

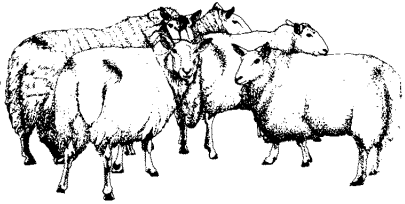
The Weaver's Journal

\$3.00

VOLUME IV NUMBER 4 ISSUE 16

APRIL 1980

- 
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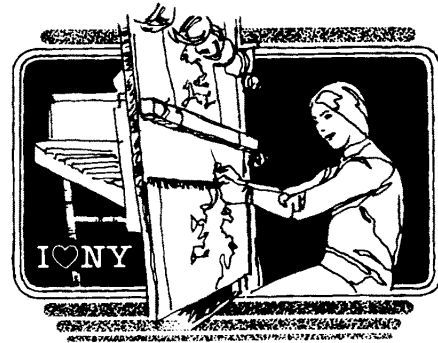
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The Weaver's Journal

Quarterly Journal for Textile Craftspeople
Volume IV, Number 4, Issue 16

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Cover Photo: Pattern Weaving by Clotilde Barrett

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Letter from the Editor

I have often heard the comment "Oh, she is just a pattern weaver". The tone was derogatory, as if pattern weaving were somehow inferior. It implied lack of creativity and imagination. This expression has made me feel unhappy for many years because the work I do most is "pattern weaving" or weaving loom controlled designs. Yet, I have always wondered that, if I called myself a "pattern weaver", this would be interpreted as if I was just duplicating all the weaves in Margaret Davison's book.

In order to clarify the expression "pattern weaver", this issue contains several articles dealing with that subject: Pattern Weaving, Geometric Proportion as a Design Tool, and Designing Rugs for Harness Controlled Weaving.

The tapestry course and the multiple harness weaving course are now well on their way.

In the April issue we like to feature rugs and in this issue you will find an exceptionally exciting variety, many of which require only 4 harnesses.

For the readers interested in garments and fibers, there are articles with information that has never been published before.

We hope that this issue will be a real pleaser and that you will communicate with us about what you found particularly interesting or uninteresting.

We have had a lot of feedback from the article on Computer Weaving in the last issue. If you want *The Weaver's Journal* to become a clearing house for ideas and communications on this subject, drop us a note and we will see to it that a strong communication system is established.

With the July issue we will be starting our fifth year. *The Weaver's Journal* has grown in size, in content and in circulation. The current rate of inflation is forcing us to also increase the subscription price. The new rates, effective April 1, 1980, are:

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U. S. 1 year	\$12.00
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Clotilde



by Olive and Harry Linder

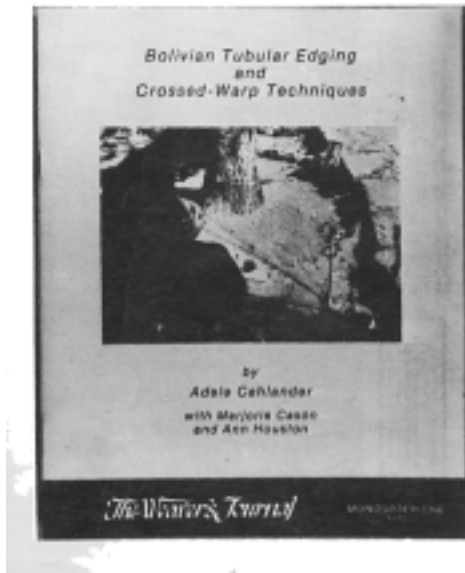
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The Weaver's Journal

Monographs

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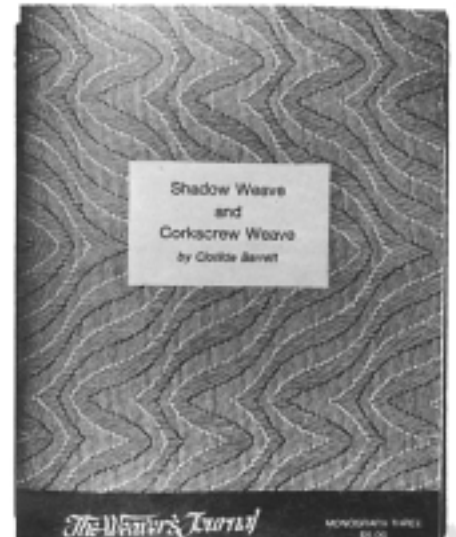
Bolivian Tubular Edging And Cross-Warp Techniques
by Adele Cahlander

Bolivians are noted for the embellishments by which they give the finished touches to their weaving. In this monograph the author teaches readers how to do the tubular edge trim in plain weave and in a more intricate crossed-warp technique. The crossed-warp technique is used to make flat bands and round tubes that are very colorful and decorative and require no special equipment. The clear drawings of the positions of the hand teach the weaver how to produce the Bolivian weaves.



Summer And Winter And Beyond
by Clotilde Barrett

This monograph deals first with the classical ways of weaving this versatile fabric structure, including multiple harness block design and polychrome weaves. Unusual interpretations are explored, including pick-up, turned S/W, and rugs. It includes a four harness four block version of S/W suitable for rugs and also S/W boundweave techniques using new ways to explore pattern and color on four harness looms. It exposes readers to many new ideas.



Shadow Weave And Corkscrew Weave
by Clotilde Barrett

The intricate designs produced by these weaves are the result of color effects applied to simple fabric structures. The patterns, based on twills, can be woven on looms with four harnesses and up. The design principles are thoroughly explained so weavers can create their own original patterns. Shadow weave has many uses for clothing, table linens, decorative fabric, wallhangings and rugs. Corkscrew weave is included in this study because the threading draft of the weave is so closely related to shadow weave.

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Pattern Weaving

by Clotilde Barrett

Pattern is an aesthetic arrangement of forms and lines according to certain rules and devices which are usually generated by mathematical formulae or by scientific methods. Pattern is a visual ordering of forms within a certain space. The forms can be free and created in the artist's mind but more often they evolve from geometric and precise elements. Variations of the forms and variations of the arrangements have to be conceived and integrated in order to produce a final work which has unity and which produces a strong visual impact.

Examples of patterns are rows of squares, interplays of squares and rectangles, concentric circles, the Greek key design, the trajectory of the earth around the sun.

Patterns have always been an important design element in the arts but in the past "pattern" has been mostly associated with the "Minor Arts" e.g., the pattern on a vase, the pattern on dress material, the pattern of wrought iron. Pattern was accepted solely for its decorative value.

