffia. The stiffness of the wefts prevents the spaces in the warp from being points of weakness.

An interesting all-wool rug can be woven with 6-ply rug wool as a warp set at

12 e.p.i. It is lifted to give four picks of 3/1 broken twill followed by four picks of 1/3 broken twill, viz. (124, 134, 123, 234, 2, 1, 3, 4) repeat, using a weft about twice as heavy as the warp.

When taken from the loom, the rug contracts and both back and front surfaces show a series of weftway ridges. This gives it great thickness and resilience.

This chapter has not explored its subject systematically, an almost impossible task where so many varied materials can be woven in so many structures. But it has tried with a preponderance of illustrations to give an idea of what can be done.

# 13 · Weft and Warp Twining

---

Twining is not weaving, but as rugs can be made entirely from weft and warp twining and as weft twining in combination with other techniques plays an important part in rug weaving, it has been included in this book.

## **History**

Twining is one of the most ancient fabric structures, and because it does not need a loom, it may well predate weaving. The astonishing finds at Catal Huyuk in Anatolia, which are presumed to date back to 6500 B.C., contain examples which seem to be twined. Better preserved, but still very old, examples come from Peru, the earliest being about 2500 B.C. The technique (which is also used in basket making) is distributed all over the world. It has been described as 'the most popular of all weaves on stretched warp threads'. (See Ciba Review No. 63 January 1948.) Primitive societies, where they still exist, use the technique extensively. It is still used in the making of horse girths in England. It was brought to a high point of decorative refinement by the weavers of the Chilkat blankets in S.E. Alaska and by the Maori weavers with their taniko cloth. Weft twining is essentially a hand technique; no device exists that can produce it or help in its production. The same applies to warp twining, except in the case of tablet weaving.

Of its many variations and types, only those suitable for floor rugs will be described here, i.e., weft-face and warp-face twining, but it is a technique which would repay exploration in relation to other less functional textiles, such as wall hangings.

## **1. WEFT TWINING**

### **Introduction**

Weft twining needs no sheds; the stretched warp is quite passive. Two or more wefts pass together across the warp, spiralling round each other and enclosing a warp thread between each half turn, see Fig. 365. So the wefts actually grip the warp. They lie like a plied yarn impaled by the warp. In Fig. 365 (a), the next movement is for weft A to be brought up across end 7 and passed behind end 8. Then weft B is brought



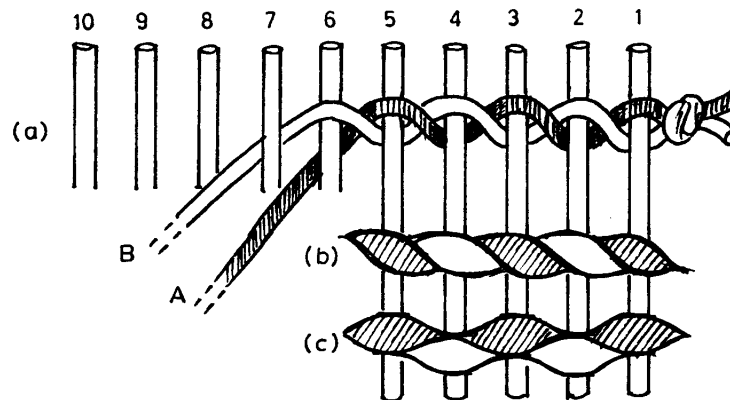


Fig. 365. Weft Twining. General Diagram

up across end 8 and passed behind end 9, and so on. The two wefts move alternately and each passes behind the next unused warp end.

Remembering that this is done on a closed shed, i.e., every warp end is included in the twining, it will be seen that one row of weft twining, see Fig. 365 (b), covers the warp to the same extent as two picks of plain weave, see Fig. 365 (c). The diagram brings out the essential feature, the '2-ply-yarn look' of a row of weft twining.

Just as a yarn can be either S-twist or Z-twist, so weft twining can be S- or Z-twist, and many of its design possibilities rest on this important fact. The diagram shows Z-twist weft twining.

#### A. Application to Rugs Woven on a Frame

Many Eastern rugs are made on a very simple vertical frame loom with no reed, so when starting a rug there is always the problem of spacing out the warp as evenly as possible. The most efficient way to do this, saving space and time, is to use one or two rows of weft twining. The beauty of the method is that it will work for almost any setting of the warp, for the thickness of the twining yarns controls the warp spacing. A fine yarn will give a closer set, a thick yarn a more open set. To make a decoration out of necessity, two different colours are sometimes used. They are knotted together at the right selvage, see Fig. 365 (a), and then twined across to the left selvage and again knotted, thus giving a small tuft at each side. Another row may be added. Though not needed at the finishing end of the rug, the twining is generally repeated there for completeness. Weavers making rugs on a frame will find this useful.

Occasionally a row or two of weft twining is found in Kilim rugs where an area of complex pattern abuts on an area of solid colour.

**B. Two-Colour Weft Twining**

**(i) CONTROL OF COLOUR AND TWIST SEQUENCES**

Its use in design, as opposed to its functional use as described above, begins to appear when several rows of weft twining using two colours are produced. There are several possibilities which depend either on the relation of colour sequence between successive rows or on the relation of direction of twining between successive rows.

If the row of twining is continued, as in Fig. 365 (a), to the left selvage, there is now a choice of two methods of turning the wefts to start the next row.

Fig. 366 (a) shows the method which brings the black of the second row over the white of the first row, and vice versa.

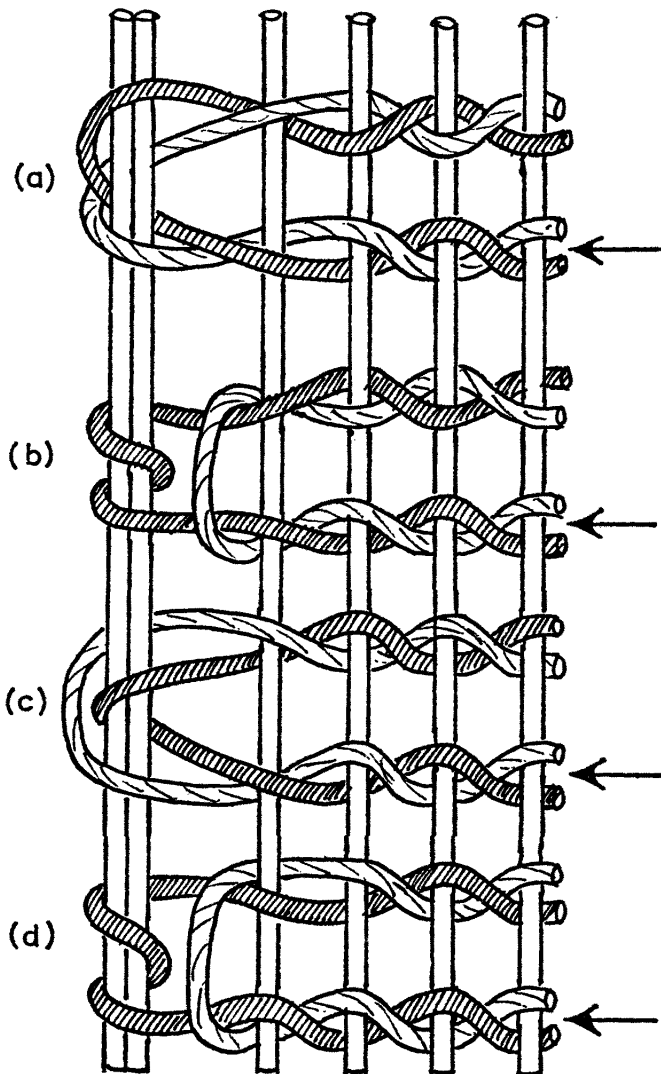


Fig. 366  
Weft Twining.  
(a-d) Different methods of  
turning wefts at the selvage

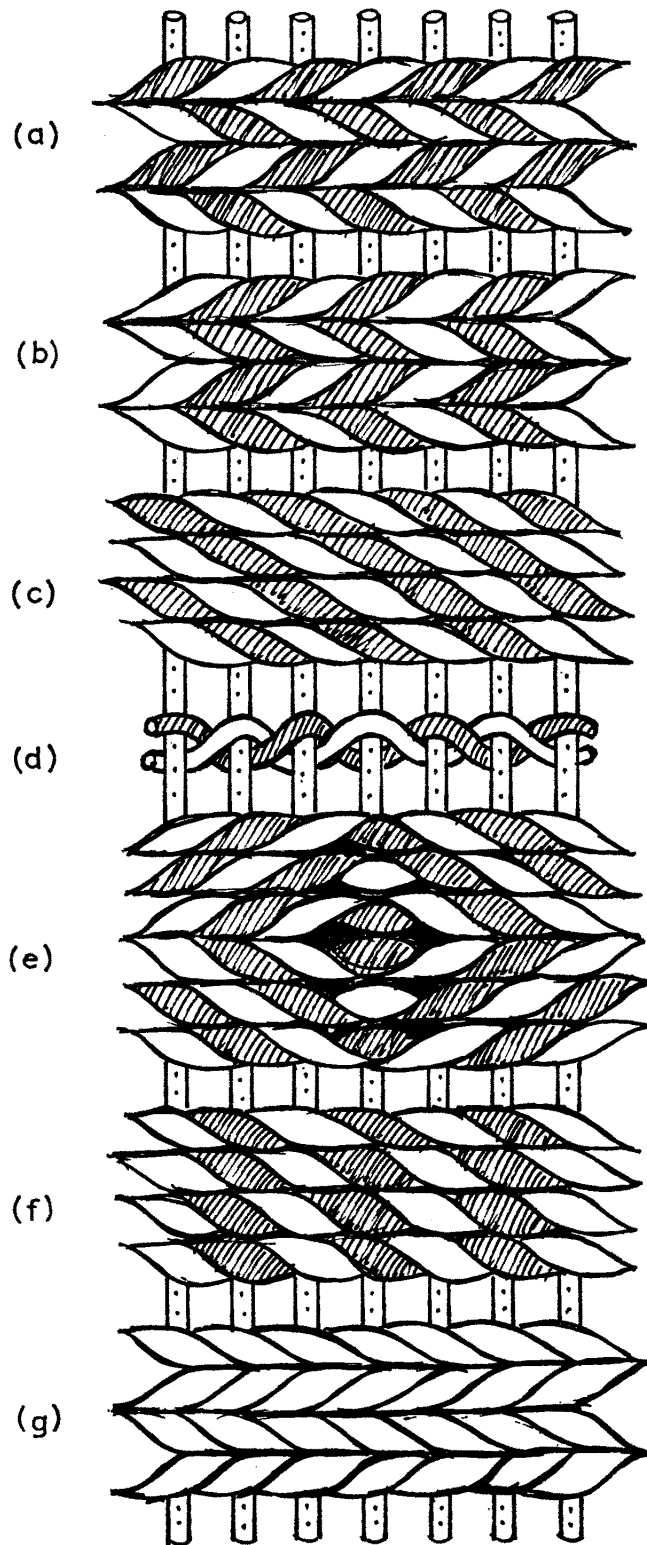


Fig. 367  
Weft Twining  
(a-f) Various motifs obtained  
with two-colour weft twining  
(g) Characteristic surface when  
alternate rows are S- and Z-  
twist

Fig. 366 (b) shows the method which brings the black over the black and the white over the white in succeeding rows. This incidentally is the method most often used when twining with two yarns of the same colour. Note its similarity to the pick-and-pick plain weave selvage.

In both these diagrams it will be seen that the twist of the second row is the opposite to that of the first row, it is S- instead of Z-twist. This is what normally happens; i.e., if the pattern of hand movements used in the first row is repeated in the second. The alternating rows of S- and Z-twist weft twining give a characteristic surface, even to one-colour weft twining, comparable with that found in soumak, see Fig. 367 (g). But it is just as easy after turning the weft at the selvage, to twine the second row in Z-twist, like the first; the hand movements are simply reversed.

Fig. 366 (c) shows how to produce a second row of Z-twist with the black yarn lying over the white yarn.

Fig. 366 (d) shows how to produce a second row of Z-twist with the black lying over the black and the white over the white. The twist can also be reversed at any point while twining a row, see Fig. 367 (d) in centre. This can be done many times across the width of the warp.

Using the twist variations and colour sequence variations described above, the following motifs can be produced.

*(a) Checks*

Turn the wefts at both selvages as in Fig. 366 (a) and a small pattern of checks as in Fig. 367 (a) is produced.

*(b) Vertical Lines*

Turn wefts at both selvages as in Fig. 366 (b), and zigzag vertical lines as in Fig. 367 (b) are produced.

*(c) Twill Lines*

Turn weft at both selvages as in Fig. 366 (c), and twill lines are produced as in Fig. 367 (c). These lines are a characteristic of weft twining and are often exploited in designing with this technique. The direction of twill line is naturally controlled by the direction of twining. If this is combined with reversing the twist in the middle of each row, concentric diamonds as in Fig. 367 (e) can be produced. Fig. 367 (d) shows how the twist and colour of the next row of twining in this pattern would be arranged. Note the reverse of twist in the centre.

*(d) Vertical Lines*

Turn weft at both selvages as in Fig. 366 (d), and vertical lines with serrated edge are produced, as in Fig. 367 (f).

Any of these motifs can naturally be combined with cross stripes, produced by twining two wefts of the same colour.

All these motifs are identical on the back of the fabric, except twill lines. Fig. 368 shows the front and back of a diamond in twill lines.

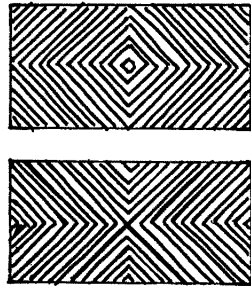


Fig. 368  
Weft Twining. Front and back  
view of a diamond in weft  
twining

Although it is simpler to use the motifs all across the rug, with a little ingenuity blocks of differing motifs can be produced, side by side. Fig. 369 (a) shows a block of twill lines joining a block of checks. This is achieved by reversing the direction of the twist at the point of junction, but only doing this every other row, i.e., in rows 2 and 4 in the diagram.

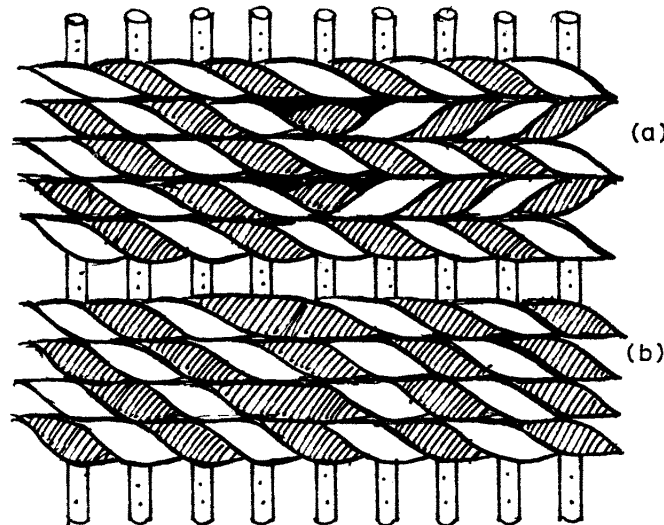


Fig. 369. Weft Twining. (a) and (b) combining two motifs

Fig. 369 (b) shows a block of twill lines joining a block of vertical lines. Here the twist is kept constant, but the changeover is achieved by making the two wefts twine around two, instead of one, warp end at the junction between the blocks. Again, this is only done every other row. With the help of these two examples, the reader will be able to work out other combinations of blocks.

Interesting rugs can be made of weft twining. The fact that it is a slow (but a very engrossing) process and needs the minimum of equipment, just a frame on which to stretch the warp, will recommend it to amateur weavers.

#### (ii) COMBINATION WITH PLAIN WEAVE

Apart from its all-over use, the technique can be used in stripes alternating with plain weave stripes, or more interestingly an area of weft twining can be surrounded by plain weave. Plate 165 shows an area of weft twining with an arrangement of twill lines on a background of plain weave in 2-and-2 stripes. Fig. 370 shows this in diagrammatic form.

Start with both wefts at the right selvage, see arrows in Fig. 370.

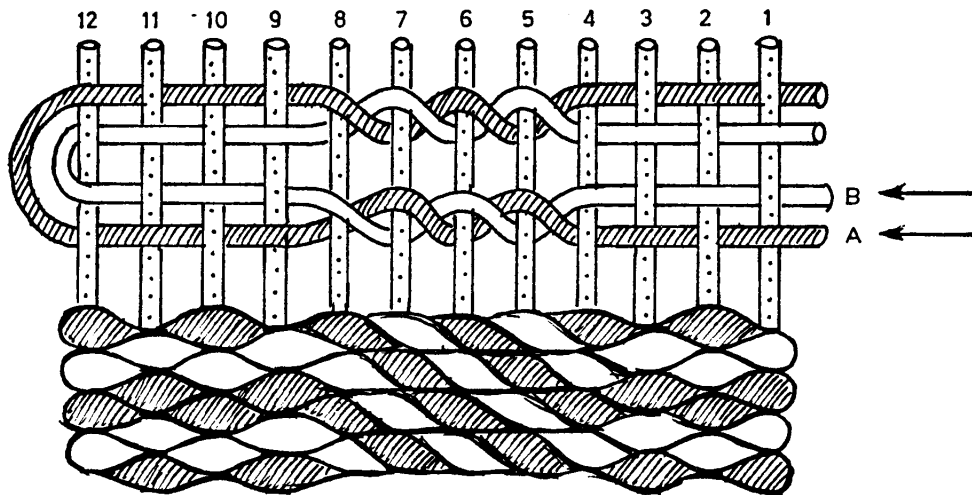


Fig. 370. Weft Twining. Combining plain weave and weft twining

Raise the even-numbered ends. Take A (black) across in this shed then bring it out of the shed, between the raised ends 4 and 6.

Raise odd-numbered ends. Take B (white) across in this shed and bring out between the raised ends 3 and 5.

Now with no shed open, i.e., on a flat warp, twine the two wefts encircling warp ends, 5, 6, 7 and 8.

Raise the even-numbered ends. Insert A into the shed down between the raised ends, 8 and 10, and carry it to the left selvage.

Raise the odd-numbered ends. Insert B into this shed down between the raised ends, 7 and 9, and carry it to the left selvage.

Both wefts have now arrived at the left selvage.

Repeat the above procedure for the return passage to the right, but reverse the colour sequence. In other words, start with B in the first plain weave shed instead of A, see Fig. 370. This is in order to produce the 2-and-2 stripes of black and white at each side; it also gives the colour shift in the twined area that makes twill lines possible. Note that both rows of weft twining have Z-twist.

From this description of a very simple example, it will be seen that there are many possibilities. There can be any number of twined areas across the width of the warp, and the shape and size of the areas is completely controllable. Also the plain weave areas can be either pick-and-pick or 2-and-2 stripes. Note the similarity between this technique and the twisted weft variation called Controlled Multiple Twisting, see Fig. 46 in Chapter 4.

### (iii) ENCIRCLING ONE, TWO OR THREE WARP ENDS

A method of weft twining found in the island of Timor, Dutch East Indies, shows another application of the technique and suggests other directions for exploration in rug weaving. It is a two-colour weft twining and the design is partly the result of the positioning of each colour. But the important characteristic is that the twining wefts do not always encircle a single warp end, they can encircle one, two or three, depending on the demands of the pattern.

Fig. 371 shows how the twining is carried out to make the lower half of the motif seen in Plate 166. Note that rows are alternately S- and Z-twist, so it is unlike the

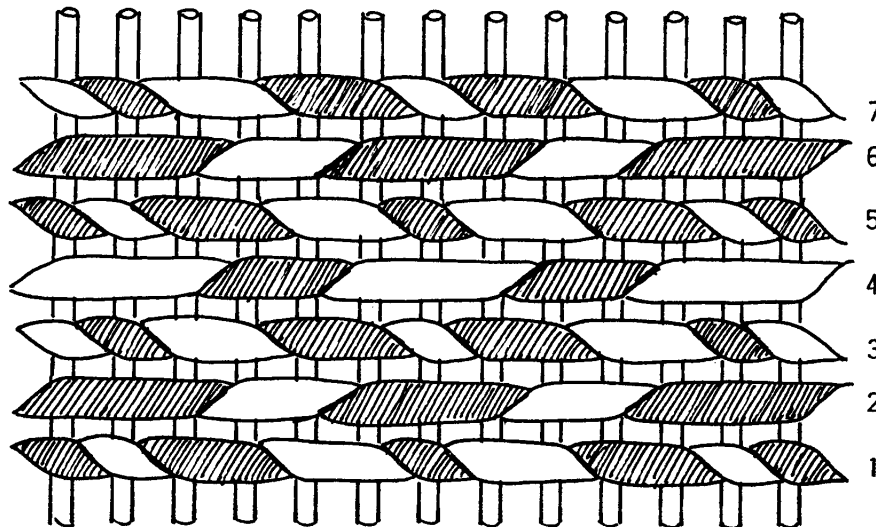


Fig. 371. Weft Twining. Producing design in two colours by varying number of ends encircled

diamond shown in Fig. 367 (e), which depends on a careful control of the twist in each row. This brings two advantages. Firstly, the design is completely reversible, though of course the colours are the opposite on the back. Where a black crosses over two warp ends on the front, a white must cross under two ends on the back. Secondly, the alternation of twist gives a far more lively, less mechanical quality to the line.

Note also that the sequence of warp ends encircled in rows 1, 3, 5 and 7, is identical, but the colours in rows 1 and 5 are reversed compared with those in rows 3 and 7. The same applies to rows 2, 4, and 6.