In the earlier 20th century, pattern became recognized as an important design element in the fine arts. This is evident in the works of such painters as Albers and Mondriaan. In their work, the rational rather than the decorative elements of pattern were brought out. Reason was the prime element in arranging geometric forms and studying variations of certain themes. Color and proportion was studied intellectually in order to make statements of an intensity not found in the decorative arts.

Today, some visual artists call themselves "Pattern Painters". They use pattern to make a visual impact on the viewer who experiences the work both physically and intellectually. The concept behind the arrangement of geometric forms varies from one artist to the next but is derived from rational experiences; such as views through microscopes, spectroscopy, computers, mathematical puzzles, and new



*Transition by Ronnine Bohannon
The design of horizontal and vertical lines
was worked out on a computer.*

techniques for applying color and shapes to the canvas. Their works show a very personal approach to pattern as a design tool of the fine arts.

In pattern weaving one can find a similar evolution from the decorative to the strong personal statement. A band of "honeysuckle" overshoot decorates a tea towel, a "bird's-eye" twill tablecloth decorates the dining room, overshoot coverlets decorate bedrooms. All these fabrics show arrangements of geometric forms according to certain rules. Today, more and more weavers use these patterns, not as ends in themselves but as a design tool for personal expression. The loom produces patterns but the weaver intellectualizes new variations and new color schemes. The pattern is no longer used



*Fire Storm by Peg Templeton
Pattern weaving emphasizing rhythm and movement.*

for its decorative value alone but has become an important vehicle through which personal concepts are being expressed. This new generation of weavers is joining other visual artists in discovering the great potentials of pattern.

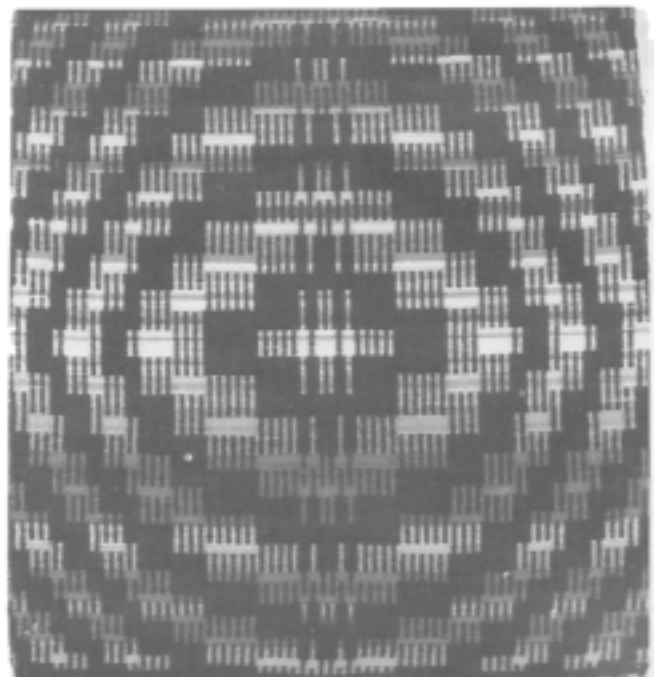
Pattern weavers seldom use texture yarns because they like the texture of the fabric to be produced by the pattern. They use color with the greatest sensitivity and often have to dye their own to obtain the subtle variations in shades which cannot always be met by commercial yarn. They are strongly aware of proportions and may resort to mathematical formulae to establish their schemes (Fibonacci's series). Some of the pattern weavers resort to computers which can quickly provide them with hundreds of rearrangements of some pattern elements. Although most pattern weaving is done on a 2 dimensional surface, this surface can be manipulated to create 3 dimensional effects.

The design elements most frequently found in "pattern weaving" are: interplay of opposites, the principle of repetition, and the concept of rhythm and optical illusions.

The pattern weaver, as opposed to the pictorial tapestry weaver, imposes upon himself the tight restrictions of the limitations of his loom. One of the challenges of pattern weaving is that concepts have to be expressed within the framework of the types of forms that a harness loom can produce. The number of harnesses the artist wants to work with is a personal choice that will strongly influence his work.

The impact of a "pattern woven" textile can be enjoyed physically through its texture and its visual effects, emotionally through its color and intellectually through the rules that govern it.

Pattern weaving is without doubt becoming a fine art.



*Color Composition by Clotilde Barrett
An interplay of rectangular colored shapes and concentric circles.*



Geometric Proportions as a Design Tool

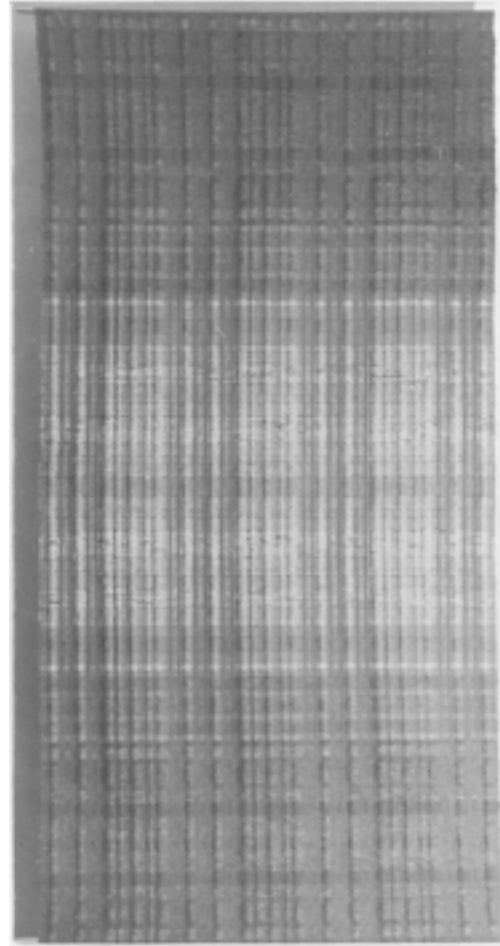
by Peg Templeton

For several years previous to my personal discovery of handweaving, I had been exploring geometric form via the medium of paint and brush. After executing a laborious series of paintings involving a basic geometric unit of very small size, I visited a friend who had recently taken up weaving. I was immediately excited by the possibilities of pattern weaving, especially the overshot weave, as a medium for expressing geometric forms. "Ah" said I, "here is a tool that will enable me to create geometric forms by the simple throwing back and forth of a shuttle!" I was fascinated by the variety and complexity of pattern which could be achieved with four basic units. It was clear to me that here was the method most perfectly suited to achieving the effect I was working for in my painting, which was a sense of movement and dimensionality in a flat surface by means of the juxtaposition of color and pattern. Thus I embarked upon what has turned out to be a rather lengthy study of the overshot weave and its suitability for contemporary applications.

At the same time I became increasingly interested in the mathematical principles which formed the foundation for pattern development and to the ways in which mathematics is an expression of the laws of nature.

Weaving is an essentially arithmetic process. In order to plan a piece of cloth one must be able to use the tools of arithmetic. As a weaver it is advantageous to be in command of the mathematical principles which are implicit in the process of weaving. Up to this time I had operated on an intuitive level when making decisions regarding measurements, amounts and proportions, but I began to look for more systematic methods to obtain the effects I was working for.

I don't recall the precise moment that I first became aware of the Fibonacci series, but I quickly began to explore the innumerable ways in which the series could be applied to my weaving. The Fibonacci series is a mathematical pro-



gression based on the constant "Phi" (1.6.8), the "Golden Proportion" of Greek temple architecture. Leonardo Fibonacci was an early 13th Century scholar whose historic manuscript "The Book of the Abacus" was the principal means whereby Arabic numerals were introduced to the European world. A small section of the manuscript contained a theoretical problem; Fibonacci's solution to the problem resulted in a series of numbers which has become known as the Fibonacci series. In this series, each number is the sum of the two preceding numbers. Thus, beginning with zero, it is possible to generate the series, knowing only the statement given above:

$0 + 1 = 1$	$5 + 8 = 13$
$1 + 1 = 2$	$8 + 13 = 21$
$1 + 2 = 3$	$13 + 21 = 34$
$2 + 3 = 5$	$21 + 34 = 55$
$3 + 5 = 8$	$34 + 55 = 89$

Hence, the series would appear as 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, 233, and so on to infinity.

The series may appear to be made up of random numbers. In fact, each number bears a special relationship to the numbers surrounding it and here is where the mystery begins. If you divide a Fibonacci number by the next highest number in the sequence, it is .618034 times as large as the number that follows (the exact figure appears when the numbers are large enough to be precise; it works for all numbers after the 14th in the sequence). Let us take the 15th number in the series, 987, and divide it by the next highest number, 1,597. The answer is .618034.

What is the significance of this particular number? The proportion of .618034 to 1 was known to the ancient Greeks as the "Golden Mean" and formed the basis for much classical art and architecture. The Greeks defined the golden mean as the point that divides a line into two parts so that the smaller part is in proportion to the larger part as the larger part is to the entire line. This principle was applied in a limitless number of ways in all forms of Greek art and architecture.

The mystery deepens when the golden proportion is expanded to a four-sided figure. If you draw a rectangle so that the smaller side is .618034 as long as the larger side, you have made the golden rectangle, called by Euclid and Pythagoras the rectangle of the Divine Section. The Greeks knew that shapes based on these principles were esthetically pleasing, and thousands of common rectangles observable in the everyday world are manifestations of the golden rectangle. To this day the reasons underlying the "workability" of this principle are not fully understood, but artists and scholars through the centuries have continued the quest for the elusive secret contained in a ratio.

In the 17th century another scholar, Jakob Bernoulli, investigated what he suspected to be the connection between the golden mean and nature. To see the connection he looked inside the golden rectangle. What he discovered was this: if you draw a square into one end of a golden rectangle, you create another, smaller golden rectangle. This division

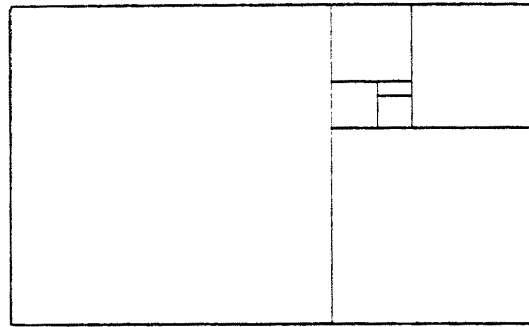


Fig. a

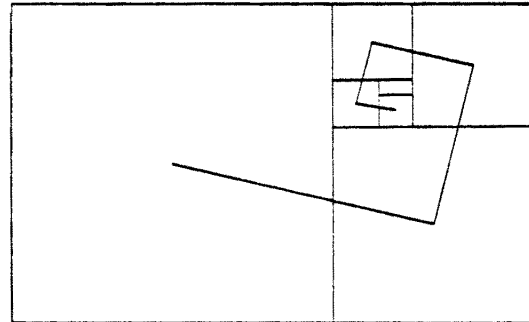


Fig. b

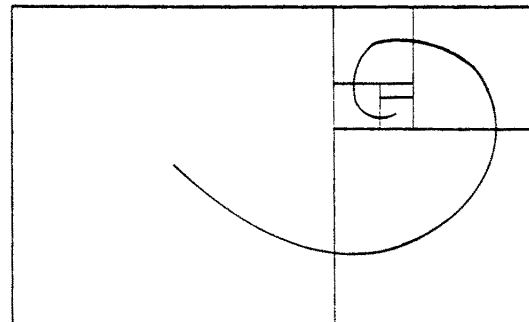


Fig. c

can be performed again and again until you are left with a succession of squares which can be reduced or expanded ad infinitum (Fig. a). If you connect the center points of the successive squares you draw a stiff sort of spiral which works its way ever larger (Fig. b). Any section of the spiral is .618034 as large as the remainder of the spiral. When you curve out the lines you have drawn a golden spiral (Fig. c). Bernoulli named it the logarithmic spiral, and he noted that any line drawn from the center of the spiral will intersect it at precisely the same angle as any other line. For this reason it is also known as the equiangular spiral. C. Arthur Coan wrote, "Nature uses the logarithmic spiral as one of her most indispensable measuring rods, absolutely reliable, yet never without variety, producing perfect stability of purpose without the slightest risk of monotony. . . We shall find it broadcast throughout all nature." The golden spiral and the Fibonacci series are observable in innumerable life forms, from the chambered nautilus to the sunflower, from pine

cones to the galaxies. For example, the sunflower: sunflower seeds are arranged in logarithmic spirals flowing out from the center in both directions. If you count the number of seeds in a row along the clockwise spiral, you will find the sum to be one of the Fibonacci numbers. If you then count the seeds in a row that spirals in a counterclockwise direction, you will find that the sum of this row is a Fibonacci number adjacent to the first number. Most sunflower heads seem to have spirals of 34 and 55 seeds. Pine cones produce logarithmic spirals based on Fibonacci numbers, and on and on. The possibilities are endless.