The motif described is symmetrical and geometrical, but a quite free design is perfectly possible as long as it observes the limitations of the technique. Such a design need not be planned in advance, but can be gradually created as row succeeds row. If working like this, remember the rather obvious fact that in order to have a float of one weft over three warp ends, the other weft must first pass under the same three warp ends; the unseen precedes the seen.

Due to the longer weft floats, this method gives a much looser structure than the normal weft twining. So in order to preserve a firm texture, the warp should be closer set or a thicker weft should be used.

This technique can be used all over a rug, or perhaps as a very intricate band at either end of a simply-coloured knotted rug, or in stripes alternating with plain weave.

#### (iv) TANIKO

The variety of weft twining developed by the Maori of New Zealand, and called *taniko*, depends on a complete turn of the two wefts between adjacent warp ends, see Fig. 372. As the wefts are of different colours, this has the effect of keeping one of them on the surface, instead of their appearing alternately as with normal weft twining. So in Fig. 372, black is on the surface over ends 1 to 4. But where the second colour, white, is wanted on the surface, a normal half twist produces the changeover as between ends 4 and 5, and thereafter white becomes the face weft.

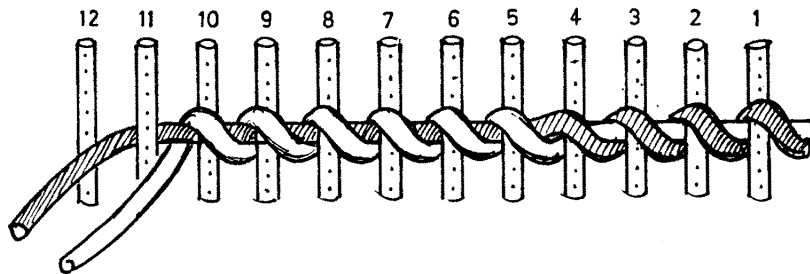


Fig. 372. Weft Twining. Diagram of Taniko



The weft not wanted on the surface, the back weft, is pulled tight after each twist and so takes a straight and invisible course on the back of the fabric. It is only the face weft which takes a serpentine course, see Fig. 372. This has the effect of tilting the face weft far more than in normal weft twining and it also makes the reverse of the fabric quite unlike the face.

The next move in Fig. 372 is to twist the white weft (face weft) behind the black (back weft). Then the black is passed behind warp end 12 and pulled tight. This is repeated for as long as white is wanted on the surface.

*Note*—That the face weft never passes behind a warp end, only behind the back weft.

The invisibility of the back weft depends on the correct warp/weft relationship, but more importantly on its being pulled tight.

The above description shows that taniko enables any two-colour design to be twined. Moreover areas of solid colour are not the only possibility, as any of the motifs in Fig. 367 (depending on a half turn) can be combined with them. See Plate 167. So the field is large and need not be confined to the triangles and diamonds found in Maori work.

More than two colours may be used in taniko. For instance with three-colour taniko, at any point in the design two colours are invisible at the back and the third is on the face. To change the surface colour, one of the two back wefts comes up to the face and the face weft drops to the back.

### C. Three- and Four-Colour Weft Twining

Fig. 373 shows four-colour weft twining. Each weft passes over two warp ends and

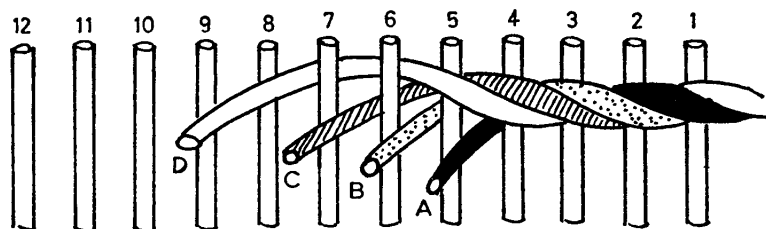


Fig. 373. Weft Twining. Four-strand weft twining

behind two warp ends, and all four wefts spiral around each other to make a 4-ply cord. The next move is for

- A to go up over ends 5 and 6 and then behind ends 7 and 8,
- B to go up over ends 6 and 7 and then behind ends 8 and 9,
- C to go up over ends 7 and 8 and then behind ends 9 and 10, and
- D to go up over ends 8 and 9 and then behind ends 10 and 11.

With a three-colour weft twining, the wefts go over two ends and behind one, so the back and front of the fabric are different.

Those familiar with tablet or card weaving will see that four-colour weft twining has the identical structure as four-hole tablet weave, but turned through a right angle, i.e., the warp and twisted weft of weft twining are related to each other in exactly the same way as are the weft and twisted warp in tablet weaving. So the many varied designs which result from the way the warp is made and arranged in tablet weaving are possible by ordering the twining wefts in a similar way. Here is another interesting field for investigation, though its use might be limited to narrow stripes.

#### **D. Twined Tapestry**

In the techniques described so far, the twined wefts go right across from selvage to selvage and the design is obtained by the relation of twist and colour in one row to that in the preceding rows. But a rug can be woven with many areas of solid colour. It is comparable with the tapestry technique but using weft twining, instead of plain weave. Each colour area has its own pair of twining wefts which pass from right to left and back again within the area, but never pass beyond its boundaries.

Rugs of this type are still made in Diessie, Ethiopia, by the Galla people. Plate 168 shows part of one of these rugs made of various shades of undyed sheep's wool. The vertical colour boundaries are managed in the neat way shown in Fig. 374, the selvages are of the type shown in Fig. 366 (b). Both warp and weft are of two 2-ply wool yarns plied together.

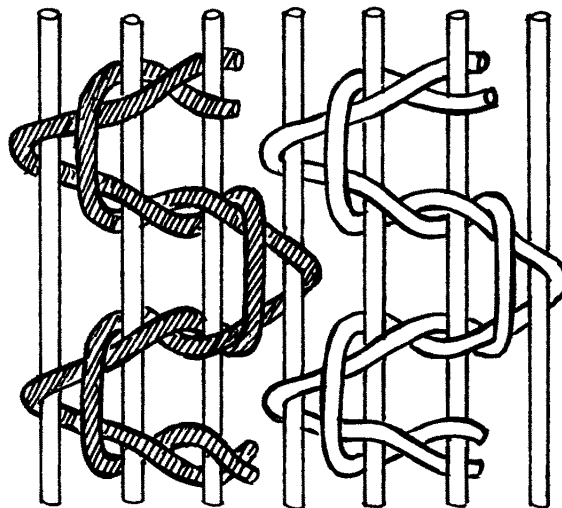


Fig. 374  
Weft Twining.  
Colour junction  
found in Ethiopian  
Twined Tapestry  
rugs

The so-called Chilkat blankets, made by the Chilkat sub-tribe of the Tlingit, achieve an even greater freedom of design. They are technically similar, but the wefts are turned as in Fig. 366 (a), at the edge of each colour area. They use two different procedures at vertical colour junctions. Either what is in effect an extra warp is used which is woven in with the right-hand colour for a few rows then with the left-hand colour, or the colour junction is stepped slightly from side to side as in some of the Kilim methods. In either case the vertical colour junction is hidden under a row of vertical three-strand weft twining.

Using any of these joining techniques, almost any type of design can be twined. The difference between twined and plain weave tapestry is mainly the very pleasing surface texture of the former, which due to the alternate rows of S- and Z-twist is as in Fig. 367 (g).

As with plain weave tapestry, the twining can be done in a curve or at an angle to the warp.

The design is identical on both sides of twined tapestry.

### E. Open Shed Weft Twining

In all the methods so far described, the twining wefts enclose all the warp ends in their passage from selvage to selvage, even though the number of ends enclosed between each half turn may vary. In other words, the twining was done on a closed shed.

But it can be carried out on an open plain weave shed, in which case the twining wefts only engage with the raised warp ends, see Fig. 375 (a). It will be seen that as each weft passes behind the warp it comes to lie in a plain weave shed (and does not float on the back in the usual way).

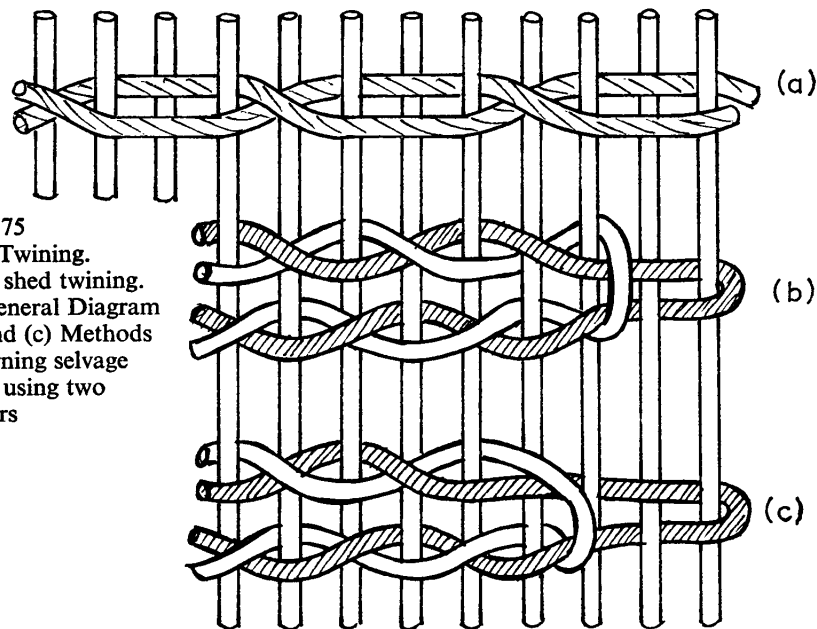


Fig. 375  
Weft Twining.  
Open shed twining.  
(a) General Diagram  
(b) and (c) Methods  
of turning selvage  
when using two  
colours

The next line of twining is carried out with the opposite plain weave shed open, and so on. So the parts of the twining wefts not showing on the surface are actually forming a plain weave cloth with the warp. This is seen on the reverse. The technique could of course be combined with plain weave, one or more plain weave picks separating each twined row.

The technique has two points in its favour.

(1) The longer weft floats make possible larger scale motifs. These are achieved without the structural weakness that would result from similar length floats in normal weft twining. Thus, to get similar length floats to those in Fig. 375 (a), normal twining wefts would have to encircle four ends between each half turn, giving a very loose structure.

(2) The alternation of sheds between successive rows of twining makes it very easy to produce diagonals.

As this technique gives a mass of floats on the face of the rug and none on the back, there will be a tendency, for any large area worked in it, to curl when the warp tension is released. So it is only suitable for narrow cross stripes.

If Fig. 375 (a) is turned on its side, the connection between this technique and that of the Navajo selvage will be obvious. It is also related to Skip Plain Weave.

#### *Turning Wefts at the Selvage*

As there are plain weave sheds being used, it seems simplest and neatest to move from one row of twining to the next by making one of the wefts weave in these two sheds, and making the other 'jump up', missing the selvage altogether. See Fig. 375 (b) and (c), in which the wefts only pass behind one raised end as opposed to two, in Fig. 375 (a).

If both selvages are done as in Fig. 375 (b), there will be oblique lines of the two colours used, sloping up to the right, see bottom of Plate 169. If then both selvages are changed to the type in Fig. 375 (c), the oblique lines will reverse their direction, see Plate 169.

If the wefts are turned at one selvage as in Fig. 375 (b) and at the other as in Fig. 375 (c), then the colours lie on top of each other and make the vertical serrated stripes seen at the top of the Plate 169.

*Note*—That the plain weave selvages appear as stripes when oblique lines are being twined, but as solid colours when vertical stripes are being twined.

—That because the selvage is in plain weave, this gives the opportunity of strengthening the edge in any of the ways described for pile rugs in Chapter 6.

## F. Practical Details

### (i) STARTING AND FINISHING TWINING WEFTS

#### *Starting*

#### (a) *One-Colour Weft Twining*

Double the weft and centre it around the selvage, so that there are two equal lengths of weft to twine with, see Fig. 376 (a).

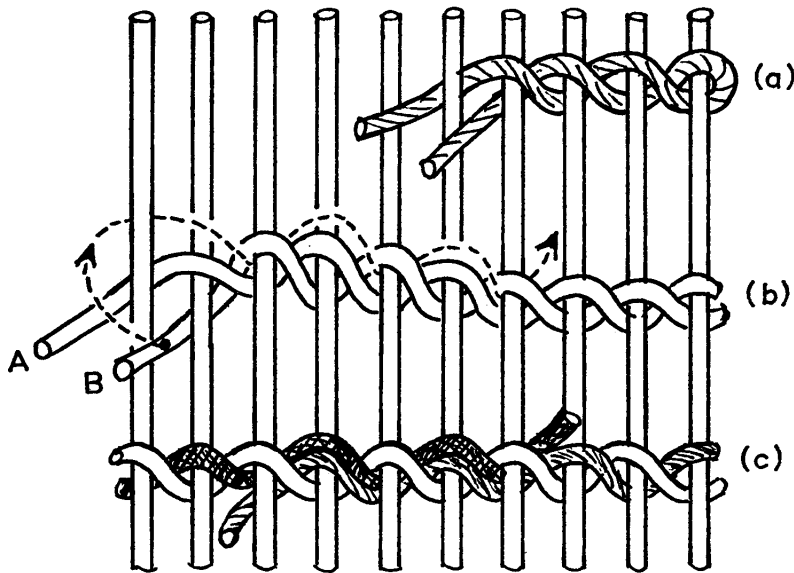


Fig. 376  
Weft Twining.  
Beginning, finishing  
and joining wefts

#### (b) *Two-Colour Weft Twining*

Knot the two wefts together. Pass one weft under the selvage and begin twining, see Fig. 365 (a).

#### *Finishing*

Finish two-colour weft twining by knotting the two wefts together with an overhand knot in exactly the same way as it was started.

Finish one-colour weft twining thus. Push up the last row of twining so that the warp is exposed below it, see Fig. 376 (b). Take the weft which would be the next to move, if twining could continue further, i.e., B, in Fig. 376 (b). Turn it round the selvage and, making it follow exactly the course of weft A, twine it back towards the right for an inch or so, see arrow in Fig. 376 (b). Push the twined row down again and darn in the two ends.

---

**(ii) WEFT JOINS**

If twining more than one row, have the wefts in a finger hank, so that a great length does not have to be dealt with in each twining movement. When a weft join has to be made, twine with the new and old weft together for a short distance, treating them as one weft, before continuing with the new weft by itself, see Fig. 376 (c). Darn in the two wefts later as described in Chapter 3. To avoid a lumpy appearance, stagger the weft joins, i.e., do not join both black and white wefts at the same place.

**(iii) WARP AND WEFT SET**

For any particular thickness of weft, the warp should be set a little closer for weft twining than for plain weave. A too thin weft or too wide warp spacing will give a spongy texture and the rows of weft twining will easily slide up and down the warp. A too thick weft or too close warp spacing will give a very rigid structure, more boardlike than anything obtainable with plain weave. This is due to the lack of movement between warp and weft, the result of the weft's twisting around and gripping the warp.

As with most things in weaving, it is best to proceed by trial. If a certain weft yarn has been chosen, the problem is to find the warp set. Wrap about twenty ends of warp around a simple frame. Twine with the selected yarn for about four rows, pulling the yarn with the tension that gives the desired texture to the fabric. By the end of the four rows, the twining will have automatically spaced the warp correctly either pulling in or opening out the threads from the position they were in when twining began. Measure this new spacing and make a full-size warp accordingly.

The problem may be the reverse one of finding the thickness of weft that will suit the spacing of a warp already on a loom. Divide the warp mentally into four. Then on each quarter-width of warp, twine several rows, using a different thickness of yarn for each of the four areas. Then compare the areas. An area with too thin a yarn will have the warp ends pulled closer together than they are in the reed and will be of too soft texture. An area with too thick yarn will have the warp ends forced apart and will be too hard. Between these two extremes will be an area with the correct thickness of weft.

**2. WARP TWINING****A. Tablet-Woven Rugs**

The only practical form of warp twining for making a complete rug is that controlled by tablets or cards. Tablet weaving is a subject in itself and only aspects of the technique peculiar to the making of rugs will be mentioned here.

Tablet weaving is essentially a method of producing *narrow* ribbonlike textiles, so a rug can only be produced by weaving a series of these strips and joining them together. But these strips can be woven wider than is usual, if the tablet weaving is carried out on a warp mounted in a loom, not just stretched between two posts, or between the weaver and a hook on the wall.

Make a warp in the normal way up to 8 inches wide. 6-ply rugwool at 16 e.p.i. is a suitable setting. Then if four hole tablets are used, there are four tablets to every inch of width of the warp.

Beam the warp on the loom.

Remove the shafts, or slide the healds to either side, to leave a clear space in the centre.

Hang a 4 dents/inch reed here and sley the warp four ends to a dent.

Thread the ends through the tablets and tie to the front stick.

The function of the reed is to space the warp correctly; beat the weft with a flat stick in each shed. It is useful to have some flat surface for the tablets to rest on, as shown in Fig. 377. The tablets will probably have to be turned in sections, first the right-hand half then the left, and this surface steadies those not being turned.

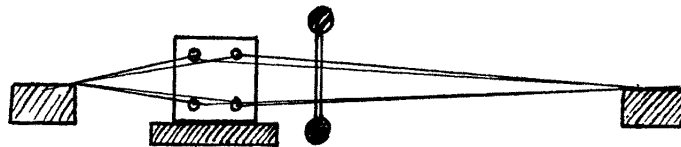


Fig. 377. Warp Twining. Tablet weaving on the loom

As the warp is fixed on the warp beam, weaves which do not continually build up twist must be used. So normal procedures but with periodic reversals of turning direction, and various double cloth techniques are suitable.

Begin and end the strips with the Double Twined Edge, described in Chapter 14.

### B. Warpway Stripes in Navajo Selvage Technique

The Navajo method of strengthening the selvages on their rugs is well known. Two extra threads (thicker than the normal rug warp) are added at each selvage after the warp has been made. They are tied to the lower and upper cross bar. One of each pair of threads, A in Fig. 378 (a), passes over the shed stick. But the one that passes behind the stick, B in Fig. 378 (a), does not have a leash attached to it, thus differing from all the normal warp ends that pass behind the stick.

So when weaving begins, end A becomes the selvage thread, but end B never enters the weave and is left floating at the back. After  $\frac{1}{4}$ – $\frac{1}{2}$  inch has been woven, ends A and B are switched over, so A drops to the back and B now passes over the shed stick. For the next  $\frac{1}{2}$  inch B is the selvage thread, and then A and B are switched again. They are

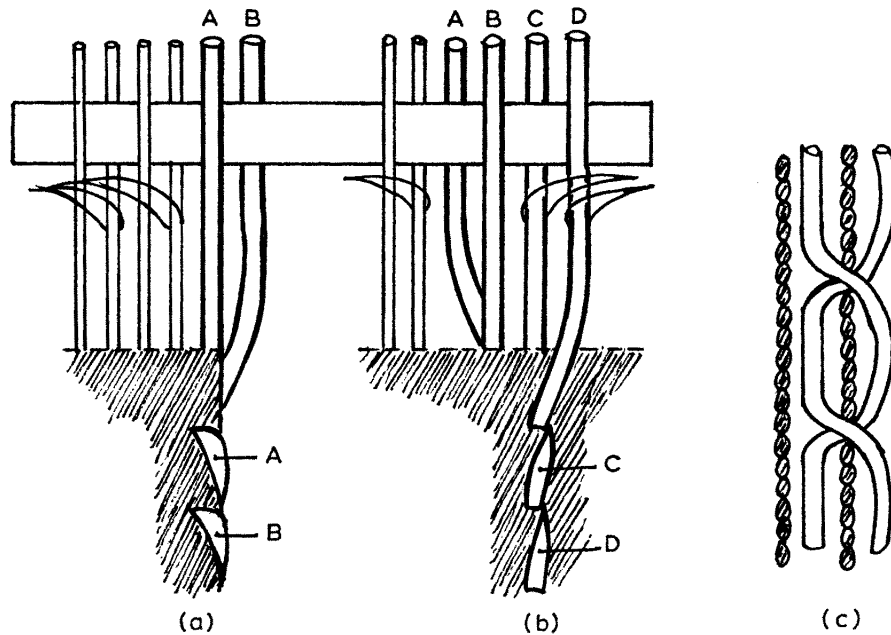


Fig. 378. Warp Twining. (a) Navajo selvage (b) Use of same technique to give warpway stripes (c) Longitudinal section

always twisted in the same way when switched, so they lie like a heavy 2-ply cord along the selvage. Naturally a reverse twist builds up in the threads above the shed stick, and periodically the threads are untied from the top cross bar to release them.

The same idea can be developed to give warpway stripes at any point across the width of a weft-face rug. It naturally needs a simple loom with a shed stick and leashes. It works well if the warp is thick and heavy, i.e., of wool rather than linen.

If a stripe is wanted front and back, at the same point in the rug, four ends have to be specially controlled at this point, see Fig. 378 (b).

Ends A and B are arranged exactly as in the Navajo selvage and they produce the stripe on the back. As shown in the diagram B is weaving and A is floating on the back.

End C passes behind the shed stick; end D passes in front of it. Both ends have leashes. This means that end C will weave normally, but end D will be raised in both sheds so will not be woven in, and thus it forms a float on the front.

To switch the ends, bring A to the front of the shed stick and drop B to the back, and bring C to the front and drop D back. Do this by sliding in a new shed stick from one side and switching the ends as they are encountered; then pull out the original stick. As with the Navajo selvage, the twist that builds up in these ends has to be periodically released.

Used thus it will be seen that the technique is a form of warp twining, hence its



inclusion in this chapter. In fact it is the warp form of Open Shed Weft Twining, described earlier in this chapter. It differs from normal warp twining in that one of each pair is always embedded in the weave, so the twining ends actually only enclose every other pick. This is brought out in the very diagrammatic longitudinal section in Fig. 378 (c), where the picks are shown shaded.