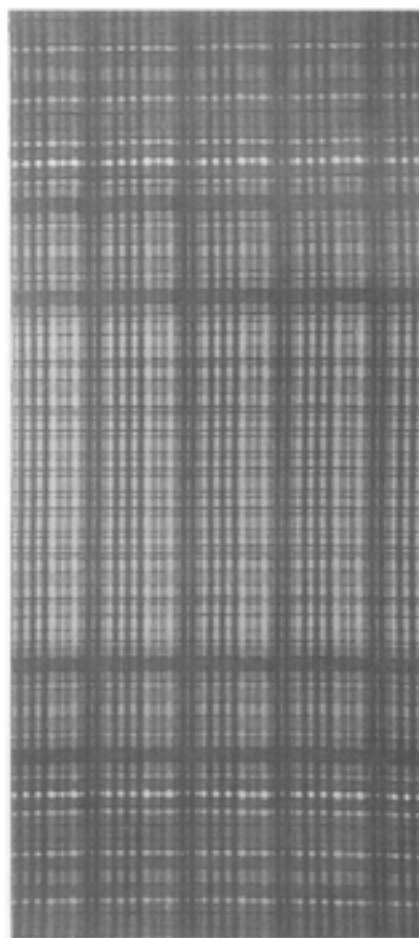
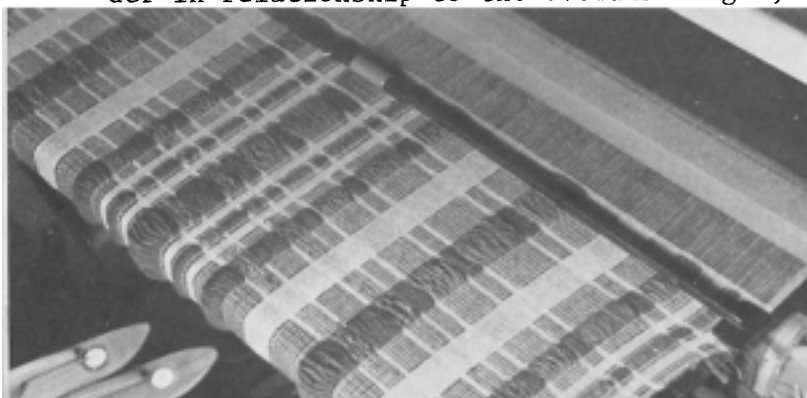
It is evident that the Fibonacci sequence and the golden spiral are an expression of a recurring growth pattern. It is speculated by modern scholars that the shape of a logarithmic spiral enables growth to occur without any change in form. (footnote)

"... a spiral is a figure that re-tains its shape (i.e. its proportions) as it grows in one dimension by addition at the open end. . . there are no truly static spirals."

Gregory Bateson, *Mind and Nature*.
(New York: Dutton, 1979), 12.
Emphasis in original.

The changing spiral is thus deeply governed by, and an elementary expression of, the constant to which Fibonacci pointed.

Everything that I learned about the Fibonacci series and the golden section convinced me that the ideas embodied in these principles could be a most useful tool in my work. Some of the possibilities of application include: determining overall dimensions; determining the relationship of areas within the weaving one to the other, i.e. the size of a border in relationship to the overall length;



determining warp stripe arrangements; deciding upon the number of pattern repeats to be used in warp and/or weft. One extremely important area of my work has been my attempt to achieve a "spectrum" effect in which the change from one weft color to the next, rather than appearing as a strong horizontal line, has a gradual, carefully modulated impact. I have found the Fibonacci series to be of invaluable assistance in this effort. I do not use these principles exclusively, however, but in combination with other criteria, always reserving the artists' prerogative to break the rules I set for myself.

As I sit writing these words, rainbows cast by a faceted crystal hanging in my window fall across the page. I find myself wondering if the intervals in a spectrum are ruled by the principles of the Fibonacci series and the Golden Section. I wouldn't be at all surprised to find that it is so.

Footnote: Much of the information in the preceding discussion is based on Hoffer, William, "A Magic Ratio Recurs Throughout Art and Nature", *Smithsonian*. VI, 9 (December 1975).



Shaft Switch Techniques

by Jean Busse

Photos by D. E. Busse

The Shaft Switch technique, developed by Peter Collingwood, is a loom controlled, weft faced flat weave designed for rug weaving, but adaptable to other weaves. It is a double faced bound weave of two colors with the color positions reversed on the opposite side.

When tie-ins for shaft switching are added to selected units of simple 2-block unit threadings such as shown in Fig. 1, the design possibilities on four harnesses are increased dramatically.

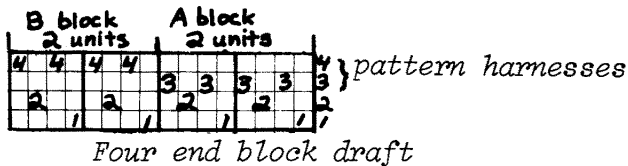
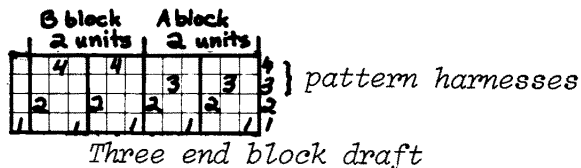
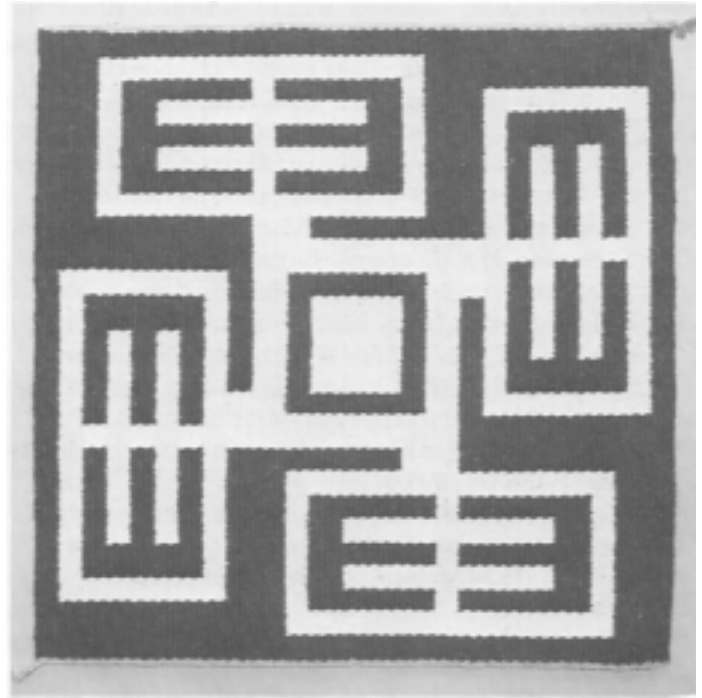


Fig. 1

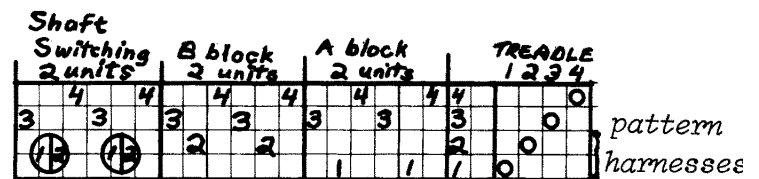
In his book, *The Techniques of Rug Weaving*¹, pages 308-313, Collingwood describes the 3-end block draft which is the weave structure most used for S. S. On pages 313-316, he describes tie-ins that can be added to allow more freedom of design.

I learned this method in one of his workshops, and have continued to use it, with some variations, on my Macomber looms. First I changed the threading so I could place the tie-ins on the harnesses closest to the front of the loom. (See Fig. 2.) It is also easier to see which warp thread is to be switched from one pattern harness to the other while weaving. Then, I simplified the tie-ins so there are half as many controls to switch.

If I were weaving production rugs, I would consider building a platform over



the harnesses similar to Collingwood's control board, which permits quick changes and shortens weaving time. The simplified tie-in method I will describe gives me the design freedom of the S. S. system, plus a loom controlled weave without extra equipment attached to my loom. It allows me to weave individually designed rugs and wall pieces quickly and efficiently, producing results exactly as planned.



Lift Hs 4, Color A
Lift Hs 1, 2 and 4 Color B
Lift Hs 3, Color A
Lift Hs 1, 2 and 3 Color B

Treadling I
weaves solid
color each
side

Lift Hs 2 and 4, Color A
Lift Hs 1 and 4, Color B
Lift Hs 2 and 3, Color A
Lift Hs 1 and 3, Color B

Treadling II
weaves
blocks

Fig. 2. Units for threading using the shaft switch rug technique.

¹Collingwood, Peter, *The Techniques of Rug Weaving* 1969, Watson-Guptill Publications, New York.

It takes a couple of hours for me to insert tie-ins on all 65 units for a 48" (122 cm) wide rug sett at 4 epi (16/10 cm). Then they can be used for several rugs woven on the same warp, each of different design.

A threading for Shaft Switch contains three types of units. Block A units, block B units, and S. S. units. (See Fig. 2). Note that the only difference between block A and block B units is the middle warp end of each unit. When this warp end is threaded on pattern harness 1, that unit weaves as block A. When it is threaded on pattern harness 2, it weaves as block B. The middle warp end of the S. S. unit is not threaded on any harness, it is floating. This is where the tie-in is added, which allows the control of that warp end to be switched at any time from harness 1 and 2 and vice versa, so that that unit can be woven as block A or as block B. This function of the shaft switching unit frees the traditional 2-block pattern from the arbitrary vertical divisions between blocks.

The two colors that make the design on the face of the rug reverse their positions on the back. Bands of solid colors, (A) on top and (B) on the back, can be woven with treading I, without switching any control-ties. (See Fig. 2) This is convenient for borders at ends of a rug such as the area a in Fig. 3.

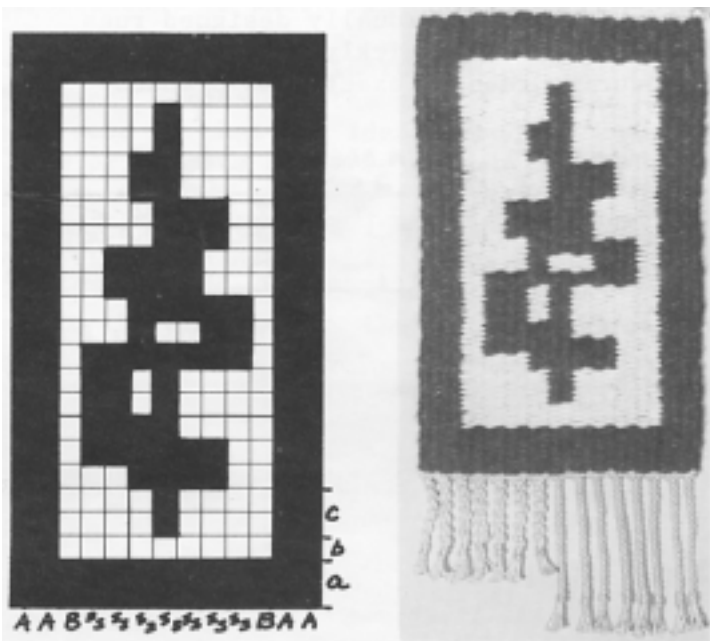


Fig. 3. Design

Design of Fig. 3. Note the different types of finishes.

When designing for S. S., I use squared paper. One square equals one unit of threading. The number of squares across the design equals the number of units in the threading.

A good sett for a Shaft Switch rug is 4 epi (16/10 cm). Each 3-end unit then equals 3/4 inch (19 mm) in the width of the rug. A 40" (102 cm) wide warp can contain 53 or 54 units. Lengthwise in the rug design, one unit equals the number of weft rows that can be woven in 3/4 of an inch. The number of rows varies with the density and bulk of the weft yarns. Thin weft weaves more rows per inch than thick weft.

The best way to learn how S. S. tie-ins work is to weave a sample about 10" (25 cm) wide, placing several S. S. units in the 2-block unit threading. With 8/5 (or similar size) linen, wind 59 warp threads. When threading, place them double, single, double, single, etc. through both the heddles and the reed at 4 "working ends" per inch. This makes 39 "working ends" in the warp that is threaded into 13 units.

When threading an S. S. unit, the center warp floats between empty heddles on H1 and H2. The tie-in is added to each of these units through these empty heddles, after the warp is tied very evenly at the front of the loom.

The string for tie-ins should be of firmly plied cotton or linen. The yarn for the control-tie should be firmly plied wool with a harsh feel.

The length of the string for each tie-in is up to 4 times the height of 1 heddle. (Follow the diagram of Fig. 4 to install the tie-ins).

Begin in front, through the empty heddle on H1, around the floating warp, then back through the heddle eye. The string goes up behind H 1, down behind H 2 and through that empty heddle eye. Go through the first loop as well as around the floating warp. The string goes back through the heddle eye, up again behind H 1 and down in front to tie to its other end. Leave enough slack in string so that either harness can rise without pulling on the other harness.