Plate 170 shows a sample using this technique

# 14 · Rug Finishes

---

## INTRODUCTION

When a rug is taken from the loom, it does not have to undergo any wet or heat processes to bring it to its final state, thus differing from many other textiles. But it always has the warp threads at both ends which have to be dealt with in some practical way to prevent the rug's unravelling. This chapter describes some of the many methods that can be used. Some are traditional, others are the result of experimenting with the ends of a rug, in an attempt to find new solutions to old problems.

There is no established nomenclature for rug finishes but names are needed for the purposes of reference in such a large field. Two of the following names are those used by Mary Atwater, others are related to the provenance of rugs which bear these finishes and others, which are of a more descriptive nature, generally apply to finishes which (as far as is known) are not used traditionally;—i.e., invented finishes.

A rug finish has two functions, (i) to prevent the initial and final picks of the rug from working loose and so unweaving and (ii) to prevent the exposed warp threads from fraying. So the finishes can be classified as weft protectors, warp protectors and warp and weft protectors (finishes which carry out both functions). These are now described.

All of these finishes apply to weft-face rugs, i.e., rugs which have, say, 6 to 12 e.p.i. One of the few practical finishes for warp-face rugs is described in the section called Specific Finishes.

## 1. WEFT PROTECTORS

### A. Overhand Knots

The most universally applicable finish is a series of overhand knots. It can be used whatever the setting or material of the warp.

There is no lower limit to the number of ends to be included in one knot, except that very small knots are inappropriate on as tough a textile as a rug. The upper limit is the number of ends which make up an inch width of the warp; i.e., with a 6 e.p.i. warp, do not include more than six ends in one knot. If this number is exceeded, the

rug may be pulled in at both ends and the weft may balloon out between the widely spaced knots.

It is important that the overhand knots be tight up against the last weft picks in the rug. One way to ensure this is to tie the knot loosely, then split the constituent threads in two and pull these two halves apart, as shown by the arrows in Fig. 379 (a). This

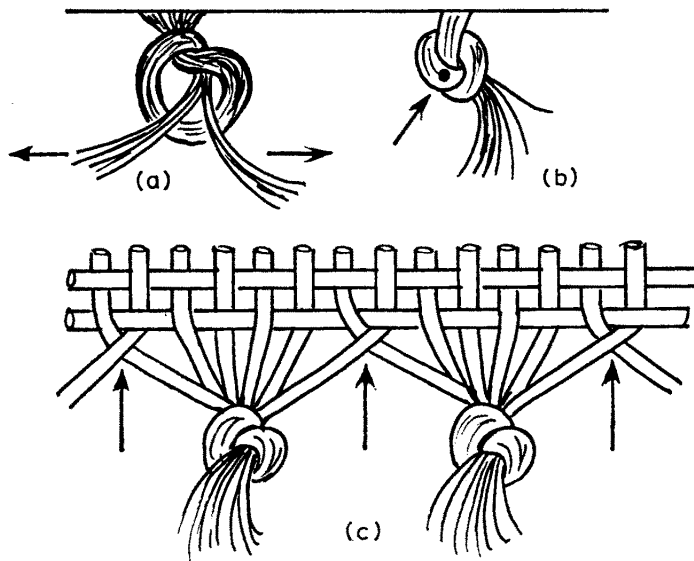


Fig. 379  
Rug Finishes. Overhand  
knot.  
(a) Method of tightening  
(b) Introducing glue into  
the knot  
(c) Preventing ballooning  
of weft between knots

manœuvre forces the knot towards the rug. Wherever an overhand knot is used in a rug finish either as a weft protector or as the final knot in one of the warp protectors, it should be tightened with great care. The only really successful way to do this is to pull each of the constituent ends separately. Some form of forceps (e.g., artery forceps), or pliers, are useful for gripping each end and applying a strong pull. Tightened thus, an overhand knot becomes a very compact hard mass and there is little chance of its working loose.

However, if the warp is of a springy wool yarn, such as belting yarn, the knot will soon become loose. For such warps put a spot of glue on the knot at the point arrowed in Fig. 379 (b); then as the ends are finally tightened, the glue is drawn into the centre of the knots and should hold all the threads together. Fig. 379 (c) shows how the ends that go into one knot can be selected in such a way as to prevent ballooning of the weft between knots. The arrows point to the positions where two ends are crossed over, thus locking the weft half-way between two knots.

For extra security a second overhand knot can be tied close up against the first.

**B. Philippine Edge**

This and all the other weft protectors are continuous knots that run without interruption from one selvage to the other. They all give ridges, some on the upper side as made, some on the lower. They all need a certain minimum number of ends in relation to their thickness. For example, a 7/7s cotton warp needs about 10–12 e.p.i., a 6/10s linen warp needs 6 e.p.i. or more, a 6-ply rug wool warp needs 4 e.p.i. If there are fewer or finer ends than the above, the finishes cannot be tied tight enough to be secure without at the same time drawing in the edges of the rug. If there are more or thicker ends, the finishes can be tied satisfactorily as long as the ends are grouped in twos or threes, and these groups used as the units in the various manipulations.

All the finishes can be tied either from right to left or left to right. The direction of tying given below are based on an endeavour to give the weaver's right hand the more complex or active part in the process.

The Philippine Edge is tied as follows:

Starting from the left, take the third end down to the left across ends 1 and 2 and then up to the right under these ends to emerge between ends 2 and 3, see Fig. 380 (a).

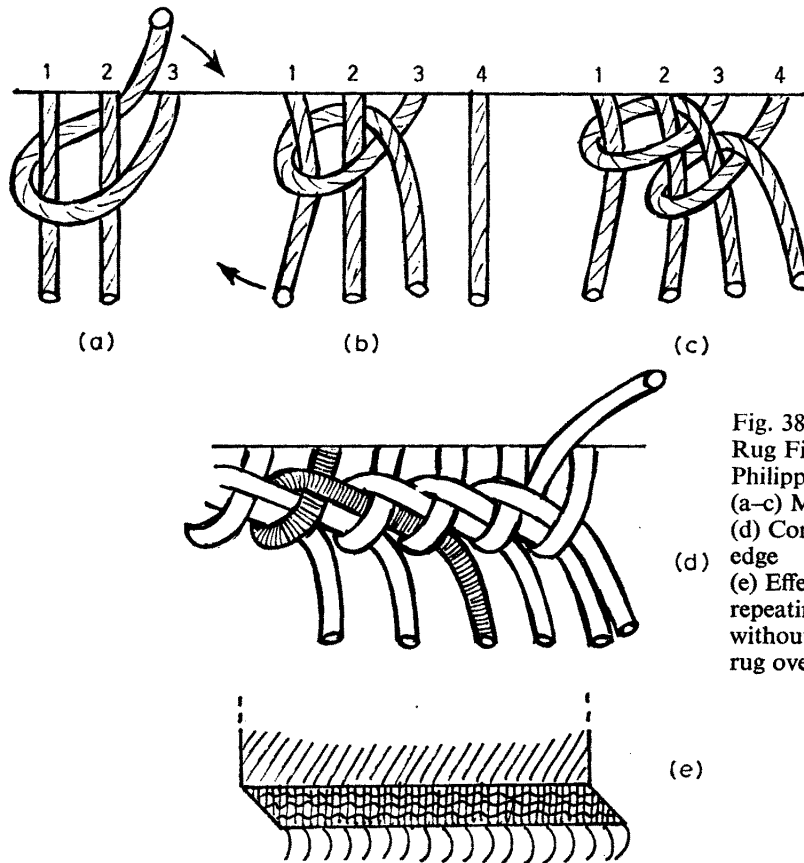


Fig. 380  
Rug Finishes.  
Philippine Edge.  
(a-c) Method  
(d) Completed  
edge  
(e) Effect of  
repeating edge  
without turning  
rug over

This knot or hitch is much used in the weft protectors. In this case, the left hand holds ends 1 and 2 under tension and the manipulation of end 3, with its final tightening in an upward direction, is done entirely by the right hand. Note that in this knot all the bending is done by end 3; ends 1 and 2 run straight through it.

Swing end 3 down to the right of end 2 and discard end 1, see arrows in Fig. 380 (a) and (b). Now, holding ends 2 and 3 tightly with left hand, pick up end 4 with right hand and repeat the above knot. Swing down end 4 and discard end 2. See Fig. 380 (c).

This continues right across the rug always knotting one newly picked up end round the previous two ends and always discarding the left-hand one of these two. When the right selvage is reached, all the discarded ends hang down as a fringe and the final end (which has just been knotted) is brought down to join them.

The resulting ridge (see Fig 380 (d)) appears on the upper surface only.

One row of the Philippine edge is quite secure, but several rows can be made. If these are all done with the rug in its present position, the ridge will get progressively wider and will shift to the right, (as shown in an exaggerated way in Fig. 380 (c)). But if the rug is turned over for each new row and the finish is always begun from the left, the ridges will appear on both sides and there will be no sideways shift. This means that the final end knotted in one row becomes the first end in the next row. The knotted band so produced (with ridges on both sides) can be made as wide as is suitable for the rug. (In fact a fabric can be produced by endlessly repeating this edging technique).

There are variations of this technique which produce a thicker ridge:

Start as above but do not discard end 1 or end 2, so when end 5 is picked up, there are now four ends in the left hand to knot around. Tie this knot and discard end 1. Pick up end 6, knot around the four ends in left hand and discard end 2. Continue thus always picking up one new end and discarding the end that has been in the left hand longest.

Though this or similar variations give a thicker ridge, it is probably no more secure than the normal finish.

### **C. Damascus Edge**

This edge is so called as the writer first saw it on a rug made by a Damascus rug weaver. It is done in two stages, the first of which starts at the right edge, so the ends have been numbered from this side.

#### **(i) FIRST STAGE**

Pick up end 1 and knot it around end 2, as shown in Fig. 381 (a). This is the identical knot to the one used in the Philippine edge. As in that instance, hold end 2 tight, as end 1 is pulled upwards. Leave end 1 in this position lying on the rug.

Pick up end 2 and knot round end 3, see Fig. 381 (b).

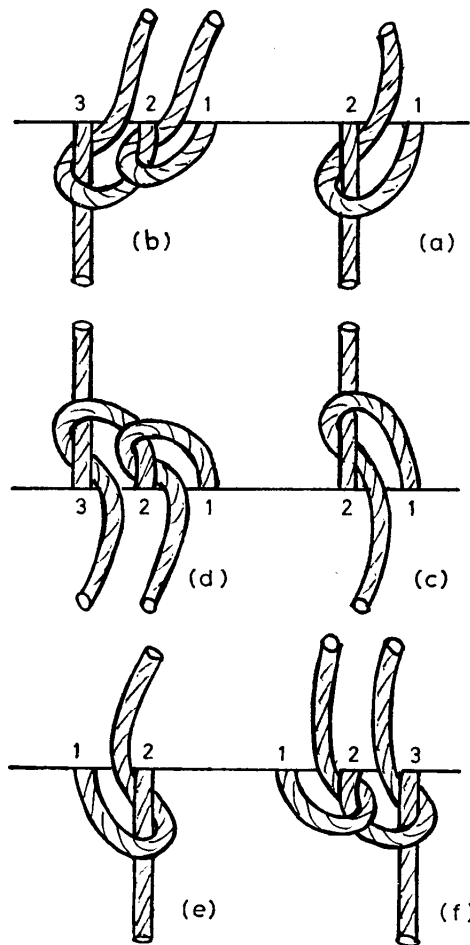


Fig. 381  
Rug Finishes. Damascus Edge.  
(a) and (b) First stage  
(c-d) and (e-f) Two methods  
of working second stage

Continue thus all the way across the rug. This produces a ridge on the back. The ends will now be pointing away from the weaver, i.e., in the wrong direction for a fringe; this is rectified in the second stage.

(ii) SECOND STAGE

There are two alternative ways of carrying this out, either (a) or (b).

(a) Without altering the position of the rug, start at the right edge and knot end 1 around end 2 in the manner shown in Fig. 381 (c). Then knot end 2 round end 3, and so on, all the way across. This produces a ridge on the front.

(b) Turn the rug over, and starting at the left edge, knot end 1 round end 2, then end 2 round end 3, as shown in Fig. 381 (e) and (f). This is the same manœuvre as in (a) but it may prove simpler to do.

In Figs. 381 (c)–(f), the first stage row of knots has been omitted for clarity's sake.

The result of the two stages is that a ridge is made on both sides of the rug and the free ends emerge from between them. It is one of the best looking of the simple finishes. Both stages can be repeated to make a wider band of ridges.

#### **D. Half Damascus Edge and Related Finishes**

A Half Damascus edge is just the first stage of the Damascus edge. The ends which are pointing away from the weaver are brought down and treated in one of the ways described under Warp Protectors. A half Damascus is a very quick efficient edge and is often used as a standard finish, as it takes no longer than overhand knots. A half Damascus finish can be repeated several times always beginning at the right. This duilds up quickly into a rather loose band. It is sometimes seen on Eastern carpets.

##### *Related Finishes*

##### (i) DOUBLE KNOTTING

End 1 is taken twice around end 2 as shown in Fig. 382 (a) and then pulled tight, see Fig. 382 (b). This is useful where there is barely enough quantity of warp. The double knot takes up more room than the single and helps to bridge the gap between one end and the next. If the single knot is normally made by rolling end 1 over end 2 with the right thumb, then the double knot is made by simply continuing the same movement a little further and takes no longer.

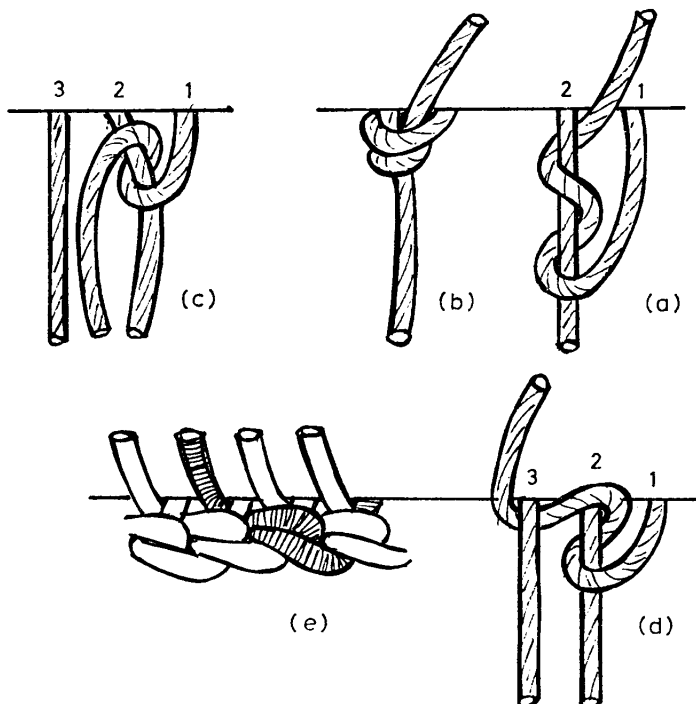


Fig. 382  
Rug Finishes. Half  
Damascus Variations.  
(a) and (b) Double knotting  
(c) Indian Edge  
(d) and (e) Another  
variation

---

(ii) INDIAN EDGE

This begins as a normal half Damascus edge, i.e., end 1 is knotted round end 2. But instead of leaving end 1 pointing away from the weaver, it is brought down again to lie between ends 2 and 3, see Fig. 382 (c). End 2 is now knotted round end 3, taking care that it passes in front of the discarded end 1. End 2 is now brought down between ends 3 and 4. The advantage of this method is that, though almost as simple as the half Damascus, it leaves the warp ends pointing in the right direction. It makes a ridge on the front. The rug can be turned over and the finish repeated.

(iii) ANOTHER VARIATION

Another variation begins as a normal half Damascus edge, but end 1 after knotting with end 2 is carried under end 3 and left pointing away from the weaver, see Fig. 382 (d). This is continued all across the warp. The result is shown in Fig. 382 (e). The next stage could be the darning of all these warp ends into the woven rug. (See under Warp Protectors.)

### E. Looped Edges

When working a half Damascus edge with very long warp ends, it happened that instead of a warp end being pulled through the knot, a blind loop of warp was mistakenly pulled through. This suggested the following finishes based on loops.

(i) LOCKED LOOPS

Starting at the right edge tie the usual knot with a *loop* of end 1 around end 2, and pull it tight, see Fig. 383 (a). Bring up end 2 with the left hand, pass it through the loop (see Fig. 383 (b)) to the right hand, which pulls it tight, away from the weaver. With the left hand pull on the free end of end 1, thus tightening its loop around end 2.

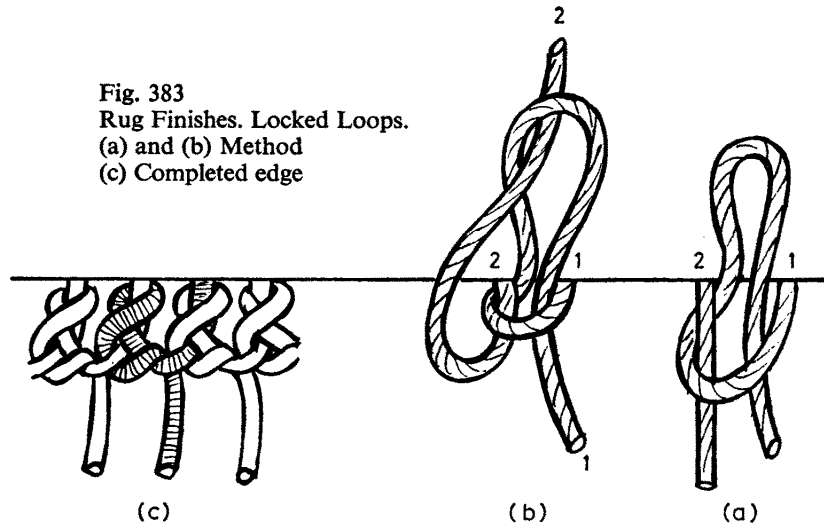
Now bring down end 2 and knot with a loop of it around end 3. Pass latter through this loop, pull on end 2 to tighten loop.

Continue thus all across the rug.

The loop of each end is locked, and prevented from undoing, by the following end which passes through it. A ridge is formed on the front, see Fig. 383 (c) where one end has been shaded to show its course. If the rug is now turned over and the process repeated (again starting from the right), the result will be ridges back and front with the ends emerging from between them.



Fig. 383  
Rug Finishes. Locked Loops.  
(a) and (b) Method  
(c) Completed edge



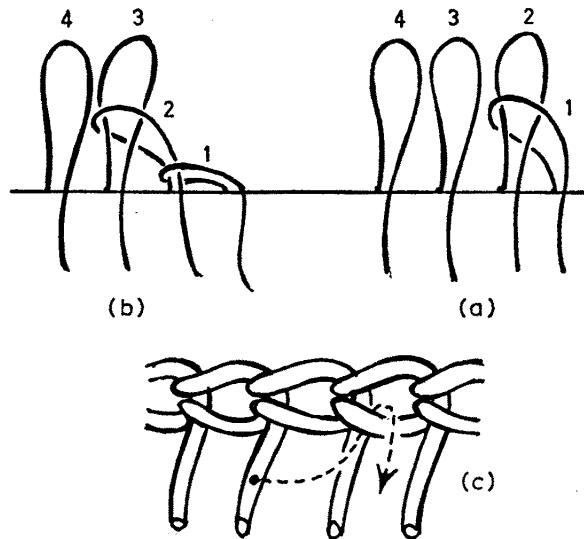
(ii) CHAINED LOOPS

This is done in two stages:

*First Stage*

Starting from the right, tie the usual knot with a loop of end 1 round end 2. Leave the loop lying on the rug. Now knot a loop of end 2 round end 3 and leave it and so on, all across the rug. There is now a loop from every end lying on the rug, with all the free warp ends hanging downwards, as shown diagrammatically in Fig. 384 (a).

Fig. 384  
Rug Finishes. Chained  
Loops.  
(a) and (b) Method  
(c) Darning free ends into  
the edge



*Second Stage*

This is the stage that gives the finish its name, as the loops are chained into each other exactly as in the chained weft loop technique in Chapter 6. Pass loop 2 through loop 1 (Fig. 384 (a)) and pull end 1. This tightens loop 1 round the neck of loop 2.

Now pass loop 3 through loop 2 and pull end 2, see Fig. 384 (b). This chaining and tightening of the loops is continued right across the rug until the left edge is reached. There the final end is passed through the final loop and that loop tightened to lock the whole row.

This finish gives a very pronounced ridge on the front. It holds the ends securely if the warp count is high enough. If not, the free ends can be darned, as shown in Fig. 384 (c) which represents an end-on view of the finish. Each end is darned upwards into the lower loop of the next knot to the right, as indicated by the arrow. As well as strengthening the finish, this makes the free ends lie in a better position.

The Second Stage of chained loops can be elaborated thus: Put loop 2 and 3 through loop 1, and pull end 1. Put loops 3 and 4 through loop 2, and pull end 2. Put loop 4 and 5 through loop 3, and pull end 3, and so on. This gives a thicker but less secure ridge.

Other ways of using these loops may be suggested by the method of finishing a frame-woven rug (see Special Finishes at end of chapter).

**F. Maori Edge**

This finish is used on Maori weft-twined fabrics. It gives a very neat rolled edge. It is structurally a cord running the width of the rug, made up of four warp ends, in the form of two 2-ply yarns plied together. At every half turn of this cord, one warp end is discarded and another brought in, so it remains of constant size. Despite its simple analysis, the finish is complicated to make and the description is best considered in two parts.

**(i) THE START**

This only has to be done once. See Fig. 385 (a)–(c). Starting at left, pass end 1 under 2, then pass 2 under 3, and then pass 1 under 4. There are now two ends pointing upwards and two ends pointing downwards. These are seen again in Fig 385 (d) where for clarity in the following description they have been relabelled A, B, C and D.