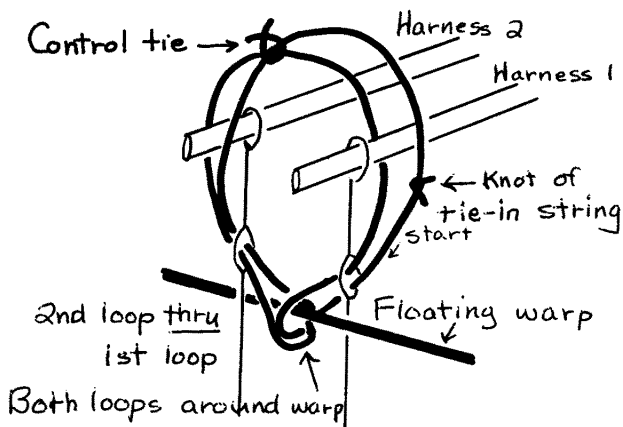


Fig. 4 Shaft Switch tie-in

When the warp is spread evenly with enough filler at the beginning for a fringe or other finish, I do one row of twining across each individual warp with either linen or rug wool. This will temporarily hold the tightly packed weft in place when the rug is taken off the loom. Twining is repeated at the end of the rug.

To weave the sampler, start out by putting all the control-ties of the S. S. snug against the top of harness 2. Use two colors for weft, one dark (A), one light (B), preferably rug wool. Two or three strands of a color, depending on the bulk of the yarns, can be used together for each weft in a butterfly or on a stick shuttle. Each color should have the same amount of bulk and be laid in its shed as loosely as possible to prevent excessive pull-in of the warp.

Begin the two wefts from opposite sides of the warp and weave $1\frac{1}{2}$ " (38 mm) border of solid color (A) on top and color (B) on the back (Fig. 3, Section a) following the threading sequence I of Fig. 2. Then treadle to weave blocks (Fig. 3, Section b.) using treadling sequence II, Fig. 2. In each 2 passes, one weft lies over or under the other when they are beaten down, making a two-faced weave. One complete row of the weave requires 4 shed changes and 4 passes of weft - (A), (B), (A), (B). This sequence of 4 passes should be completed before switching control of any units.

Weave without switching control of the S. S. units for a while to familiarize yourself with the appearance of the weave, and to determine how much weft slack is needed in each shed. I use a stretcher for rugs and move it forward to the fell

after each inch (25 mm) of weave. The weft can be pulled quite snug at the edge, and then left very loose through the shed. Yarns tend to catch on each other as they cross, exchanging places from the top to the back layer. This leaves bits of the lower color showing on top. I beat only after the second and fourth pass on an open shed to get better coverage with the top layer. My 12 pound weight on the beater helps to obtain a heavy even beat.

To change the color in an S. S. unit (Fig. 3, Section c, central unit), pull up the two strings held by the control-tie so they are taut. Then slide the control-tie along the strings until it is snug on top of the other harness. Weave further, changing other tie-ins according to the design, after any sequence of 4 passes.

If you change the color order to (B), (A), (B), (A), this will reverse all the color positions. Treadling remains the same unless there is a solid border or horizontal stripes, as mentioned above.

Other color orders that are not pick and pick require floating selvages to maintain neat edges. Stripes can be woven in some spaces with color order of (A), (B), (B), (B), or (A), (A), (A), (B). A sequence using 3 colors - (A), (B), (C), (B) will weave stripes of A and C colors.

After more than two yards (1.83 m) of weaving, the middle warp of each unit begins to lose tension. Since even, tight tension of the warp is vital, use two warp beams for longer weavings.

There is no plain weave possible with this threading.

Though I have not used these tie-ins on a sinking shed loom, they should work well if there is an open shed when the warp is very tight.

This is a technique that does not just happen when you follow all the steps in order. All of the elements that make up this weave must function well together for success. The yarns, the amount of slack in the sheds, the even, tight warp, the firm beat, the secure control-ties, etc., are all equally important. The time spent working with the Shaft Switch technique to discover how to make it work for me has been well worth it. Perhaps it will be for you.



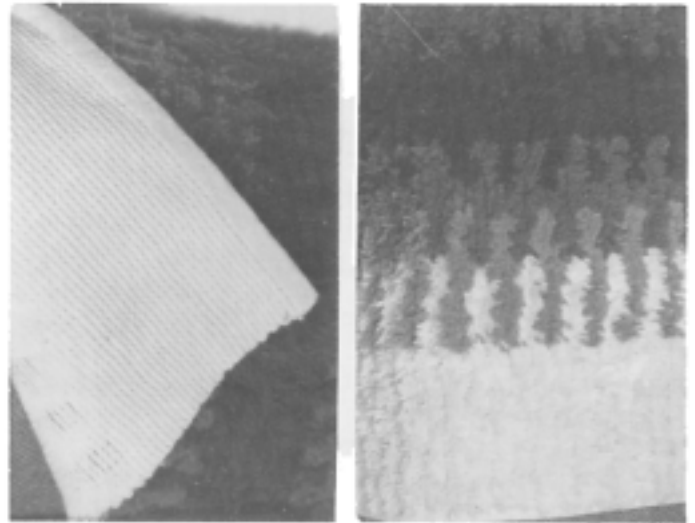
Woolly Afghan in Summer and Winter Pile Techniques

by Ellen Champion



This weft does not show on either face of the fabric.

△ The pattern weft weaves long floats which will be cut to make pile. It is four singles of Navajo wool wound together. The colors are white, dark brown, dark blend, and light blend.



The summer and winter pile technique is a cut corduroy technique done on a summer and winter threading. The fabric can be woven as a double faced cloth; pile (or cords) on one side and a firm backing (or self lining) on the other. Depending on the choice of yarn and the design of the fabric, this technique has many uses: rugs, throws, pillows, wallhangings, soft sculpture and garments. Josephina's suit, described on pp. 50 of this issue of *The Weaver's Journal*, is an 8 harness application of the technique. The warm and cozy afghan illustrated here is a four harness design.

X The weft for the backing is also white 2 ply New Zealand wool.

Threading: See Fig. 1.

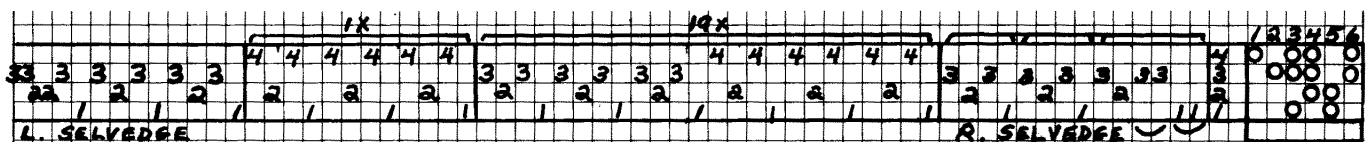
Sett: 12 epi (50/10 cm)

Selvedge: double the first two and the last two ends in the heddle and in the reed as shown in Fig. 1.

Width in the reed: 41" (104 cm).

Treading:

HEM: weave tabby

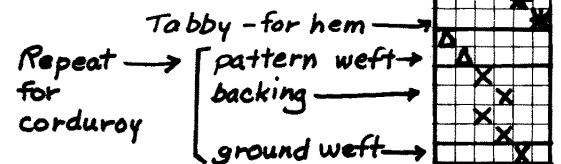


WARP: natural 12/2 cotton

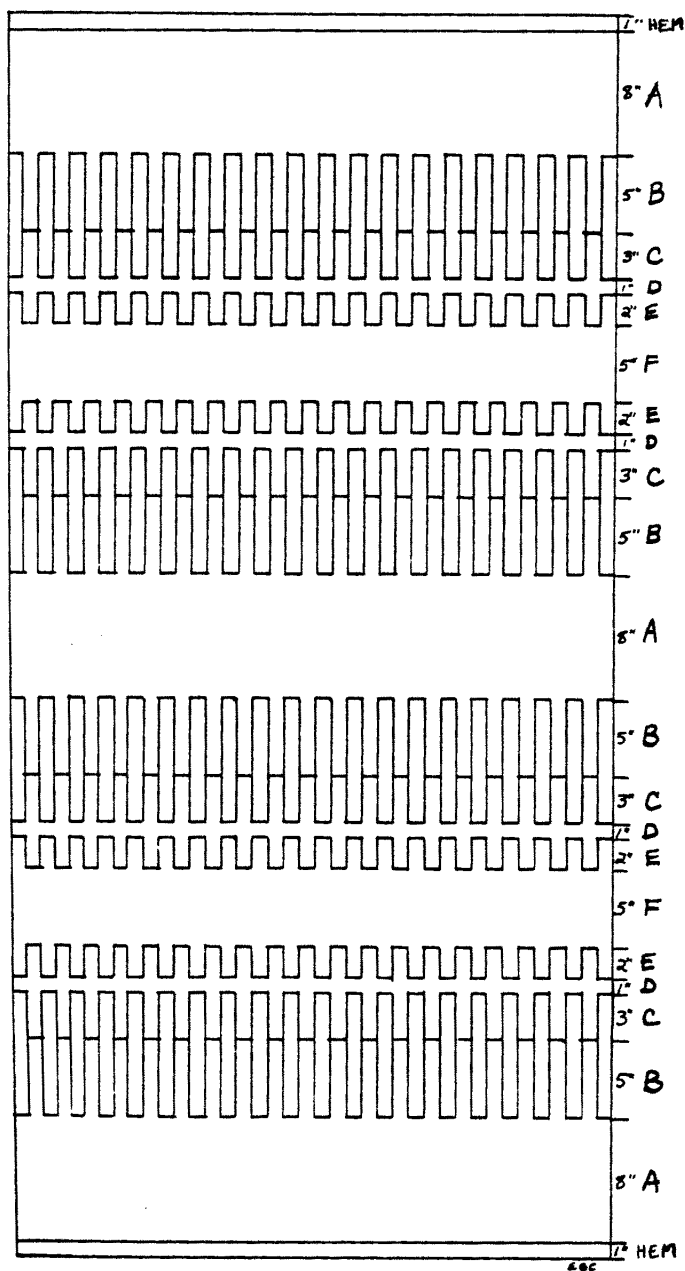
WEFTS:

X The ground weft weaves tabby picks between the picks of pattern weft. It is white 2-ply New Zealand wool.

Fig. 1



PILE: Repeat the seven corduroy picks as shown in Fig. 1. The two colored stripes in the design are created by alternating pattern weft picks of two different colors. (See Fig. 2.)



- A white
- B white, tan
- C tan, brown
- D brown
- E brown, dark brown
- F dark brown

Fig. 2

Selvages:

In order for the pile to make good selvages, one should have two shuttles with pattern weft, one for treadle 1, the other for treadle 2. The pattern weft laid in with treadle 1 is always cut on both selvages, the other is a continuous weft. Regulate the length of the pile by pulling the floats of the pattern weft up.

Design:

The idea of the afghan and the design were inspired by the shaggy pelt of a ram. The width of the bands in the design (See Fig. 2) is proportioned according to Fibonacci's series (see "Proportion as a Design Tool" by Peg Templeton in this issue).

Finished size: 80" x 40" (214 x 107 cm)

Finished weight: 9½ lbs (4.31 kg).



Multiple Harness Weaving Course

Part II: Twills and Satins

with contribution by Nancy Searles

Corrections: In *Multiple Harness Weaving Course, Part 1*, in last two paragraphs, change Fig. 15 to Fig. 16.

References: Oelsner, G. H. *Handbook of Weaves* pp. 26-38.

REVIEW OF THE TWILL TIE-UPS AND TREADLINGS

Multiple harness twill tie-ups are schematically represented by horizontal lines with an equal amount of numbers above and beneath the line.

Example 1:
$$\begin{array}{c} 2 \quad 1 \quad 2 \\ \hline 5 \quad 3 \quad 1 \end{array}$$

Example 2:
$$\begin{array}{c} 2 \quad 1 \\ \hline 3 \quad 2 \end{array}$$

● The sum of these numbers is equal to the number of harnesses.

Example: $2 + 1 + 2 + 5 + 3 + 1 = 14$, this is a tie-up for 14 harness twill.

$2 + 1 + 3 + 2 = 8$, this is a tie-up for 8 harness twill.

● The numbers above the line represent the length of the warp floats.

● The numbers under the line represent the length of the weft floats.

In our example 1, the weft will go under 2 warp threads, float over 5 threads, go under 1, float over 3, go under 2 and float over 1.¹



Cross section of interlacement of one weft pick with the 14 warp ends of one repeat of 14 harness straight twill.

In our example 2, the weft will float over 3 warp threads, go under 2 warp threads, float over 2 and go under 1.



Cross section of interlacement of one weft pick with the 8 warp ends of one repeat of an 8 harness straight twill.

● If the sum of the numbers above the line (warp floats) is greater than the sum of numbers under the line (weft floats), the twill is a warp twill.

● If the sum of the number under the line is greater than the sum of the numbers above the line, the twill is a weft twill.