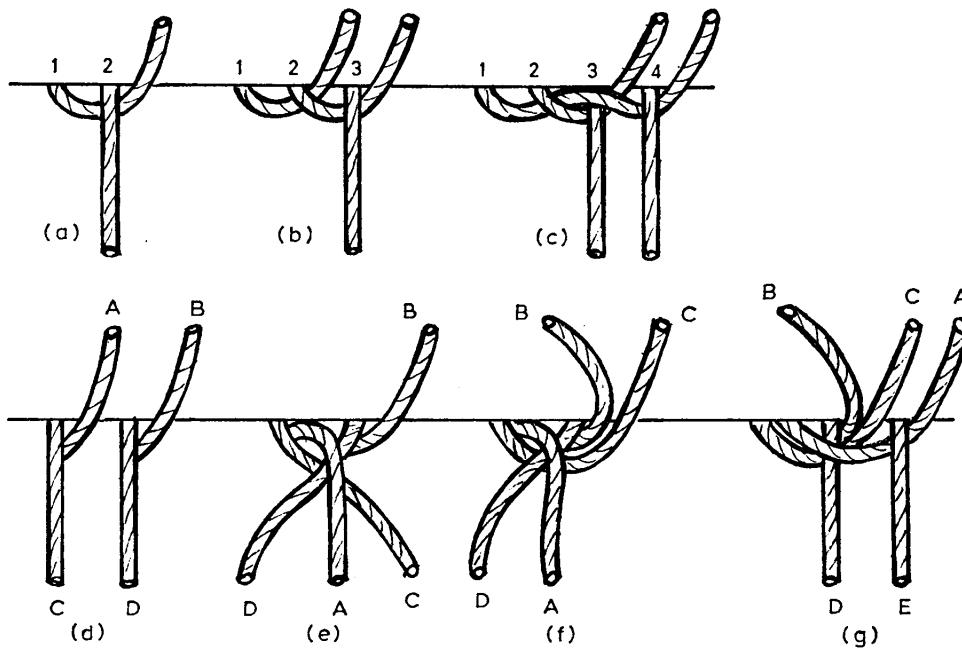


Fig. 385. Rug Finishes. Maori Edge. (a-c) Initial stages (d-g) Four stages of the finish proper

(ii) CONTINUATION

Now cross D over C, as close to the rug as possible, and bring A down over this crossing, see Fig. 385 (e). Hold this triple crossing tightly between the left thumb and index finger. With the right hand discard B to the left and bring up C to take its place, see Fig. 385 (f). Still with the right hand, bring up A under the next end, E; leave go of the crossing and tighten the finish by pulling C and A upwards and D and E downwards, see Fig. 385 (g). The sequence (e-g) is now repeated with these four ends; and the process is continued across the rug.

*Note*—Each sequence ends with two ends pointing upwards and two pointing downwards; of these, one is a new end and the other three were involved in the last sequence. Thus each end is involved in four sequences and is then discarded.

Though this is a very secure edge, the rug can be turned over and the whole process repeated so that there are two rolled edges with the free ends merging between them.

### G. Four-Strand Sennit Edge

This edge is structurally a four-strand square sennit (see Warp Protectors). As it proceeds across the width of the rug, new ends are constantly added to it and old ends discarded from it, so like the Maori edge (which suggested it) it remains of constant size.

Unlike other weft protectors it needs an extra piece of yarn. This should be longer than twice the width of the rug and depending on the warp setting may have to be thicker than the warp yarn. So it could be two pieces of warp used as one or some other yarn (perhaps the same colour as the weft).

Centre this yarn (shaded) over end 1 at the left edge of the rug, so that there are now two warp ends pointing upwards and two extra yarns pointing downwards, see Fig. 386 (a). Bring up the left-hand part of this extra yarn, pass it between ends 1 and 2 and bring it down so that it is now the right-hand extra yarn, see Fig. 386 (b).

Bring end 1 down, pass it between the two parts of extra yarn and carry it up so that it is now on the right of end 2, see Fig. 386 (c).

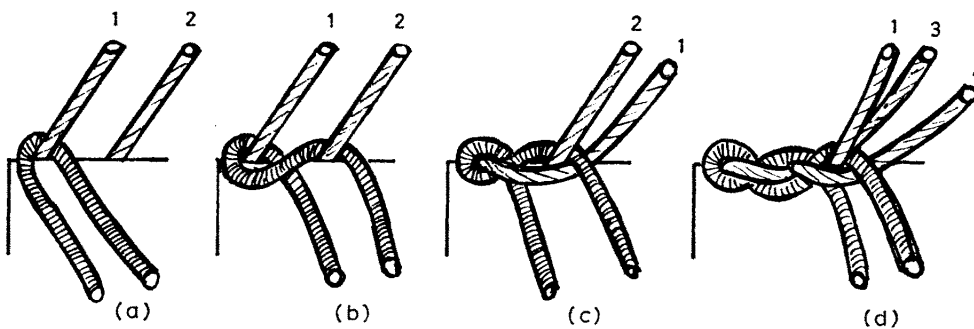


Fig. 386. Rug finishes. Four-strand Sennit Edge. (a-c) Method  
(d) Stage reached when working the variation

Now discard end 1, and end 3, which should be found lying behind it, takes its place. So again there are two ends (numbers 2 and 3) pointing upwards and two extra yarns pointing downwards.

The two stages shown in Fig. 386 (b) and (c) are repeated; viz. lower left end between upper two ends to become lower right; upper left end between lower two ends to become upper right. Then end 2 is discarded and end 4 taken up in its place.

This process is repeated right across the rug. As it is only the upper ends that are discarded the extra yarn remains in the edge continuously from left to right selvage.

The following variation gives a securer edge, because each warp end is involved in four stages instead of two.

When the stage in Fig. 386 (c) is reached, do not discard end 1, but treat end 1 and end 3 as one unit for the next two stages. These are done exactly as described above, (the fact that one of the four ends is of double thickness making no difference at all), after which, the edge will look like Fig. 386 (d). Now discard end 1; bring in end 4 which for the next two stages will work as a unit with end 2. After these two stages, discard end 2, and bring in end 5, and so on.

*Note*—Difficulty in deciding which of the pair of ends to discard may be resolved by pulling on them individually.

—Neither of these finishes is easy.

—The first can be tightened after it is made by pulling on the free ends one by one.

—Probably the more complex sennits could be adapted as rug finishes; but the weaver should be familiar with them as entities in themselves before endeavouring to apply them in this way.

## 2. WARP PROTECTORS

After using one of the above weft protectors, the weaver is still left with a fringe of free-hanging warp ends. Unless these are treated in one of the following ways, they will gradually un-ply and wear away.

### A. Darning

The simplest way to protect the warp ends is to hide them, by darning them back into the substance of the rug. After certain of the weft protectors, the warp ends are left pointing in the right direction to make this seem a simple and obvious solution. These are half Damascus (together with variation (i) and (iii)), Locked and Chained Loops, Maori and Four-Strand Sennit.

In all these cases, the fringe ends can be darned singly or in pairs for a distance of 1–2 inches into the rug.

Insert a needle (the type used for darning in weft ends is suitable) into the rug so that it slides down parallel with a warp end, then thread it with a wire loop, pull the fringe end into the rug, and cut it off flush.

*Note*—This procedure doubles the thickness of warp in the last few inches of the rug, so it could be expected to make this part of the rug buckle or distort in some way. However, if in preparation for this finish, the weft is woven with a specially loose tension for the first and last few inches of the rug, this difficulty will be overcome.

—As a further precaution darn the ends in a variable distance; so no two adjacent ends emerge at the same spot.

## B. Overhand Knots

Overhand knots can be used in several ways.

(i) One of the commonest is to make several rows of knots, say three or four, the knots in one row receiving their ends from two adjacent knots in the preceding row and themselves contributing their ends to two knots in the succeeding row. See Fig. 387 (a). So the position of the knots in successive rows is staggered; this makes it possible for the knots to lie close together and so a thick finish with densely-packed knots can be made.

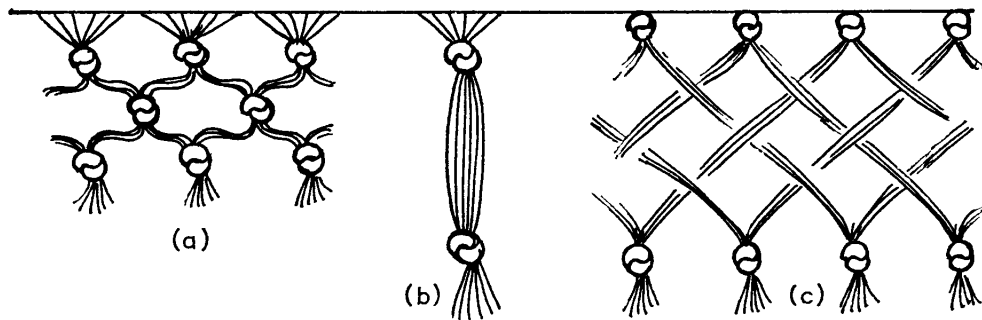


Fig. 387. Rug Finishes. Overhand knots as warp protectors

(ii) The overhand knot can be simply repeated at the extremity of the group of fringe ends as shown in Fig. 387 (b). Or these groups can be interlaced in some such way as shown in Fig. 387 (c) before the final knots.

## C. Plaiting

A plait of any type makes a good fringe; due to its flexibility it lies well. A three-strand plait can be quickly made, (using two to four warp ends as one strand), if the fingers are used correctly. After the strands have been crossed two or three times, pull them tight to force the plait close up against the rug edge. There are many other more complex types (see *The Ashley Book of Knots*). Each plait can be finished off in one of three ways.

(i) With an overhand knot. Tighten it as described under overhand knots in weft protectors. This is very important as the knot is the first line of defence. Once it works loose, the whole fringe can begin to wear away.

(ii) With two half hitches. Split the constituent threads of the plait into two equal groups. Take the right half up behind the plait and then down through its own loop, see Fig. 388 (a). Tighten. Now take the left half up behind the plait and down through its own loop, see Fig. 388 (b); slip this knot below the first knot and then tighten. This gives a more compact finish than an overhand knot, see Fig. 388 (c).

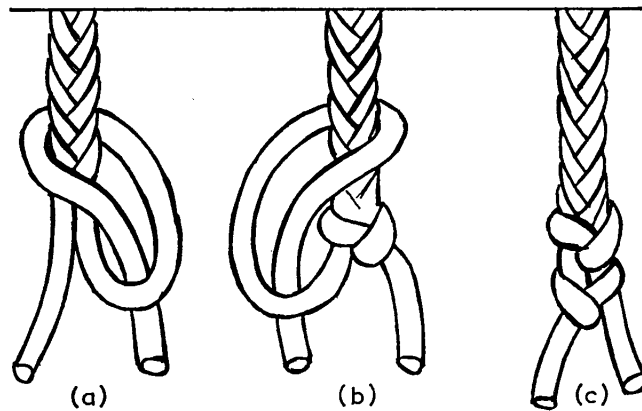


Fig. 388. Rug Finishes. Finishing a plait with two half hitches

(iii) If either of the above proves too bulky, the plait will have to be whipped. Fig. 389 (a) shows diagrammatically the neatest way to do this. Using a length of warp yarn, lay a loop of it down towards the end of the plait. Then bind the plait tightly, working downwards (in the arrow's direction). When this binding has covered about  $\frac{1}{2}$  inch of the plait, tuck the yarn into the loop as shown. Then pull on the end A, drawing the loop plus the yarn under the binding, see Fig. 389 (b). Trim both ends.

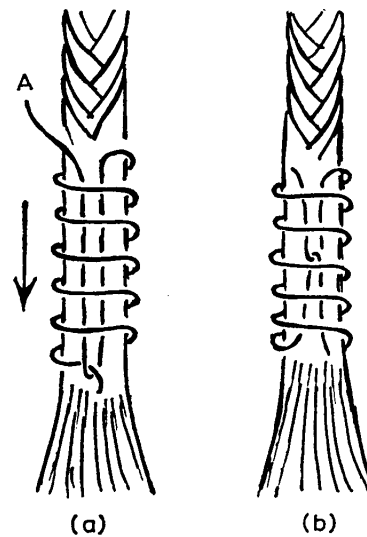
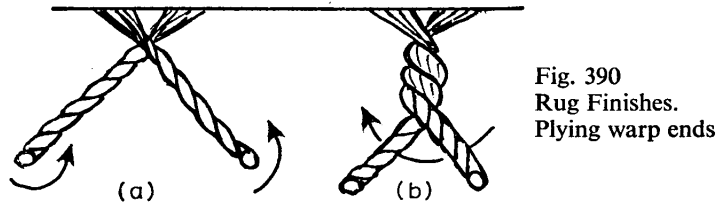


Fig. 389. Rug Finishes. Whipping a plait

### D. Plying

Groups of warp ends can be plied, so that the fringe appears as a series of thick 2-ply cords.

Divide each group into two equal halves, and twist both in the direction that increases their twist. Thus if the final plying of the yarn was Z-twist, then add more Z-twist, see Fig. 390 (a). Because one half of the group is in the right-hand and the other is in the left, there is a natural tendency to impart opposite twists to the two halves, which has to be overcome. The two groups are plied with the reverse twist, i.e., S-twist in the above example, see Fig. 390 (b).



It is best to put extra twist into both groups simultaneously (rolling them between fingers and thumb), then make one half turn of plying and keep on repeating this for the whole length. This gives a better result than twisting each group separately right to its end and then bringing the two groups together and hoping they will ply.

Finish each plied end with one of the ways described under plaiting. If too much twist is added, the plied ends will not lie flat. If the warp yarn is very highly twisted to begin with, make the initial twisting in the reverse direction of the yarn's final twist.

### E. Alternate Hitches

For the amount of ends involved in it, this gives a very bulky finish. An Alternate Hitch finish is at least twice as thick as a plied end containing the same number of threads. In addition, this finish uses up a greater length of warp than normal—i.e., the finish is less than half the length of the constituent threads. These two facts imply

(1) that it is useful wherever a large scale fringe is wanted, e.g., on a very large rug, where a normal fringe would seem out of scale.

(2) that it has to be prepared for. Extra long warp ends have to be left at both ends of the rug.

Divide the ends to be used into two groups, labelled A and B in Fig. 391 (a). Knot A round B as shown. This is the knot that occurs so often in the weft protectors. Hold B tight, as the knot is made. Then swing A down to the right. Now hold A tight, knot B round it and swing B down to the left, see Fig. 391 (b). Repeat these two knots.

Fig. 391 (c) shows the appearance of this finish.



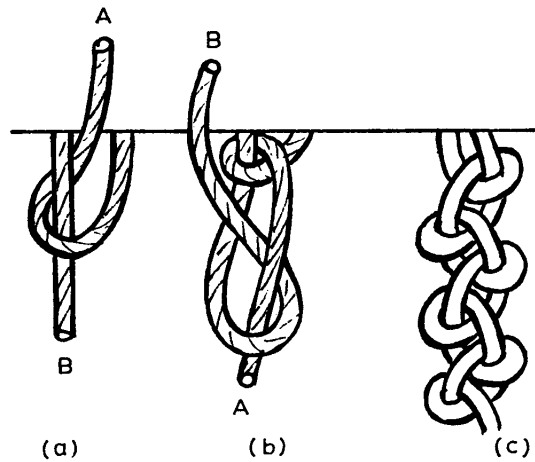


Fig. 391  
Rug Finishes.  
Finishing warp ends  
with alternate  
hitches

#### F. Four-Strand Square Sennit

Once the simplicity of a three-strand plait is passed, there is an almost endless variety of more complex intertwined finishes. Most of these are classed as sennits. Some are flat sennits (or braids) and are developments of the three-strand plaiting principle. Others are solid sennits and have characteristic cross-sections—e.g., square, triangular, circular, star-shaped. They may involve anything from four to sixty-one strands. Fig. 392 shows the simplest of this class, a four-strand square sennit.

Start with four ends, or four groups of ends, and cross them as in Fig. 392 (a). There are now two strands pointing down to the left (A and B) and two strands pointing down to the right (C and D).

The sennit is made in two movements.

(1) Carry the upper left strand, A, around behind the others, then forwards between the two opposing strands (C and D), and finally lay it below B, see arrow in Fig. 392 (a). So from being the upper left strand, A has become the lower left strand, see Fig. 392 (b).

(2) Carry the upper right strand (D), around behind the others, then forwards between the two opposing strands (B and C) and finally lay it below C, see arrow in Fig. 392 (b).

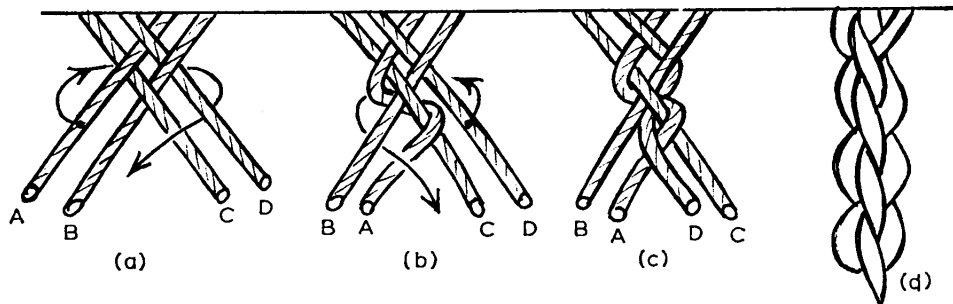


Fig. 392. Rug Finishes. Four-strand Square Sennit. (a-c) Method (f) Finished appearance

The sennit is now as in Fig. 392 (c). A and B have changed their relative positions, and so have C and D, but note that A and B are still both to the left and C and D still both to the right.

The above two movements are repeated; i.e., the upper strand from each side alternately is taken around the back, and then forwards between the two opposite strands to become the lower strand on its own side.

After each movement pull the right and left group firmly apart to tighten the sennit. Finish with an overhand knot or whipping. Fig. 392 (d) shows the completed sennit. If the strands are of two colours, then these can be made either to run longitudinally or spirally in the sennit according to their arrangement at the beginning.

The same principle can be applied to any even number of strands. Other sennits are more complex to make and can be found in *the Ashley Book of Knots*.

### 3. WARP AND WEFT PROTECTORS

#### A. Swedish Tapestry Edge

This is the simplest member of the class and has a limited usefulness. End 1 is darned down beside end 2 for about 2 inches and cut. End 2 is then cut flush with the edge of

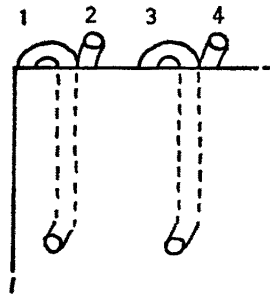


Fig. 393  
Rug Finishes. Swedish  
Tapestry Edge

the rug. End 3 is darned down beside end 4 and cut. End 4 is then cut. See Fig. 393. It is obviously not very secure, but is a neat way of finishing the edge of a rug which is then going to be turned under and sewn.

#### B. Woven Edge

There is very little evidence of ancient finishes as they are generally the first part of a textile to wear away. But there is a woven edge on a woollen fabric which was found in Denmark and dates from at least 1000 B.C.

The principle of the woven edge is that warp ends are one by one turned through a right angle and, acting as 'weft', are woven into the neighbouring warp ends.

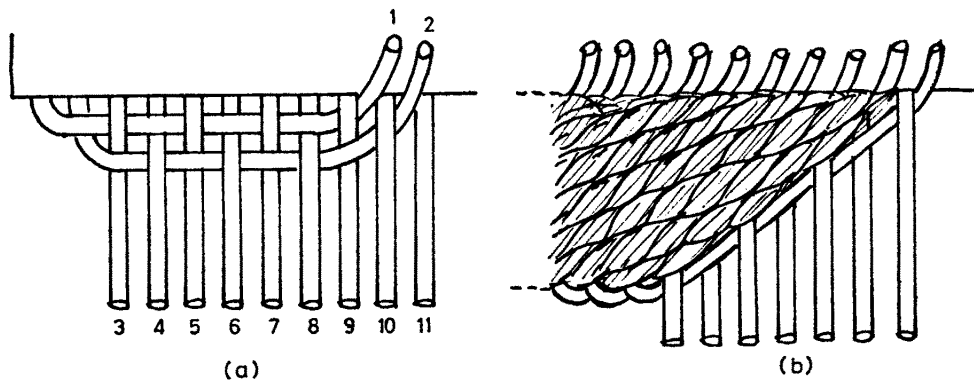


Fig. 394. Rug Finishes. Woven Edge. (a) General Diagram (b) Showing angled fell of the woven band

Referring to Fig. 394 (a), begin at the left edge of the rug and weave end 1 in a plain weave shed (over ends 2, 4, 6, 8 and under ends 3, 5, 7, 9), so that it emerges between ends 9 and 10. Then weave end 2 in the opposite plain weave shed (over ends 3, 5, 7, 9 and under ends 4, 6, 8, 10) so that it emerges between ends 10 and 11.

This is continued, the leftmost end always being woven in the next shed, for the same distance, and always emerging at one warp interspace beyond the last.

The woven band thus produced will gradually widen as each new end is woven, until a point is reached when the emerging end 1 is vertically over the next end to be woven (End 9 in Fig. 394 (a)). From then on the band will be of constant width, see Fig. 395 (a). Thus the width of the band depends on how far end 1 is woven in the first shed, as all subsequent ends follow its lead. In Fig. 394 (a) it is woven under four ends, but it could equally well have been under 3, 5, 6, 7, 8, etc. So the width of the woven band is easily controllable.

When the right edge of the rug is reached there will be about eight ends left with no warp to weave them into. These ends are made into a plait or sennit, and whipped, see Fig. 395 (a).

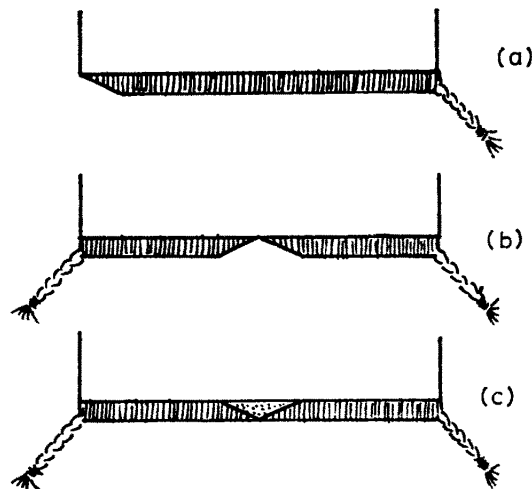


Fig. 395  
Rug Finishes. Woven Edge.  
Details of three types of  
woven edge

The 'weft' must be laid in slackly so that, when pressed tightly home, it completely covers the warp. When this is done, it will be found that the fell of the woven band is not at right angles to the warp, but that it slopes towards the edge of the rug as shown in Fig. 394 (b). A rug fork or the fingers can be used for pushing the 'weft' into position.

A pair of tweezers or artery forceps are a great help in the weaving. Enter them from the right into the correct shed, then grasp the leftmost end with them and draw it back into the shed. If these are not available, carry out a similar manoeuvre with two fingers of the right hand.

The emerging ends are cut about  $\frac{1}{4}$  inch from the rug surface. If the rug is one-sided (i.e., a pile rug), carry out this finish with the rug upside down, so that the short cut ends will be on the underside. If the weaver considers the edge is not secure enough or if he is offended by the short cut ends, the emerging ends can be darned one by one back into the rug, and cut off flush with its surface.

The above is the basic method, but, as often happens with such a simple idea, there are many variations.

(i) VARIATIONS IN STARTING THE WOVEN EDGE

(a) *Starting at Centre*

The edge can equally well be started at the centre of the rug and worked in both directions. So there is a dip in the centre where the two woven bands start and there is a plait or some tassel at both corners, see Fig. 395 (b). Start by tying a half knot with the two central ends and then begin weaving, see Fig. 396 (a). The knot prevents

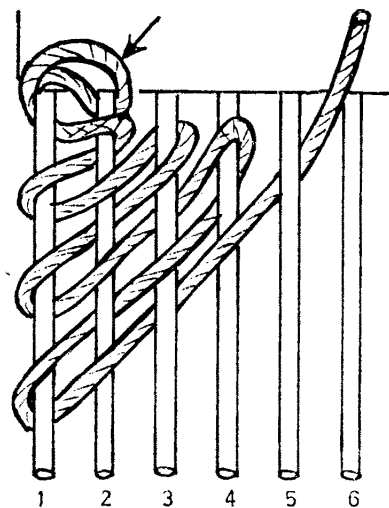
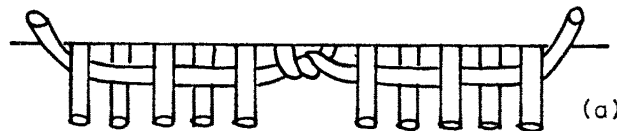


Fig. 396  
Rug Finishes. Woven Edge.  
Details of starting an edge  
(a) In the centre  
(b) At one side of the rug

the weft ballooning at this point. This edge is seen on the sample in Plate 14. To avoid the central dip, start by weaving a triangle in the centre with a separate piece of warp yarn (just like weaving a triangle in a kilim) and then continue as above. As long as the size of the triangle has been correctly judged, the woven edge will be perfectly straight, see Fig. 395 (c).

(b) *Starting at Side*

A woven edge can be started at one or other side of the rug, in such a way that the band is at full-width right from the beginning. This means building up a right angle triangle to counter the normal sloped beginning of the woven edge. The triangle can be woven either from an extra length of yarn or from one of the warp ends. Fig. 396 (b) shows the former alternative. The length of yarn is centred round end 2 (arrowed) and then woven to left and to right, always including one more end in its passage to the right. When the triangle is large enough, the yarn is made to emerge as shown. The warp ends are then woven in normally. So the next step in Fig. 396 (b) is to take end 1 under 2, over 3, under 4, over 5, and under 6. If the triangle is woven from a warp end, use end 2 and proceed exactly as above.

(ii) VARIATIONS IN WEAVING METHOD

A woven edge can be made at the final end of a rug, *as it is being cut from the loom*.

Cut the left-hand end, open a plain weave shed and weave the cut end in for a certain distance. Cut the next end, change the shed and weave the end in for the same distance. Proceed thus all across the rug. Remember that as the fell of the woven band is not at right angles to the warp, the batten cannot be used for beating. So use a rug fork.

It will be appreciated that this speeds up the work considerably but it can obviously be done only at one end of any rug. In a similar way, the edge can be made from the centre outwards, cutting two ends each time and weaving one to the right and the other to the left.

(iii) VARIATIONS IN WEAVE

(a) *Two-Pick Woven Edge*

There is no necessity for each 'weft' to weave only one pick before it emerges. Fig. 397 shows a stage in the making of a two-pick woven edge. The shaded end is woven to the right. When it meets the rug edge, instead of emerging in the normal way it is turned round the next warp end (arrowed), and weaves back to the left in the opposite shed. It then emerges at the outer edge of the woven band.

The first pick of the next end (unshaded) now enters the same shed as the second pick of the shaded end, see Fig. 397. It will then return to the left in the next shed.

Thus there are two picks in every shed, one passing to the right and one passing to the left. All the ends finally emerge at the outer edge of the woven band. If the weaving is secure enough they can be cut short here. Alternatively this finish could be considered just as a weft protector and the emerging ends then be plaited or plied.

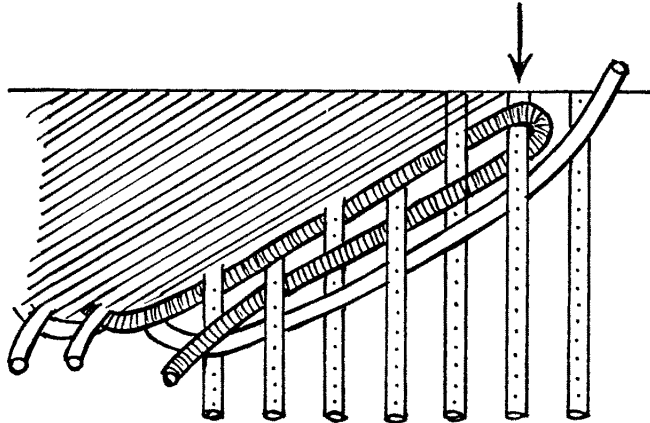


Fig. 397  
Rug Finishes. Two-Pick  
Woven Edge

(b) *Three-Pick Woven Edge*

Fig. 398 shows a stage in a three-pick woven edge. In this method the shed is changed between every pick. The shaded end is woven to the right with six ends (starting under the first), back to the left with five ends, and back to the right with five or six ends (depending on what is to follow). The next end (unshaded) does exactly the same.

*Note*—There is only one pick in every shed. The final pick is woven with six ends (as is the unshaded end) if the emerging end is to be cut short or darned into the rug. In some Swedish finishes, it is woven with five ends (as is the shaded end), pushed through to the back in the space marked X, and subsequently darned outwards. A needle is inserted along the nearest warp thread, the emerging end threaded into it and drawn out, so that it now protrudes from the outer edge of the woven band. These ends are then plied or plaited, thus treating the woven edge merely as a weft protector.

—That the second pick weaves with one less end than the first. If it wove with the same number it would form a loop at the outer edge that could work loose. If however the ends are to be darned outwards as described above, they will catch and secure these loops—so in this case, the thread could weave six picks to right, six to left, six to right.

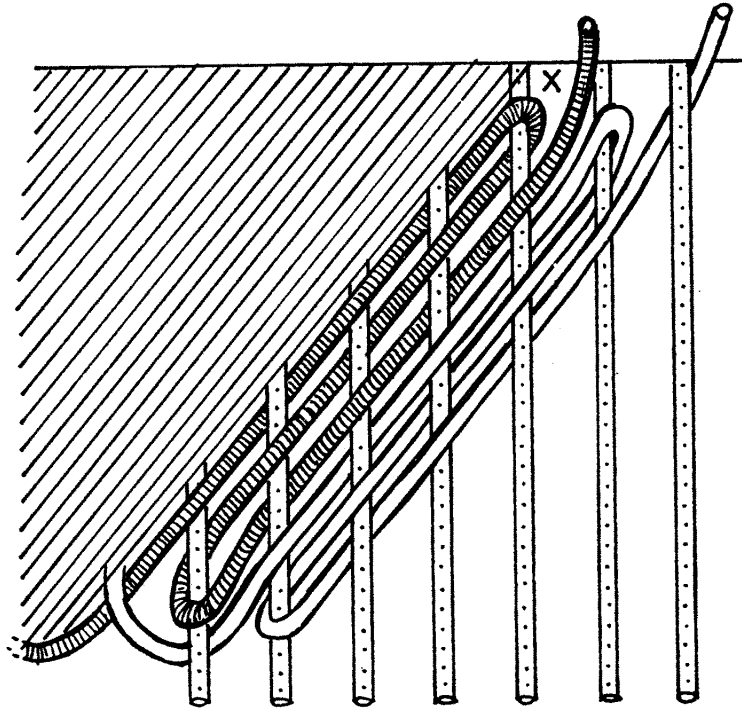


Fig. 398  
Rug Finishes.  
Three-Pick Woven  
Edge

Because in these variations the threads interlace two or more times with each other, they can achieve the same security by interlacing with fewer ends than are involved in a normal woven edge. Thus a three-pick woven edge in which the 'weft' weaves with four ends in each pick, is probably just as secure as a normal (one pick) woven edge in which it weaves with twelve ends. A related feature is that a two- or three-pick woven edge in which the 'weft' weaves with a certain number of ends, will be much wider than a one-pick woven edge weaving with the same number of ends. The extra width is the result of the increased angle of the fell of the woven band.

To ensure a straight edge to the rug, some weavers first knot the warp in pairs and then regard these pairs as the unit in weaving the edge. When this is done with a two- or three-pick woven edge, the 'weft' as it turns between the first and second pick is caught between the knot and the rug, see Fig. 399.

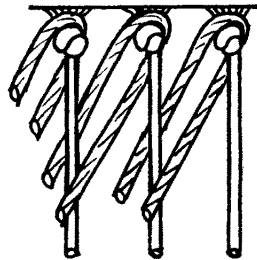


Fig. 399  
Rug Finishes.  
Detail of Woven Edge

## (iv) VARIATIONS IN COLOUR

If the warp is striped, the colours will appear as lozenges in the woven edge, see Plate 161.

**C. Twined Edge**

Just as the last finish is based on the idea of weaving warp into warp, this is based on the idea of twining warp about warp. (Reference to Chapter 13 on Twining is advised at this point.)

Start at either side of the rug or in the centre. In Fig. 400, the twined edge begins at the left side of the rug. The twining can be either S- or Z-twist, or a combination of the two. Assuming it is to be Z-, start by twisting ends 1 and 2 as in Fig. 400 (a). These two ends are now going to twine with six warp ends.

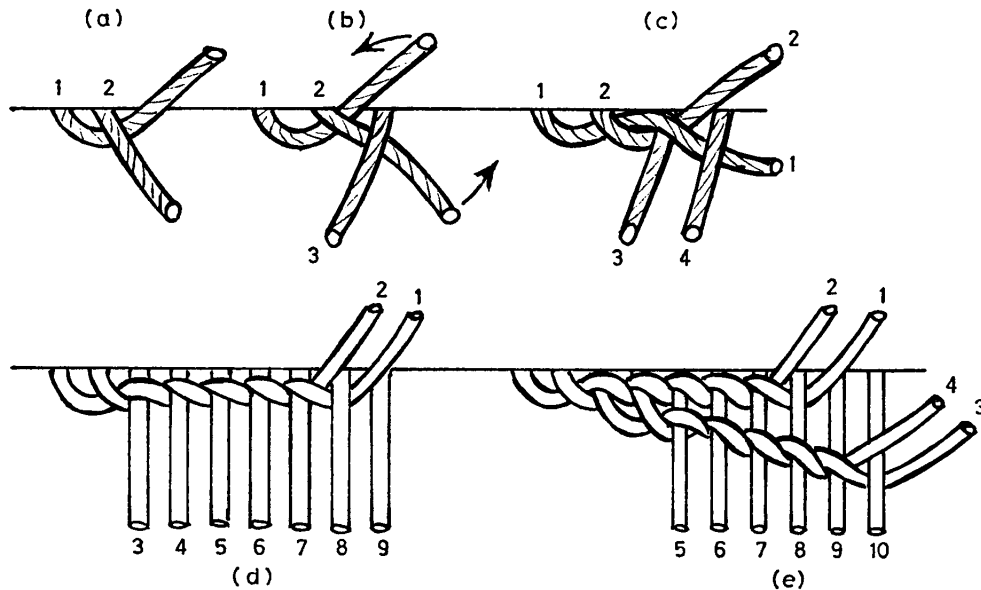


Fig. 400. Rug Finishes. Twined Edge

Bring end 3 down between the twining ends, as in Fig. 400 (b). Lock it in position with another twist of the twining ends (arrows in Fig. 400 (b)), then bring end 4 down between them, see Fig. 400 (c). Carry on thus until six ends have been brought down (these are ends 3–8 in Fig. 400 (d)). The two twining ends emerge, as shown, in adjacent warp interspaces.

Now twist ends 3 and 4 as in Fig. 400 (a), and use them as the twining ends for the next row. They will twine round the next six ends (numbers 5–10), and emerge in the



next two warp interspaces, see Fig. 400 (e). Continue thus across the rug; and deal with the emerging ends by cutting them short or darning them into the rug.

*Note*—That each row of twining reaches two warp ends to the right of the former.

—When twining to the right, hold the two twining ends in the right hand and bring the warp ends down between them with the left hand. With practice the right hand can twist the two ends without shifting its grip.

—As each row is twined it will tend to slant down towards the twining hand (right), see Fig. 400 (e). So on completion, force it up against the previous row.

Due to its structure a twined edge is very strong, but it is naturally slower to make than a woven edge.

#### *Variations*

(a) *Twist.* With a one colour warp, variations of the direction of twist can make a subtle patterning in the twined edge. But ensure that such variations will not prevent the edge lying flat.

(b) With a warp of two colours, end-and-end, the two-colour weft twining effects can be produced in this edge. If the edge is done exactly as described, the two colours will appear as stripes running in the warp direction. By varying the twist and the colour which begins each row, the other effects described in Chapter 13 are possible. These can lead to very interesting rug finishes.

#### **D. Wrapped Edge**

Again with the wrapped edge, warp is worked into warp, but in this case the working takes the form of wrapping. This can be analysed as soumak which is alternately wrapped in the locking and non-locking manner. But unlike soumak, row succeeds row without any intervening plain weave. It was seen on a tent-hanging from Bokhara.

Starting at the left edge, wrap end 1 around 2, as shown in Fig. 401 (a). Tighten this, then wrap end 1 around end 3, as shown in Fig. 401 (b). These two wrappings, one of the locking, one of the non-locking type, are repeated with an odd number of ends (five in Fig. 401 (c)). The odd number ensures that the row finishes with a locking wrap, from which the end emerges as shown. If Fig. 401 (c) is turned over, it may be easier to see that wrappings of the locking and non-locking type are being produced alternately. Now pick up end 2 and do exactly the same as above, i.e., start with a locking wrap.

Fig. 401 (d) shows the edge when these two rows have been pressed down tightly.

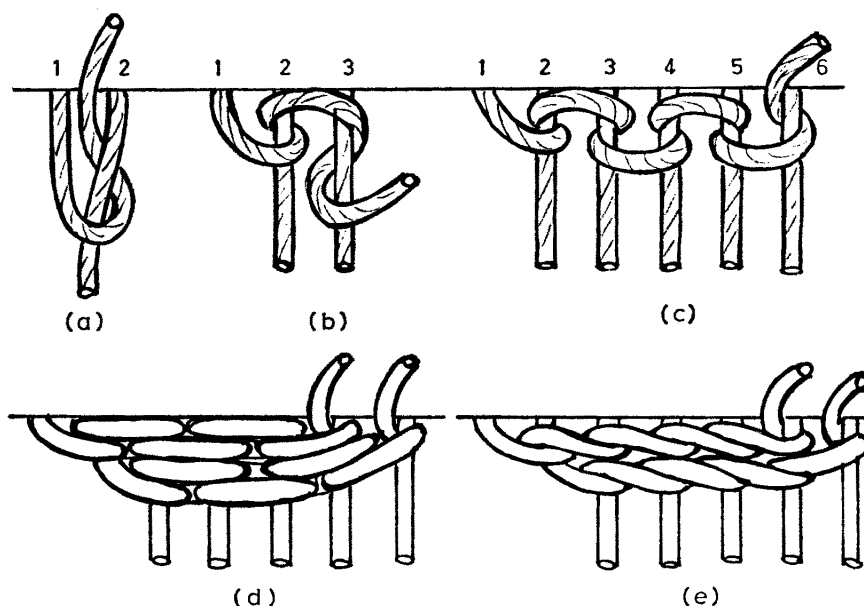


Fig. 401. Rug Finishes. Wrapped Edge. (a-c) Method (d) Completed edge (e) Variation

Note how the positions of the soumak loops alternate rather like bricks in a wall. The edge is continued thus, right across the rug. The reverse of this edge is quite different, consisting of narrow ridges made by the soumak 'wefts' as they wrap around successive warp ends.

It is important to keep the passive elements (the warp ends) under tension as the wrappings are made, also to make the latter at a tension that will not distort the warp ends from their true parallel position.

A possible variation is the following. If only the locking wrap (Fig. 401 (a)) is used and repeated, say, six times, a slightly different edge is produced. This could be called a locked soumak edge. The wrapping can be made round an odd or even number of ends, but always round the same number in each row. As Fig. 401 (e) shows it resembles the twined edge. The back of this edge is identical with the back of the normal wrapped edge.

### E. Combinations of Woven, Twined and Wrapped Edges

#### (i) STARTING OR ENDING A WOVEN EDGE WITH A LOCKED SOUMAK

See Fig. 402 (a). Starting a woven edge thus, gives a very firm border to the band. Finishing it thus, gives it additional strength, especially if the emerging ends are cut short.

*Note*—How the 'weft' passes over two warp ends, after the initial wrapping and before it enters a plain weave shed. This helps the bulk of the wrapping to bed down into the weaving below it.

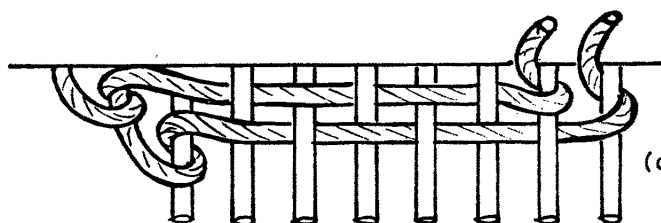
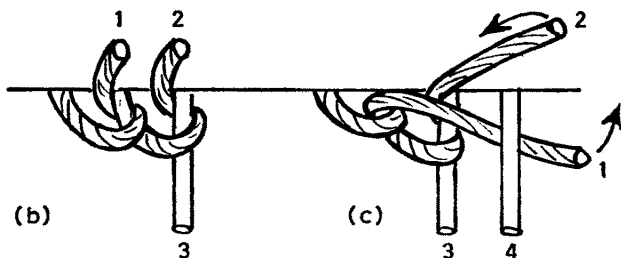


Fig. 402

Rug Finishes.

(a) Combining Wrapped with Woven Edge

(b) Combining Wrapped with Twined Edge

**(ii) USING LOCKED SOUMAK AS DECORATION**

One row of locked soumak (using two 'wefts' as one), introduced in a woven or twined edge, makes an obvious ridge. Such ridges can either have a rhythm of their own or be related to some design element in the rest of the rug.

Or an all-over texture can be made by alternating, say, two twined or woven rows with one soumak row.

**(iii) STARTING A TWINED EDGE WITH TWO LOCKED SOUMAK WRAPPINGS**

Begin by wrapping end 1 round 2 and end 2 round end 3, see Fig. 402 (b). Then bring end 1 across to the right, and behind end 4, see Fig. 402 (c). Now continue twining, i.e., twist ends 1 and 2, as arrows, and bring down end 5 between them.

These are only a few of the many ways, both functional and decorative, in which the various warp-into-warp finishes can be combined.

**F. Woven Edge Using Extra Warp**

This is one of the most complex but satisfying of rug finishes. It involves setting up a narrow warp (about 2-3 feet longer than the rug is wide), and holding it close up against the edge of the rug. It is then woven using the rug's warp ends as its weft. Each warp end goes in one shed and back in the next and then is discarded. It shares this latter shed with the next warp end. Thus each shed contains two warp ends which

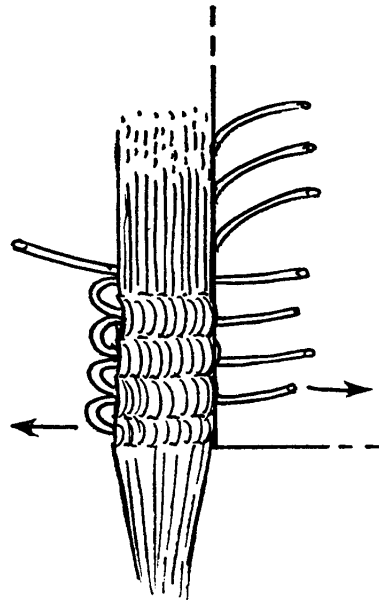


Fig. 403  
Rug Finishes. Woven Edge  
using extra warp

move in opposite directions. The discarded ends are cut off or darned into the rug. See Fig. 403.

This, in brief, is the method, but its carrying out presents some problems, mostly to do with tension.

The narrow warp has to have some shedding mechanism. This can be a rigid heddle or stick and leashes, in which case the warp will have a warp-face plain weave structure. Or it can be tablets, in which case the warp will have the characteristic twined warp structure of tablet weaving. As the warp is quite separate from the rug, it gives a good opportunity for introducing not only new colours, but also the neat intricacies that tablet weaving is capable of.

When the warp is made, it is stretched (perhaps between pegs mounted on a table's edge). Now the rug has to be stretched as well so that both extra warp and rug contract an equal amount when the process is completed and the rug is laid on the floor. One way to do this is to fix a temple so that it stretches the edge of the rug that is to be worked. The width at which the temple is set is something that has to be found by trial and error and will, of course, depend on the relative elasticity of the rug's weft yarn and the extra warp yarn. The temple can be relaxed at intervals during the weaving to see whether the rug and the woven edge contract equally or whether the temple has to be reset to overcome any inequality. The temple is useful in another way. If the ends as yet unwoven are turned back under the temple, they are prevented from fouling the shed of the extra warp.

It is difficult to weave the extra warp so that it is tight up against the rug's edge. So leave a loop of each 'weft' at the outer margin of the woven edge. Every 6 inches or

so, tighten the first pick then the second pick of each 'weft' in turn; i.e. first pull on the loop (arrow to left in Fig. 403), then pull on the emerging end (arrow to right in Fig. 403). This brings the woven edge as close as desired to the rug.

The extra warp yarn can be identical with the rug warp or be the same yarn dyed; or it can be another material altogether. But remember that the soundness of the finish depends on how this yarn and the rug's warp yarn grip each other.

#### WHEN USING TABLETS

Set the tablets so that each is twining the warp in the opposite direction to its neighbour.

If the woven edge is beating down too far, i.e., if the edge is becoming shorter than the attached rug, turn the tablets once or twice without inserting a 'weft'.

A neat way to begin and end a tablet-woven extra warp is to weave a few inches in a circular manner. Using a separate weft, always enter it into the shed from the same side. Tightening the resulting weft floats, one by one, causes the braid to curl up into a tube, the right and left selvages meeting. See Plate 10.

### G. Twined Edge Using Extra Yarn

#### Taniko Edge

This method uses extra yarn, which is twined round the warp ends. It is a Maori finish.

Take two pieces of yarn each of which is about three times the width of the rug. Double each piece over and loop the two doubled pieces into each other, so that the two pieces join as in Fig. 404 (a). For clarity, these have been shown black and white, but there is no need for them to be in different colours.

Centre the looped yarns round the selvage of the rug, as in Fig. 404 (a). Cross the white and black yarns over and, in so doing, pass the white through the black. Tighten by pulling apart, see Fig. 404 (b). Pass the black yarns behind end 2, see Fig. 404 (c). Bring down the last warp end (i.e., end 1) behind end 2, see Fig. 404 (d). Cross the black and white yarns back again, this time passing the black through the white, see Fig. 404 (e). Tighten them. Tighten the warp ends by pulling ends 1 and 2 in opposite directions (arrows). The process is continued: pass white yarns behind end 3, bring down end 2 behind end 3, cross black and white yarns over and tighten, and so on. As the yarns are crossed over, always separate the left-hand pair and pass the right-hand pair between them.

The completed edge is shown diagrammatically in Fig. 404 (f). It will be seen that the edge is structurally two rows of weft twining, which are produced simultaneously by this method. The emerging ends are cut off or darned in.

VARIATIONS

(i) As it stands, the edge is not very secure. So at the stage shown in Fig. 404 (d), knot end 1 and 2 together. Use a half knot as shown in Fig. 404 (g) or add another twist to it. This greatly increases the practicability of this edge.

(ii) A further strengthening is achieved if after each of the above knots is tied the last discarded end is brought up and laid beside the knot before the black and white yarns are crossed over. So these yarns are now twining round three thicknesses of warp instead of two, and the warp ends are now emerging from the outer margin of the edge. Fig. 404 (h) shows the serpentine course taken through the edge by one warp end. The emerging ends can safely be cut flush with the edge, to give a very neat if tedious finish.

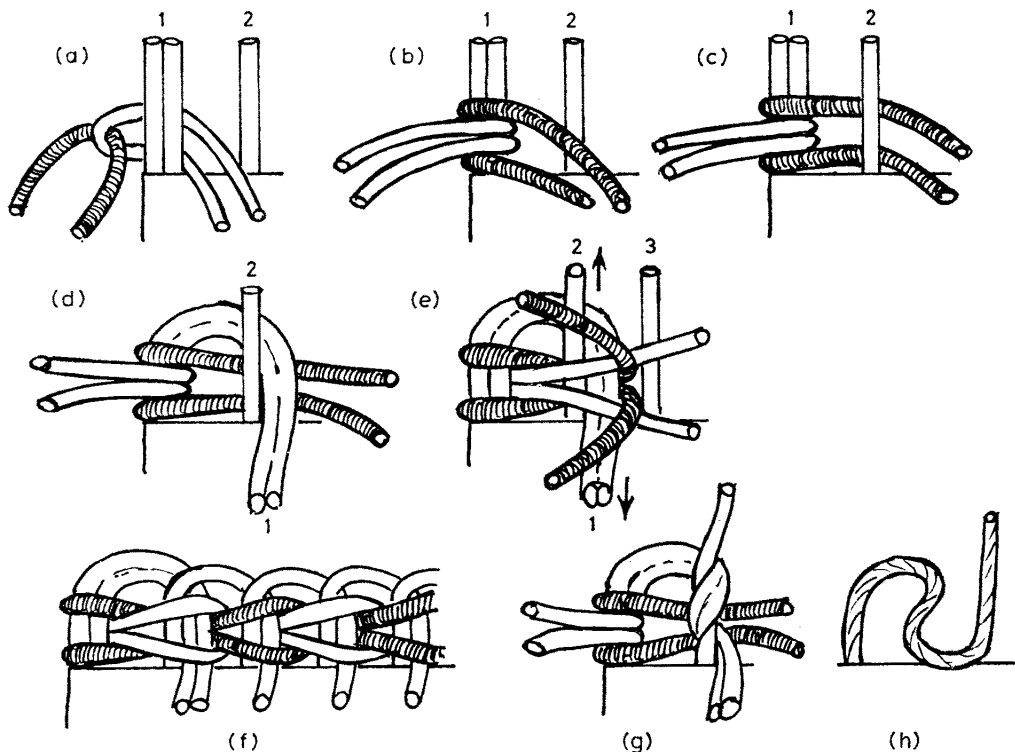


Fig. 404. Rug Finishes. Taniko Edge. (a-e) Method (f) Completed edge (g) and (h) Variations

The thickness and material of the two twining yarns is obviously crucial. They have to be such that when the edge is made firmly enough to secure the warp ends, it lies flat without curling or buckling.

**H. Specific Finishes****(i) FOR A RUG WOVEN ON A FRAME WITH A FINITE WARP**

Rugs are sometimes woven on a warp that has been stretched between nails on the upper and lower crossbar of a rug frame. When such a rug is finished, it has loops of warp, not cut threads, at both ends, those at the starting end probably being shorter.

Warp loops produced thus, or in any other manner, can be finished in the following way. See Fig. 405 (a).

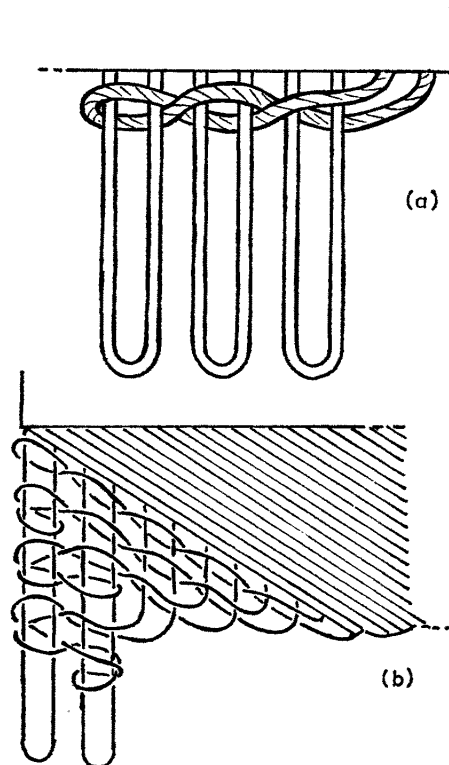


Fig. 405  
Rug Finishes. Special  
finish for rug woven on  
a frame

Take the first loop at the right edge of rug. Pass the second loop through it. Twist the first loop (in the direction suggested by the twist of the yarn) and pass the third loop through it, twist it again in the same direction and pass the fourth loop through it. Continue until the end of the loop is reached, see Fig. 405 (a). Then do exactly the same with the second loop, third loop, and so on. The result is a twined edge, but with no emerging ends.

When the opposite edge of the rug is reached, double the loops back on themselves as shown in Fig. 405 (b). This can probably be done until only two loops are left, which can then be knotted together or one can be darned down beside the other.

This is a very sound edge, because there are no cut warp ends to work loose.

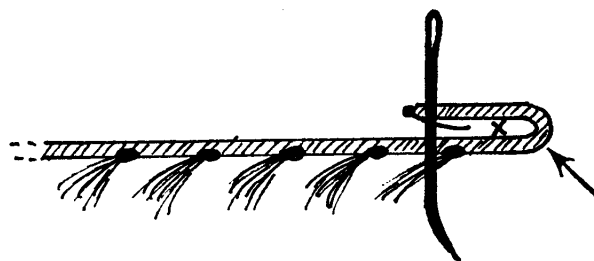
(ii) FRINGELESS FINISH FOR A KNOTTED RUG

A fringeless finish is often wanted on a long pile rug and one of the simplest and neatest is the following:

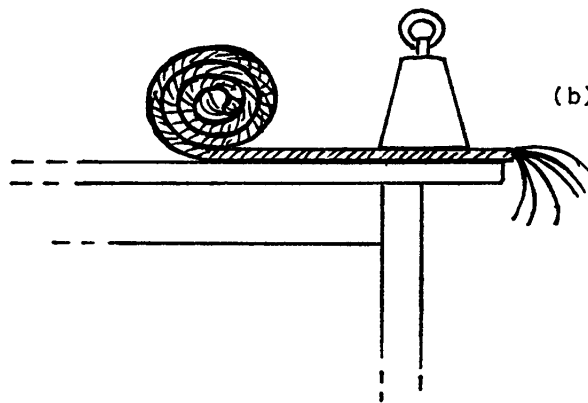
Begin and end the rug with about two more inches of plain weave than are required to show. Then with the rug, pile downwards, do a half Damascus edge.

Cut the free ends about 1 inch long.

Fold an inch or so of the rug back onto itself, thus making a longitudinal pocket (marked X in Fig. 406 (a)). Push the free ends into this pocket and sew the folded piece to the back of the rug, as indicated by the needle. These stitches will be hidden by the pile of the rug.



(a) Fig. 406  
Rug Finishes  
(a) Fringeless finish  
(b) Position of rug when working a finish



It is quite difficult to make a straight fold especially with a wide rug. So as the rug is being made, some weavers put in a row of weft chaining or two picks of another colour at the point where the fold is to be made (see arrow in Fig. 406 (a)) to act as a guide. This can be decorative as well as functional.



## (iii) FOR WARP-FACE RUGS—DOUBLE TWINED EDGE

Because of the great bulk of warp to be dealt with at the ends of a warp-face rug, any of the normal finishes are far too clumsy. It is interesting that wherever textiles of this type are made, the weavers have almost always arrived at the same solution to the problem—and that is to insert two or more rows of weft twining.

Two rows can be inserted at the same time if a modification of the Taniko Edge is used.

Always make this edge on the loom if possible. So before the weaving begins, make the edge on the tightly stretched warp. Then weave the rug, and make a similar edge beyond the last pick. The rug can then be cut from the loom and needs no further finishing. If another rug is to be woven on the same warp, leave a short gap and repeat the process. This edge is seen on the samples in Plates 150–153.

Carry out the finish exactly as in Fig. 404 (a)–(e) but omit stage (d). In other words, do not cut any warp ends, and bring them down. The sequence of movements is therefore: open left pair and pass right pair through, pass the pair now on the right behind the next group of warp ends, and repeat. Tighten the edge every time the pairs are crossed over.

As there are so many warp ends to the inch (e.g., forty-eight belting yarn or thirty-six 2-ply carpet yarn) the twining yarns are passed behind a group of ends, not a single end as in taniko. The number of ends in a group depends on the warp yarn and the thickness of the twining yarn. As an example if the warp has forty-eight belting yarn to the inch (used three as one; so there are in fact 16 treble e.p.i.) and the twining yarn is a 6-ply rugwool, then the group would contain nine ends (i.e., three treble ends).

*Note*—It is helpful to have a thick stick holding a plain weave shed open while working this edge, as this makes counting ends easier.

- Each of the pairs of twining yarn can be wound in a finger hank, so that great lengths of yarn do not have to be manipulated.
- In order to achieve an exactly correct relationship between the elements in the finish, remember it is possible to use two twining yarns of different thickness and that they can embrace varying numbers of warp ends.
- The twining yarns can be of different colours, which will appear as arrow shapes in the finish.

When the far edge is reached, tie the four threads in an overhand knot and tighten it against the last warp group. Two rows of this edge look well on a wide warp-face rug; work one from left to right and the other from right to left, so that there is an overhand knot at both edges.

**1. General Remarks**

(i) A rug must be firmly held and at a suitable height, if the finish is to be done comfortably and efficiently. A good method is to place it rolled up on a table, with a heavy weight on it and with its edge protruding slightly beyond the table, see Fig. 406 (b). The table's edge can act as a check on the straightness of the rug's edge. While working the finish, concentrate on doing everything with an even tension.

(ii) The weaving of a rug always begins and ends with a few picks of thick yarn. These are not part of the actual rug but merely act as a temporary weft protector after the rug is cut from the loom and before it receives its real finish. These picks are kept in place with a few temporary half knots in the warp.

Only remove these picks as the finish is being worked. For example, a Philippine edge starts at the left selvage, so slide these picks out, freeing a few warp ends at this point only. Work the edge as far as possible, then free more warp ends. In this way, the final (or initial) picks of the rug proper never get a chance to shift from their correct position as woven. This is very important in a wide rug.

(iii) There is always a tendency for a rug to be pulled in slightly at either end of the finish. This leads to a rounding of the rug's corners. This can generally be overcome, if in working the finish the doubled or trebled ends at the selvages are split, and their constituent ends worked singly.

(iv) For all these finishes, there are certain ways of holding and manipulating the warp ends that will make for quickness and efficiency. They have been omitted from this chapter, partly because they are so difficult to describe and partly because every weaver has his own slightly different way of doing things; to discover that way is one of the pleasures of mastering a new technique.

(v) These finishes can be practised (and new ones tried out) on a magnified rug fringe. The latter is made by fastening 1 foot lengths of thick cord, about  $\frac{1}{2}$  inch apart, to a strip of wood which can be clamped to a table. If a new finish works on this contrivance, test it next on the real thing.

## Bibliography

---

- Achdjian, A. *Le Tapis*. 1949. Paris.
- Allard, Mary. *Rug Making, Techniques and Design*. 1963. Chilton Books, Philadelphia.
- Amsden, Charles Avery. *Navaho Weaving*. 1949. University of New Mexico Press.  
Reprinted and revised by Rio Grande Press, Glorieta, New Mexico.
- Ashley, Clifford W. *The Ashley Book of Knots*. 1948. Faber and Faber, London, and Doubleday, New York.
- Aslanapa, Oktay. *Turkish Art and Architecture*. 1971. Praeger.
- Aslanapa, A. *Turkish Arts*. Istanbul.
- Beaumont, Robert. *Carpets and Rugs*. 1924. Scott, Greenwood & Son.
- Von Bode and Kühnel, *Antique Rugs from the Near East*. 1958. Textile Book Service, Metuchen, New Jersey.
- Brinton, R. S. *Carpets*. 1934. Pitmans Common Commodity Series.
- Bronson, J. and R. *The Domestic Manufacturer's Assistant*. 1817. Reprinted by C. T. Branford. U.S.A.
- Collin, Maria. *Gamla Vävnader och Deras Mönster*. 1928. Stockholm.
- Crowfoot, Grace. *Coptic Textiles in Two-faced Weave with Pattern in Reverse. The Sudanese Camel Girth*. Kush, vol. iv, 1956.  
*The Tent Beautiful*. Palestine Exploration Quarterly, April 1945.
- Cyrus, Ulla. *Manual of Swedish Handweaving*. 1956. C. T. Branford. U.S.A.
- Dreczko, Werner. *Teppiche Europas*. 1962. Aurel Bongers, W. Germany.  
*Teppiche des Orients*. 1962. Aurel Bongers, W. Germany.
- Dunn, Eliza. *Rugs in their Native Land*. 1910. Fisher Unwin.
- Edwards, A. C. *The Persian Carpet*. 1953. Duckworth, London, and Humanities Press, New York.
- Emery, Irene. *The Primary Structure of Fabrics*. 1966. Textile Museum, Washington.
- Emmons, George T. *The Chilkat Blanket*. 1907. Memoirs of the American Museum of Natural History, Vol. III, Part IV.
- Gallinger and Del Deo. *Rugweaving for Everyone*. 1957. Bruce Books, New York.
- Grierson, Ronald. *Woven Rugs*. 1952. Dryad Press, Leicester.
- Haack, Hermann. *Oriental Rugs*. 1960. Faber and Faber.

- Hald, Margarethe and H. C. Broholm. *Costumes of the Bronze Age in Denmark*. 1940. Copenhagen.
- d'Harcourt, Raoul. *Textiles of Ancient Peru and their Techniques*. 1962, University of Washington Press.
- Hoffmann, Marta. *The Warp-Weighted Loom*. 1964. University Press, Oslo, and Textile Book Service, Metuchen, New Jersey.
- Hopf, A. *Oriental Carpets and Rugs*. 1962. Thames and Hudson, London.
- Hosain, Ali. *Oriental Carpets*. ACO DRUCK GMBH, W. Germany.
- Ingers, Gertrud. *Trasmattor*. 1955. I.C.A. Sweden.
- Nya Mattor*. 1959. I.C.A. Sweden.
- Jacoby, Heinrich. *How to know Oriental Carpets and Rugs*. 1952. Allen and Unwin. 2nd Edition 1967, Textile Book Service, Metuchen, New Jersey.
- Jacobsen, Charles. *Oriental Rugs, a complete guide*. Charles Tuttle, Vermont.
- James, George Wharton. *Indian Blankets and their Makers*. 1920. Chicago. Reprinted by Rio Grande Press, Glorieta, New Mexico.
- Kendrick, A. F. and Tattersall, C. E. *Handwoven Carpets, Oriental and European*. 2 vols. 1922. Benn Bros. Ltd., London.
- Kent, Kate Peck. *The Cultivation and Weaving of Cotton in the Prehistoric Southwestern United States*. 1957. The American Philosophical Society.
- The Story of Navaho Weaving*. 1961. Heard Museum of Anthropology and Primitive Arts.
- Kuhnel, Ernst and Bellinger, Louisa. *Cairene Rugs and Others Technically Related: 15th-17th Century*. 1957. Textile Museum, Washington.
- Larson, Knut. *Rugs and Carpets of the Orient*. 1966. Warne. London.
- Lewes, Klara and Hutton, Helen. *Rugweaving*. 1962. Batsford, London, and Branford, Newton Centre, Massachusetts.
- Lewis, G. G. *The Practical Book of Oriental Rugs*. 1920. J. B. Lippincott & Co.
- Mead, S. M. *Taniko Weaving*. 1952. A. H. and A. W. Reed, Wellington, N.Z.
- Mera, H. P. *Navaho Textile Arts*. 1958. Laboratory of Anthropology, Santa Fé, New Mexico.
- Mumford, J. K. *Oriental Rugs*. 1901. London.
- Murphy, W. S. *The Textile Industries*. 1910. Gresham Publishing Co., London.
- Nisbet, H. *Grammar of Textile Design*. 1916. Scott, Greenwood & Son.
- Nooteboom, C. *Quelques Techniques de Tissage des Petites Iles de la Sonde*. 1948. Rijksmuseum voor Volkenkunde, Leiden, Holland.
- Reichard, Gladys. *Navaho Shepherd and Weaver*. 1936. New York. Reprinted and revised, 1968, by Rio Grande Press, Glorieta, New Mexico.
- Ropers, H. *Les Tapis d'Orient*. 1962. Presses Universitaires de France.
- Sirelius, U. T. *The Ryijy Rugs of Finland*. 1962. Helsinki.
- Sylwan, Vivi. *Svenska Ryor*. 1934. Stockholm.
- Tattersall, C. E. C. *Notes on Carpet Knotting and Weaving*. 1920 and 1961. Victoria

- and Albert Museum, London.
- The Carpets of Persia*. 1931. Luzac & Co., London.
- Tidball, Harriet. *The Double Weave, Plain and Patterned*. 1960. Craft & Hobby, Pacific Grove, California.
- The Handloom Weaves*. 1957. Craft & Hobby, Pacific Grove, California.
- Tomlinson, Charles. *The Useful Arts and Manufactures of Great Britain*. About 1850. London.
- Tovey, John. *The Technique of Weaving*. 1965. Batsford.
- Watson, William. *Textile Design and Colour*. 1946. Longmans, London.
- Wyatt, M. D. *Industrial Arts of the Nineteenth Century*. 1851. London.

# Suppliers of Equipment and Yarns

---

The following suppliers are all prepared to deal with handweavers and will send their products anywhere in the world.

## SUPPLIERS OF WEAVING EQUIPMENT

Gunnar Anderssons, Vävskedsverkstad, Oxberg, 792 00 Mora, SWEDEN.

General suppliers of all weaving equipment, including shuttles, temples, looms, rya and flossa guide rods and knives. Also 'ski shuttles', called *mattstickor*, no 69c in catalogue.

Walter Arm, 3507 Biglen, SWITZERLAND

Looms of all types, shuttles, temples, rug forks and a small electrical doubling machine. A special carpet loom, up to 2 metres wide, is made, with underslung batten and 4 shafts with countermarch action; also a vertical 2 shaft tapestry loom with a pivoted batten and full-width pedal; both can have either sectional or warp beams.

Peter Collingwood, Old School, Nayland, Colchester, ENGLAND.

Wire loops for cutting corduroy.

K. Drummond, 30 Hart Grove, London, W.5. ENGLAND.

Wooden 'ski shuttles'.

Dryads, Northgates, Leicester, ENGLAND.

Suppliers of weaving equipment to schools, including vertical rug frames and looms. Also solid metal and lead-weighted wooden rug beaters. Small celluloid tablets.

Föreningen Hemslöjden, Box 433, Borås, SWEDEN.

The Ulla Cyrus loom. An excellently designed countermarch loom, with overslung batten and specially strengthened beams. Suitable for all but the heaviest rug weaving. Order direct from the maker, Arvid Kristiansson, Hallstorp, 510 12 Oxabäck, SWEDEN.

'Harris' Looms, Northgrove Road, Hawkhurst, Kent, ENGLAND.

Makers of the 'Maxwell' multishaft floor looms, which are strong enough for rug weaving and of the 'Harris' table looms (up to 16 shafts) which are very suitable for weaving rug samples.

Anders Lervad and Son, Askov, pr Vejen, DENMARK.

Excellent looms of all types. A special carpet loom is made from 2½–6 metres wide, but the normal looms are strong enough for rug weaving. Also vertical rug looms,

tablets, and a good range of shuttles and strong temples. Detailed catalogue sent on request. Lervad (UK) Ltd, Vernon Building, Westbourne St, High Wycombe, Bucks, ENGLAND is a subsidiary firm catering for the United Kingdom and Ireland.

Manchester Metal Works, 368/376 Bury New Road, Salford M7 9BS, Lancs, ENGLAND.

Strong metal skeiners, swifts or ryces of many types and sizes, some specially designed to take heavy yarns, such as carpet wool. Also tension units and other devices available.

Vävtolsfabriken Glimåkra AB, S-280 64 Glimåkra, SWEDEN.

Suppliers of a good range of weaving equipment, including a very solid rug loom made up to 3½ metres wide. The warp and cloth beams are of metal and are turned by geared handles. The breast beam, knee bar and back bar are also of metal. Sliding seat and two sets of pedals for the wider sizes. Other looms made which are also strong though incorporating less metal. U.K. agent is Baddy's Bookshop, 165 Linthorpe Road, Middlesbrough, Yorks, ENGLAND. Catalogue sent on request.

## **SUPPLIERS OF YARNS**

All the following suppliers will send samples and price lists free of charge, unless otherwise stated. The minimum quantity that each firm will sell of one type of yarn is given where possible.

### **Warp Yarns**

Barbour Threads Ltd, Hilden, Lisburn, Co. Antrim, N. IRELAND.

Linen and synthetic seaming twines in various plies. Minimum quantity=12 lbs.

Blackstaff Threads Ltd, P.O. Box 134, Belfast BT14 7EP, N. IRELAND.

Will spin to order any type of flax yarns; minimum quantity = 200 lb. Carry a stock of 6/10s lea flax twine, very suitable for rug warps.

Bridport-Gundry Ltd, Bridport, Dorset, ENGLAND.

Specialize in the manufacture of a wide range of twines, spun from flax, hemp, nylon, polypropylene and polythene. Minimum quantity=2 lbs. A heavy spun nylon rug weft yarn can be produced to order.

Mersey Yarns, 2 Staplands Road, Liverpool, L14 3LL, ENGLAND.

Good range of cotton, hemp, jute and ramie yarns and twines; heddle twine and loom cord; jute and flax fibre for spinning and weaving purposes. (This firm has taken over the supply of yarns formerly sold for handweaving purposes by H. & J. Jones and Southwick and Case.)

Pymore Mill & Co Ltd, Bridport, Dorset, ENGLAND.

Flax rug warp in various counts, e.g., 3/12s, 3/8s, 3/6s on 1 lb tubes.

---

**Weft Yarns**

**Borgs, S-22104 Lund, SWEDEN.**

Suppliers of all types of yarns, including many grades of linen rug warp. Amongst weft yarns for rugs are:

Nöthårgarn, 100% wool singles yarn.

Afghangarn, very high quality lustrous worsted for rya rugs.

Frostagarn, more normal quality worsted for rya rugs in many colours.

**Craftsman Mark Yarns, Broadlands, Shortheath, Farnham, Surrey, ENGLAND.**

A range of yarns specially spun for handweavers. Includes a 2-ply rug wool in white, natural grey and natural black, about 40 yds per ounce. Also 6/10s lea rug warp. Minimum quantity=1 lb.

**A. K. Graupner, Corner House, Valley Road, Bradford BDI 4AA, ENGLAND.**

2-ply rug wool, approx: 2/50s, in white and in various grey mixtures. Also, when available, odd lots of other rug yarns which may be dyed, natural, all-wool or blends.

**Hyslop Bathgate & Co, Galashiels, SCOTLAND.**

2/2½s worsted yarn in white and 25 colours, about 700 yds per lb. A soft yarn but suitable for some types of knotted pile and corduroy. Sample card sent on request. Minimum quantity=one hank (¼ lb).

**Julius Koch, Nørrebrogade 52, Copenhagen, DENMARK.**

Supplier of handweaving yarns of all types. Very large colour range of a 2-ply yarn (five natural greys and over 150 dyed shades) called ryegarn, which is suitable for both pile and flat weaves. Also about 80 dyed shades of a singles coarse wool (nöthårgarn) suitable for flat rugs. Small charge for samples.

**Multiple Fabric Co Ltd, Dudley Hill, Bradford BD4 9PD, ENGLAND.**

2- and 3-ply horsehair yarns, belting yarns spun from camel hair, grey hair, white wool, white and black mohair. All supplies in oil on tubes. Minimum quantity=5 lbs. Special carding brushes for raising surface of warpface rugs.

**Norsk Kunstvevgarn A/S, Homborsund 4897, pr. Grimstad, NORWAY.**

The best spinner of Norwegian Spaelsau wool. Excellent 2-ply yarns in four different counts, including kunstvevgarn (tapestry yarn, about 3,000 metres per Kgm) aklegarn and ryegarn (about 450 metres per Kgm). The latter is a very heavy, solid yarn of a type not offered by other spinners. Also ullspissgarn, a coarse singles wool yarn similar to Nöthårgarn. All types available in white, five shades of grey (from pale to almost black) and about 20 dyed shades. Minimum quantity=one hank (about ¼ lb).

**Weavers' Shop, Royal Carpet Factory, Wilton, nr. Salisbury, Wilts, ENGLAND.**

A good range of 2/55s carpet wool in white and dyed colours. Minimum quantity=½ lb. Wool can be specially dyed, if not less than 20 lbs of one colour is required. Small charge for samples. Also mixed thrums, suitable for knotted pile.



# American Suppliers of Equipment and Yarns

---

I am grateful to Harriet Tidball and Comm. T. R. Cooley for much help in compiling this list.

## **Equipment, looms etc.**

Bexel Handlooms, 2470 Dixie Highway, Pontiac, Michigan.

Very strong, heavy loom with overslung batten.

Gilmore Looms, 1032 No. Broadway Ave., Stockton, California 95205.

Herald Looms, Bailey Manufacturing Co., 118 Lee St., Lodi, Ohio 44254.

Leclerc Industries, P.O. Box 267, Champlain, New York, also

L'Isteville 6, Quebec, Canada.

L. W. Macomber, 166 Essex St., Saugus, Massachusetts.

## **YARNS**

### **A. Warp Yarns**

Frederick J. Fawcett, Inc. 129 South St., Boston, Massachusetts.

High grade Linens.

Countryside Handweavers, Box 1225, Mission, Kansas 66222.

Swiss linen, also Ciba dyes in small quantities.

Lily Mills, Shelby, North Carolina.

### **B. Weft Yarns, wool**

Briggs and Little Woolen Mills, York Mills, Harvey Station, New Brunswick, Canada.

Lily Mills, Shelby, North Carolina.

Paternayan Bros., Inc., 312 East 95th St., New York, N.Y. 10028.

Two types of very high grade rug wool.

Troy Yarn and Textile Co., 603 Mineral Springs Ave., Pawtucket, Rhode Island, 02860.

The following supply 'mill ends' of commercial carpet wool when available:

Chas. Y. Butterworth, 2222 East Susquehanna Ave., Philadelphia, Pennsylvania, 19125.

Contessa Yarns, P.O. Box 37, Lebanon, Connecticut, 06249.

Cooper-Kenworthy Inc., P.O. Box 6032, Providence, Rhode Island, 02904.

The Mannings, East Berlin, Pennsylvania, 17316.

# Index

---

- African kilim, 142  
Ainu, 184  
Aleppo, 142  
Alpujarras, 211  
Alternate Hitches, 495–496  
Alternated Two-Shaft Blocks, 295–296  
American Indian textile, 119, 120  
— interlocked tapestry, 169  
— kilim, 142  
Amria, 447, 450  
Apron, 53, 80  
Argatch, 202, 234, 240–246  
Atwater, Mary, 290, 481
- Backstick, 53  
Baghdad, 142  
Balkans, 269  
Batten, 47, 48, 49, 51, 52, 73, 441  
Beam, back, 48, 49  
—, breast, 49, 54  
—, cloth, 44, 46, 47, 49, 50  
—, sectional warp, 64–65  
—, warp, 44, 46, 47, 49, 50, 55, 439  
Beaming for warp-faced rugs, 439–440  
— for weft-face rugs, 63  
— — — —, one-man method, 63–64  
— — — —, using sectional warp beam, 64–65  
Beater, see also, rug fork, 43, 57, 72  
Beating, 73, 441  
Bedouin, 42, 438, 449  
Belting yarn, 60–62, 451–452  
Block Weaves  
— — in warp-face rugs, 455–456  
— — — —, pick-up version, 457–458  
— — in weft-face rugs, see Chapter 8  
— — — —, pick-up versions, 369–391  
— — — —, using eight shafts, 340–367  
— — — —, using four shafts, 308–331  
— — — —, using six shafts, 331–340  
Bokhara, 504  
Bowing the weft, see also, waving the weft,  
71–72  
Brick joining, 153–154  
Bronson Spot Weave, 293
- Bronze Age, 43, 114  
Brussels carpet, 49  
Bubbling, see also, waving the weft, 71–72  
Bulgaria, 142  
Bushongo, 187  
Butterfly, see also, Finger hank, 76–77
- Cane, 62  
Catal Huyuk, 142, 463  
Centre Shed Pick-Up, 369–391  
Chained Loops  
— — in rug finishes, 488–489  
— — in weft looping, 215–218  
Chaining, Weft, see under, Weft Chaining  
Chenille carpet, 49  
Chilkat blanket, 463, 474  
China, 235, 259  
Coir, 60, 61, 459–461  
Colour Blending  
— — in rya rugs, 249–250  
— — in warp-face rugs, 443  
— — in weft-face rugs, 215–218  
Colour plying, 91–93  
Cone, 58, 75, 90  
— winding, 73–74  
Compensated Inlay, 133–140  
— —, Basic Method, 134–137  
— —, Four Inlay Wefts in One Block, 139  
— —, Inlaying Several Blocks, 137  
— —, Several Blocks with One Inlay Weft,  
139–140  
— —, Two Inlay Wefts in One Block, 137–138  
Coptic double-faced textile, 317, 318  
— rug, 219  
— tapestry, 98, 159  
Corduroy  
—, Double  
—, —, using eight shafts,  
—, —, — — —, Block Weaves, single and  
double-faced, 428–430  
—, —, — — —, Half Corduroy, 432–434  
—, —, — — —, Twill Corduroy, 430–432  
—, —, using four shafts,

- Corduroy, Double**, using four shafts, combined with Pulled-Up Loops, 422–426  
 —, —, —, —, —, cutting pile, 403–405  
 —, —, —, —, —, double cutting, 414–416  
 —, —, —, —, —, double-faced, 421–422  
 —, —, —, —, —, inlaying colours, 410–413  
 —, —, —, —, —, mixing colours, 410  
 —, —, —, —, —, off-centre cutting, 416–418  
 —, —, —, —, —, varying pile length, 413–418, 419–420  
 —, —, —, —, —, varying threading draft, 418–420  
 —, —, —, —, —, warpway stripes, 406–410  
 —, —, using five shafts, 426–427  
**Single**  
 —, —, using Four End Block Draft,  
 —, —, —, —, —, —, on eight shafts, 398–399  
 —, —, —, —, —, —, on four shafts, 396–398  
 —, —, on normal threading,  
 —, —, —, —, —, on eight shafts, 394–396  
 —, —, —, —, —, on four shafts, 392–394  
 —, —, using stick and leash loom, 436–437  
**Cotton**, 60, 62, 85, 235, 449, 459–461  
**Cowhair**, 61  
**Cross Stripes**, see also, **Weftway Stripes**,  
 — — in warp-face plain weave, 444  
 — — in weft-face plain weave, 102–103  
**Crossed Wefts**  
 — — in **Contrary Motion**, 114–119  
 — — in **Parallel Motion**, 119–121  
**Curving the Weft**, see also, **Waving the Weft**,  
 71–72
- Dal**, 183  
**Damascus Edge**, 484–486  
**Darning**  
 —, use of needle, 59  
 — warp in warp-face rugs, 443  
 — warp in weft-face rugs, 78  
 — weft, 70–71, 81, 150  
 — used in rug finishes, 492  
**Denmark**, 114, 142, 233, 351, 497  
**Dobby**, use in block weaves, 333–335  
**Dorak**, 142  
**Double Cloth**, see under, **Plain Weave Double Cloth**  
**Double Twined Edge**, 452, 512  
**Double Two-Tie Unit Weave**, 305–306, 340–342  
**Double-Faced Corduroy**, 421–422  
**Double-Faced Weaves**,  
 — — using four shafts, 279–283  
 — — using three shafts, 260–267  
**Double-Sided Pile Rugs**, 246–248
- Doubling Stand**, 59  
**Dovetailing**, 154–155  
**Drawloom**, 49  
**Drugget**, 452  
**Dura-Europas**, 219, 225  
**Durries**, 42
- Eccentric wefts in kilims**, 159–164  
**Egypt**, 41, 43, 183, 211, 219, 447, 450  
**Ethiopia**, 473
- Fastening loom to floor**, 44, 45  
**Finger Hank**, 76–77  
**Finland**, 225, 230, 246  
**Flax**, unspun, 459–461  
**Flijd**, 42  
**Floating Selvage**, 105–108  
**Flossa rug**, 235, 250  
**Four Strand Sennit**, 496–497  
 — — — **Edge**, 491–492  
**French method of tightening warp**, 44, 45  
**Front stick**, 53, 66–67
- Gauze Soumak**, 189–190  
**Ghiordes knot**, 225, 226, 230, 237–239, 247–248  
**Great Britain**, 49  
**Grene**, 43  
**Goathair**, 42, 60, 61, 449  
**Guiana**, 184
- Hacilar**, 142  
**Half Damascus Edge**, 486–487  
 — **Corduroy**, 432–434  
 — **Flossa**, 253–254  
 — **Rya**, 253–254  
**Handspun weft**, 93–94  
**Hatching**, 126  
**Heading**, 68  
**Healds**, 53, 440  
**Hemp**, 60, 62, 235, 459–461  
**Holland**, 46  
**Honeycomb weave**  
 — — using four shafts, 292, 460  
 — — using six shafts, 304–305  
**Horsehair**, 60, 62, 88, 452
- Indian double cloth**, 351  
 — **kilims**, 142  
 — **rug loom**, 46, 47  
**Inlaid fleece**, 434

- Interlocked Tapestry, see under Tapestry  
 Interlocked  
 Irghenhausen, 183
- Joining strips of rug, 83–84  
 Joining wefts  
 — — in corduroy, 405  
 — — in warp-face rugs, 442  
 — — in weft-face rugs, 68–69  
 — — in weft twining, 477  
 Jute, 60, 62, 235, 459–461
- Kashan, 142  
 Kashkai, 42  
 Kashmir, 259  
 Kazak, 234, 236  
 Kidderminster carpets, 49, 351  
 Kilim, see also, Tapestry, Slit, 42, 141–169,  
 183, 191, 464  
 Knee bar, 49, 54  
 Knot  
 — count, 238  
 —, double weaver's, 439  
 —, Ghiordes, Smyrna or Turkish, 225, 226–  
 230, 237–239, 247–248  
 —, overhand, 481–482, 493  
 —, overhand slip, 75, 78  
 —, reef, 66, 75, 78  
 —, Sehna or Persian, 230–232, 239  
 —, Single Warp or Spanish, 232  
 —, square, 66, 75, 78  
 —, weaver's, 78  
 Knots encounter in weaving, 78  
 Knotted Pile, 43, 48, 141, 183, 224–255  
 — —, construction, 234–246  
 — —, —, amount of weaving between knot  
 rows, 236  
 — —, —, length of pile, 235  
 — —, —, knot count, 238  
 — —, —, material of pile yarn, 235–236  
 — —, —, spacing of knots, 237–239  
 — —, —, treatment of argatch, 240–246  
 — —, design, 248–253  
 — —, —, colour blending in ryas, 249–250  
 — —, —, design limitations in ryas, 248–249  
 — —, —, relating paper design to knotted rug,  
 250–253  
 — —, double-sided, 246–248  
 — —, fringeless finish for, 511  
 — —, history, 224–225  
 — — on warp-face plain weave, 452  
 — —, types of knot, 226–232
- Krokbragd  
 —, block weave based on four shaft, 349–350  
 —, three shaft, 267–268  
 —, —, block weave based on, 338–340  
 Ktesiphon, 225  
 Kurds, 142, 159
- Lapps, 43  
 Lazy lines, 157–159  
 Linen, 60, 235  
 Locking and non-locking soumak, 185  
 Loom  
 — extension for difficult warps, 54–55  
 — frame, 49  
 — seat, 53  
 — types, see Chapter I  
 — —, backstrap, 41  
 — —, barrel, 351  
 — —, Brussels carpet, 49  
 — —, comparison between vertical and hori-  
 zontal frame looms, 55  
 — —, counterbalanced, 53  
 — —, —, use in pick-up weaves, see Chapter 9  
 — —, countermarch, 53  
 — —, —, use in pick-up weaves, see Chapter 9  
 — —, horizontal frame, 41, 47–49  
 — —, — —, requirements of modern, 49–55  
 — —, horizontal ground, 41–42  
 — —, jack, 53  
 — —, pit-loom, 48  
 — —, vertical frame, 41, 43–47, 65  
 — —, warp-weighted, 41, 43  
 — —, Wilton carpet, 51  
 Looping, Weft, see under Weft Loops  
 Loulan, 225
- Ma'alle, 252  
 Malatia, 142  
 Maori, 471, 489, 508  
 Mat, matting, 459–461  
 Meet and Separate Technique  
 — — — —, method using clasped wefts,  
 130–133  
 — — — —, normal method, 126–130  
 Middle East, 122, 141, 142  
 Mohair, 59, 61, 235, 451–452  
 Morris, William, 351  
 Morocco, 232  
 Morton, Alastair, 392
- Navajo, 43, 164, 169, 261, 478–480, 475  
 New Caledonia, 184  
 Norwegian Rölakan, 170–177

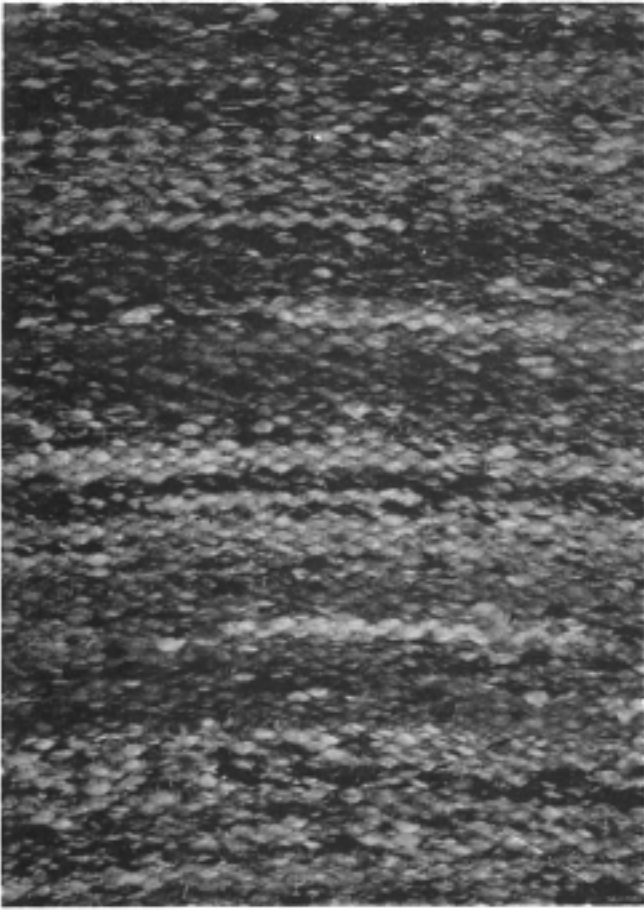
- Norwegian spaelsau wool, 61, 62  
 — tapestry, 159  
 Nylon, 61, 235
- Oedenburg urn, Hungary, 43  
 Oltenia, 142, 159  
 One Shuttle Techniques, 89–102  
 One-Weft Double Cloth, 450–451  
 Overhogdal, 183
- Pazyryk, 224  
 Pedals, 47, 48, 53, 441  
 Persia, 42, 46, 183, 225, 351  
 Persian Knot, 230–232  
 Peru, 122, 159, 169, 183, 211, 259, 351, 450, 452, 463  
 Philippine Edge, 483–484  
 Pick-and-pick stripes, see also, warpway stripes, 103–110  
 Pick-Up  
 —, general notes, 390  
 —, two methods described, 368–375  
 —, two methods compared, 375  
 — versions of weft-face block weaves, see Chapter 9  
 —, warp-face, 449–451, 457–458  
 Pile rugs, see under Knotted Pile  
 Pit-loom, 48  
 Plain Weave  
 — — Double cloth,  
 — — — —, history, 351  
 — — — —, introduction, 351–354  
 — — — —, weft-face  
 — — — —, —, pick-up version, 383–385  
 — — — —, —, using eight shafts, 356–365  
 — — — —, —, using four shafts, 354–355  
 — —, warp-face, see Chapter II  
 — —, weft-face, see Chapters 4–6  
 — — with warp and weft showing, see Chapter 12  
 Plaiting, 493–494  
 Plying, 495  
 Poland, 142, 159  
 Polypropylene, 61  
 Polythene, 61  
 Pulled-Up Weft Loops, 211–218  
 Pulled Warp, see also, Tapestry, Slit, Wedge Weave, 164–169
- Raddle, 55  
 Raffia, 235, 459, 461  
 Raised End Pick-Up, see Chapter 9  
 Rameses' Girdle, 359  
 Ramie, 60
- Ratchets on warp and cloth beams, 50–51  
 Rayon tow, 60  
 Reed, 47, 52  
 Rigid Heddle, 391  
 Rölakan, see also, Tapestry, Interlocked, 169–180  
 Rope, 459, 461  
 Rug  
 — Finishes, see Chapter 14, also under Warp and Weft Protectors  
 — fork, see also, beater, 43, 57, 72  
 —, marking length, 78–80  
 —, protecting the woven rug, 54  
 —, taking from the loom, 80–81  
 —, viewing during weaving, 80  
 —, weaving large rug in strips, 81–84  
 Rugs  
 —, flossa, 235, 250  
 —, rya, 225, 230, 235, 236, 239, 246, 248–250, 252  
 —, Shiant, 187  
 —, warp-face, see Chapter 11  
 —, wedge-weave, 164–169  
 —, weft-face, see Chapters 4–9  
 — with warp and weft showing, see Chapter 12  
 Rumania, 142, 159  
 Rush, 459, 460, 461  
 Rya rugs, 225, 230, 235, 236, 239, 246, 248–250, 252
- S and Z-Twist Stripes, 92  
 Saha, 42, 449–450  
 Sardinia, 211  
 Scandinavia, 43, 48–49, 57, 211  
 Scotch carpet, see also, Kidderminster carpet, 351  
 Seagrass, 62, 459, 460, 461  
 Sectional warp beam, 65  
 Sehna kilims, 142, 155–156, 159, 235  
 — knots, 230–232, 239  
 — loops, 219–222  
 — pile rugs, 236  
 Selvage  
 —, adjustable floating, 107–108  
 —, floating, 105–107  
 — in knotted rugs, 234, see also under, Argatch  
 — in soumak rugs, 196–198  
 — in weft-face rugs, 88–89  
 Shadow Weave, four shaft, 290–291  
 — —, six shaft, 302  
 Shaft Switching, 313–316, 322, 327, 330–331  
 Shedding mechanism, 52–53

- Shemakha, 183  
 Shirvan, 183  
 Shuttle  
   —, 'ski', 55–56  
   —, stick, 56  
   — winding and throwing, 74–76  
 Single End Spot Weave, 293–295  
 Single Warp Knot, 232  
 Sisal, 61, 62, 459, 460  
 Skeiner, 57  
 Skip Plain Weave, 122–124, 449, 475  
 Skog, 183, 185  
 Slit Tapestry, see under, Tapestry, Slit  
 Smyrna Knot, 226–230  
 Snärjevånnad, see also, Soumak, 183–204  
 Soumak or Weft Wrapping, 141, 183–204  
   —, Busongo, 187  
   —, Gauze, 189–190  
   —, general technical details, 184–185  
   —, history, 183–184  
   —, locking and non-locking, 185  
   — on warp-face rugs, 452  
   —, practical details, 196–198  
   —, single and double, 187  
   —, surface angling, 185–186  
   —, two-colour, 188–189  
   —, uses in rug finishes, 504–506  
   —, Vertical  
   —, —, Double, 202–204  
   —, —, Single, 198–202  
 Spaelsau wool, 61, 62  
 Spanish knot, see also, Single Warp Knot, 232  
 Spinning on a bobbin winder, 94  
 Spots  
   — in warp-face plain weave, 444  
   — in weft-face plain weave, 110–112  
 Starting the weft  
   — — — in warp-face rugs, 442  
   — — — in weft-face rugs, 68  
 Stripes  
   —, S and Z-Twist, 92, 93  
   —, warpway, 103–110, 406–409, 444  
   —, weftway, 102–103, 444  
 Sudan, 450  
 Sweden, 142, 159, 169, 183, 224, 225, 246, 259, 269  
 Swedish Rölakan, 177–178  
 Swedish Tapestry Edge, 497  
 Syria, 47, 258, 259  
  
 Tablet woven extra warp as rug finish, 507–508  
   — — rugs, 477–478  
 Tabriz, 236  
  
 Taniko, 471–472  
   — Edge, 507–509  
 Tapestry, 141–182  
   —, Interlocked, 169–180  
   —, —, Double or Swedish Rölakan, 177–178  
   —, —, Single or Norwegian Rölakan, 170–177  
   —, —, two-colour areas, 178–180  
   —, Slit or Kilim, 141–169, 183, 191, 464  
   —, —, history, 142  
   —, —, introduction, 141  
   —, —, 'lazy lines', 157–159  
   —, —, oblique and curved wefts, 159–164  
   —, —, practical details, 149  
   —, —, variations of angled colour junctions, 156–157  
   —, —, weaving a triangle, 143–149  
   —, —, weaving vertical colour junctions, 151–156  
   —, —, wedge weave rugs, 164–169  
   — techniques not in plain weave, 180–182  
   —, Twined, 473–474  
 Temple, 56, 57, 67, 77–78  
 Tension box, 65  
 Thebes, 43  
 Three-Colour Block Weave, 342–347  
   — — — —, pick-up version, 387–390  
 Three-Weft Double-Faced Weaves, 281–283  
   — — — —, block weave based on, 365–367  
   — — — —, pick-up version, 386–387  
 Thurstan, Violetta, 447, 450  
 Tibet, 219, 235  
 Tie and Dye Warp, 443–444  
   — — — Weft, 94–97  
 Timor, 470  
 Troy, 43, 142  
 Turkish Knot, 226–230  
 Turkoman tentband, 452  
 Twills  
   —, Four-Shaft  
   —, —, Broken 2/2 Twill, 273–277  
   —, —, Double-faced 3/1 Twill, 279–281  
   —, —, — — —, block weave based on, 347–348  
   —, —, — — —, pick-up version, 382–383  
   —, —, Skip Twills, 284–289  
   —, —, Straight 2/2 Twill, 269–273, 276–277  
   —, —, Twilled Overshot Blocks, 289–290  
   — in warp-face rugs, 453  
   —, nomenclature, 258  
   —, Six-Shaft,  
   —, —, combining 3/3 with 2/2/1/1 twill, 301–302

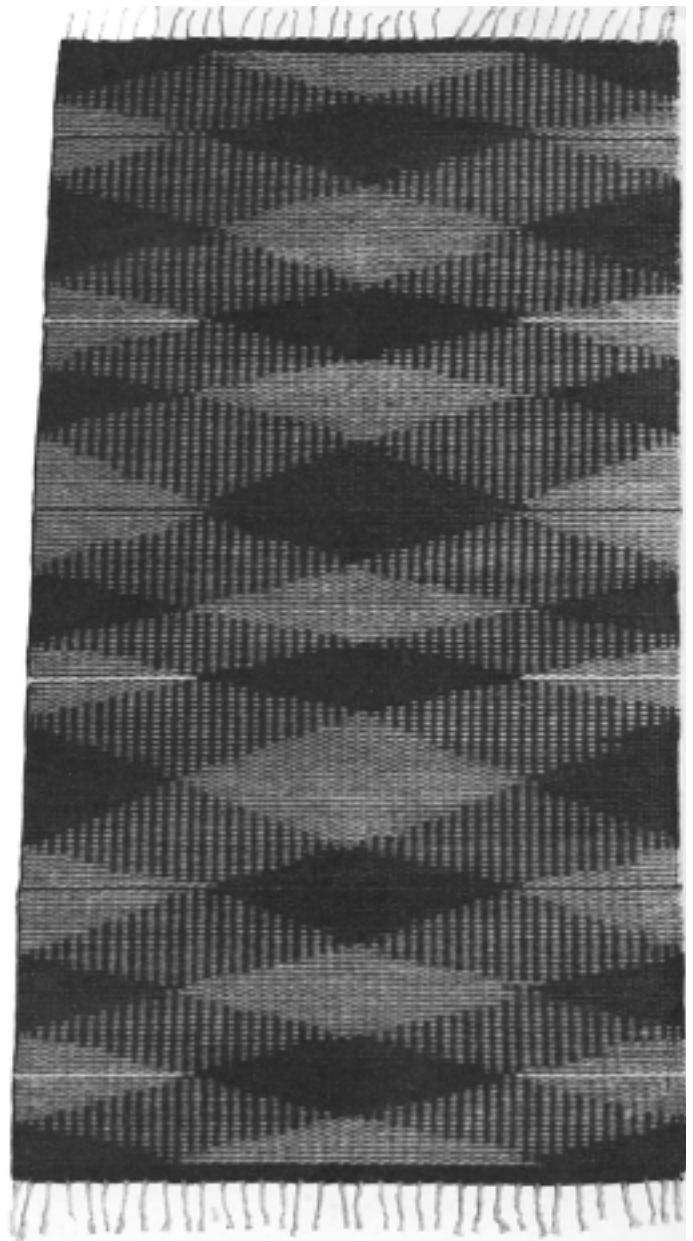
- Twills, Six-Shaft, Skip Twills, 303–304  
 —, —, 1/3/1/1 twill, 299–300  
 —, —, 2/2/1/1 twill, 297–299  
 —, —, 3/3 twill, 300–301  
 —, Three-Shaft,  
 —, —, Double-faced 2/1 Twill, 260–261  
 —, —, —, —, block weave based on,  
     337–338  
 —, —, —, —, pick-up version, 376–378  
 —, —, Krokbragd, 267–268  
 Twined Edge, 503–504  
 — — using extra yarn, 507–509  
 Twining, see under, Warp Twining and Weft  
     Twining  
 Twisted Wefts, 98–102  
 Two-Shuttle techniques, 68  
 Two-Tie Unit Class of block weave, 307–308  
 Tying warp to front stick, for warp-face rugs,  
     441  
 — — — — —, for weft-face rugs, 66–67
- Warp  
 — and weft protectors, 497–509  
 — — — — —, combination of woven, twined  
     and wrapped edges, 505–506  
 — — — — —, Swedish Tapestry Edge, 497  
 — — — — —, Twined Edge, 503–504  
 — — — — —, — —, using extra yarn, 507–509  
 — — — — —, Woven Edges, 497–503  
 — — — — —, Wrapped Edge, 504–505  
 —, loom extension for difficult warps, 54–55  
 —, making and beaming a rug warp, 63–66  
 —, one-man method of beaming, 63–64  
 —, opening out, 68  
 — protectors, 492–497  
 — —, Alternate Hitches, 495–496  
 — —, darning, 492  
 — —, Four Strand Sennit, 496–497  
 — —, overhand knots, 493  
 — —, plaiting, 493–494  
 — —, plying, 495  
 —, putting warp on vertical frame loom,  
     65–66  
 — tension, 50–51, 71, 82  
 — Twining, 477–480  
 — —, tablet woven rugs, 477–478  
 — —, warpway stripes in Navajo selvage  
     technique, 478–480  
 — yarns, 60–62  
 Warp-face rugs  
 — —, general technical details, 439–443  
 — — in multishaft weaves, 453–458  
 — — — — —, block weaves, 455–456
- Warp-face rugs in multishaft weaves, con-  
 verting weft-face into warp-face weaves,  
 453–455  
 — — — — —, pick-up weaves, 457–458  
 — — in plain weave, 443–452  
 — — — — —, bringing spots of weft to  
     surface, 446  
 — — — — —, colour blending, 443  
 — — — — —, combining thick and thin  
     wefts, 444–446  
 — — — — —, combined with weft twining,  
     447  
 — — — — —, combined with weft-face plain  
     weave, 447–449  
 — — — — —, practical details, 451–452  
 — — — — —, tie and dye warps, 443  
 — — — — —, two pick-up techniques,  
     449–451  
 — — — — —, warpway and weftway stripes  
     and spots, 444  
 — — — — —, specific finishes for, 512  
 Warpway stripes  
 — — in double corduroy, 406–410  
 — — in warp-face plain weave, 444  
 — — in weft-face plain weave, 103–110  
 Waving the weft, 71–72  
 Weave diagrams explained, 256–258  
 Weaving letters and figures, 124–125  
 Weft  
 — Chaining, 204–211  
 — —, first type, 204–209  
 — —, practical details and uses, 210–211  
 — —, second type, 209–210  
 — —, two-colour, 206–209  
 — Loops, 211–224  
 — — based on soumak, 222–223  
 — — based on Ghiordes knot, 223–224  
 — —, Pulled-Up,  
 — —, —, Chained, 205–218  
 — —, —, general technical details, 212  
 — —, —, history, 211  
 — —, —, placing the loops, 213–214  
 — —, —, practical details, 215  
 — —, —, uses, 214  
 — —, Sehna, 219–222  
 — —, wrapped, 218–219  
 — —, —, cut, 435–436  
 — Pile Techniques, see Chapter 10, also under,  
     Corduroy  
 — Protectors, 67, 481–492  
 — —, Damascus Edge, 484–486  
 — —, Four Strand Sennit Edge, 491–492  
 — —, Half Damascus, 486–487

- 
- Weft Protectors, looped edges, 487–489**  
 — —, Maori Edge, 489–490  
 — —, Overhand knots, 481–482  
 — —, Philippine Edge, 483–484  
 —, starting the weft, 68, 442  
 — tension, 105, 151, 442  
 — Twining, 463–477  
 — —, application to rugs woven on a frame, 464  
 — — combined with warp-face plain weave, 447  
 — — combined with weft-face plain weave, 469–470  
 — —, control of colour and twist sequences, 465–469  
 — — encircling one, two and three warp ends, 470–471  
 — —, introduction, 463–464  
 — —, open-shed, 474  
 — —, practical details, 476–477  
 — —, taniko, 471–472  
 — —, three and four-colour, 472–473  
 — —, twined tapestry, 473–474  
 — —, two-colour, 465–472  
 — —, use in rug finishes, 503–504, 508–509, 512  
 —, waving, 71–72  
 — yarns, 60–62  
**Weft-face plain weave**  
 — — — combined with warp-face plain weave, 447–449  
 — — — combined with weft twining, 469–470  
 — — —, selvages, 88–89  
 — — —, warp and weft settings, 85–88  
**Weft-face rugs, see Chapters 4–9**  
**Wefts**  
 —, combining thick and thin in warp-face plain weave, 444–446  
**Wefts, Crossed**  
 —, —, in Contrary Motion, 114–119  
 —, —, in Parallel Motion, 119–121  
 —, darning, 70–71  
 —, eccentric, 159–164  
 —, handspun, 93–94  
 —, joining  
 —, —, in corduroy, 405  
 —, —, in twining, 477  
 —, —, in warp-face weaves, 442  
 —, —, in weft-face weaves, 68–69  
 —, oblique and curved, 159–164  
 —, tie and dye, 94–97  
 —, Twisted, 98–102  
**Weftway Stripes**  
 — — in warp-face plain weave, 444  
 — — in weft-face plain weave, 102–103  
**Weighting batten, 51, 441**  
**Whipping, 494**  
**Wilton carpet, 49**  
 — — loom, 51  
**Wire loop for cutting corduroy floats, 404**  
**Wool, 60, 61, 85, 235, 451**  
 —, spalsau, 61, 62  
**Working end, 86**  
**Woven Edge, 497–503**  
 — — using extra warp, 506–507  
**Woven ridge, 284**  
**Wrapped Edge, 504–505**  
**Wrapped weft loop, 218–219**  
**Yarn, see Chapter 2**  
 —, belting, 60–62, 451–452  
 —, flossa, 62  
 — winder, 57–58  
 —, rya, 62  
**Yomud, 244–245**  
**Yugoslav method of tightening warp, 44, 45**  
 — Kilim, 142, 147

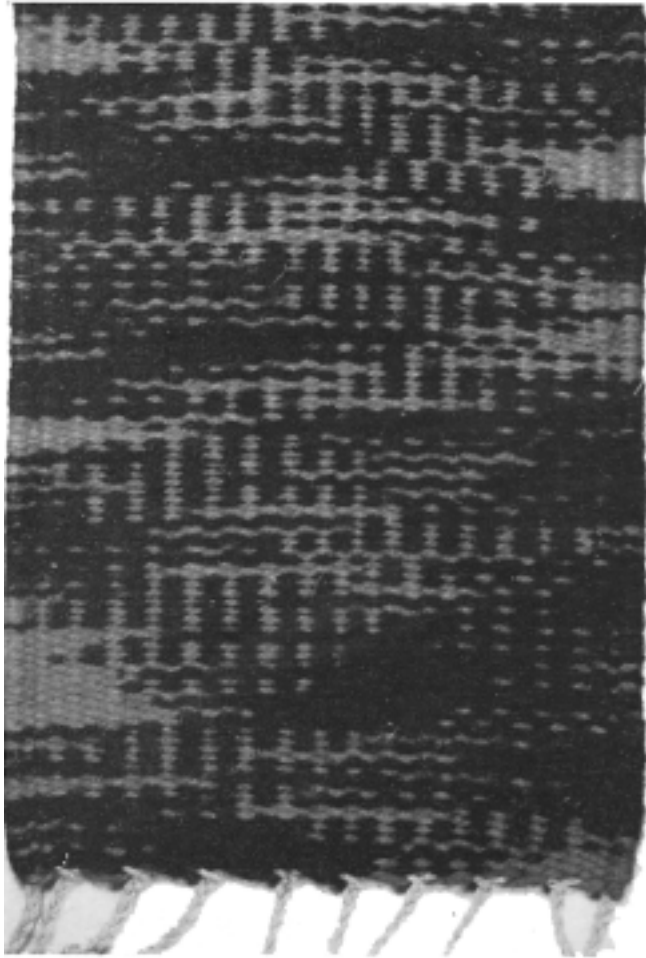




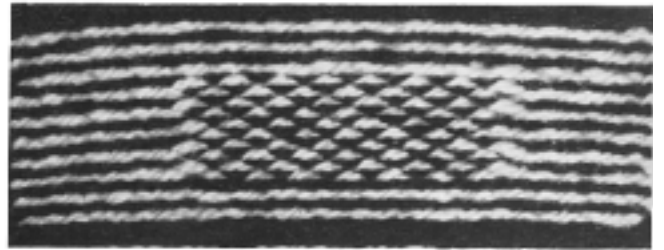
1. Sample with handspun weft of rayon, hemp and jute.



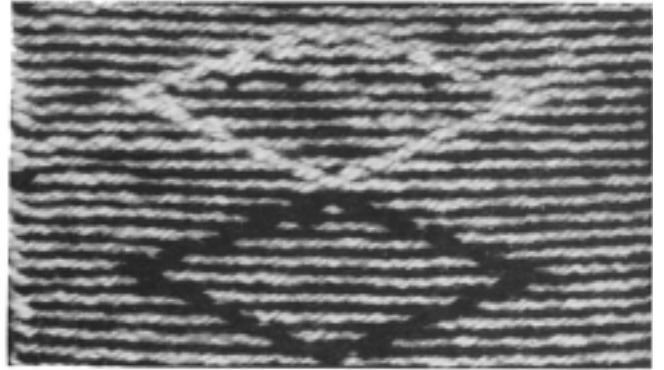
2. Rug with tie-and-dye weft giving a repeating design.



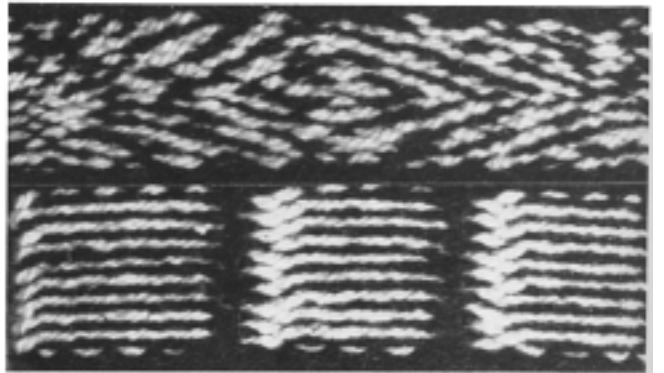
3. Sample with tie-and-dye weft giving a non-repeating design.



4. Twisted wefts. Area of spots on a background of lines.



5. Twisted wefts. Diagonal lines on a background of horizontal lines.



6. Twisted wefts. Vertical lines on a background of horizontal lines and concentric ovals.