Example 1: $2 + 1 + 2 = 5$
 $5 + 3 + 1 = 9$

9 is greater than 5. This is the tie-up for a weft twill.

Example 2: $2 + 1 = 3$ $3 + 2 = 5$
5 is greater than 3. This is a tie up for a weft twill.

Handweavers, who often think of the weft yarn as the pattern yarn, prefer to weave weft twills because their pattern yarn will show more on the face of the cloth.

● Opposite tie-ups are those whose numbers above the line and under the line have been interchanged.

Example 1: $\begin{array}{c} 2 \quad 1 \quad 2 \\ \hline 5 \quad 3 \end{array}$ and $\begin{array}{c} 5 \quad 3 \\ \hline 2 \quad 1 \quad 2 \end{array}$
are opposite tie-ups.

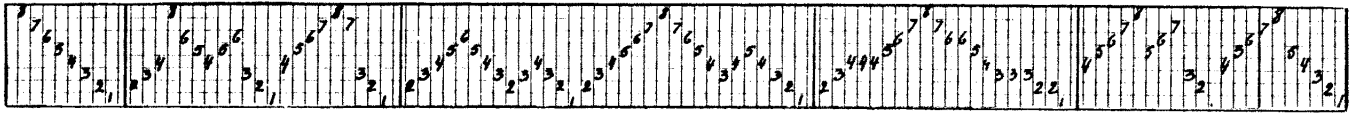
Example 2: $\begin{array}{c} 2 \quad 1 \\ \hline 3 \quad 2 \end{array}$ and $\begin{array}{c} 3 \quad 2 \\ \hline 2 \quad 1 \end{array}$
are opposite tie-ups.

The right side (top surface) of a fabric woven with one tie-up is the same as the wrong side (underneath surface) of a fabric woven with the other.

¹ This schematic representation of a twill tie-up is most commonly read from left to right.

Twill Gamp by Nancy M. Searles

The easiest and most effective way to experiment with twill threadings, tie-ups and treadlings is to weave a gamp (sample blanket). A gamp is a fabric woven with several different threading sequences threaded side-by-side over the weaving.



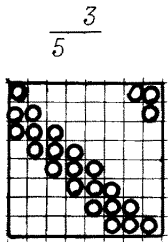
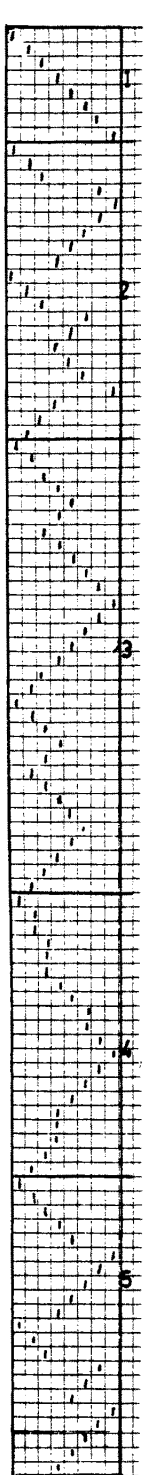
straight

skip

point

undulating

broken

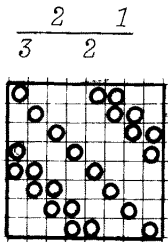


treadling

1

treadling as drawn in

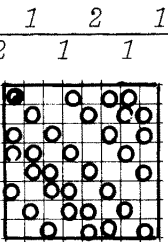
2



3

4

5



1

2

3

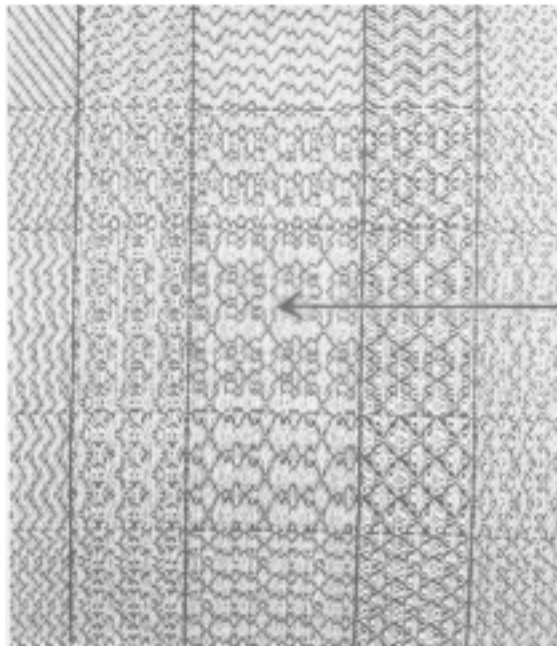
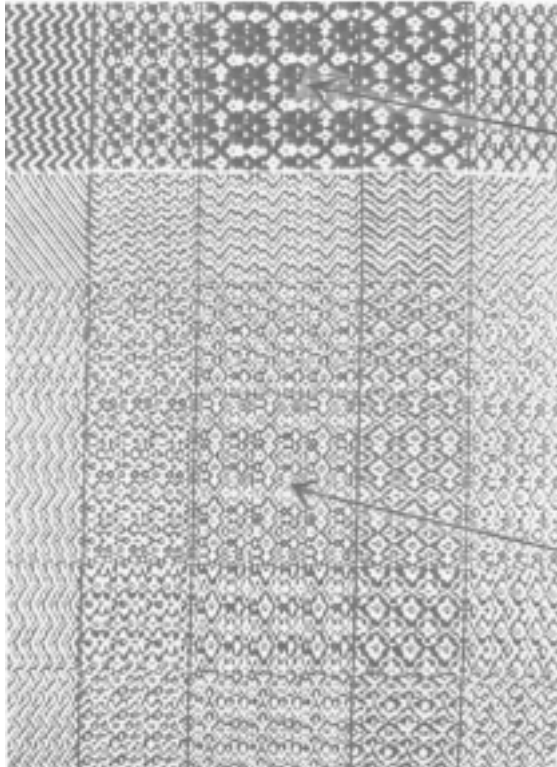
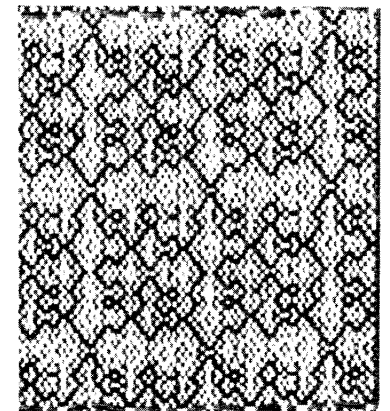
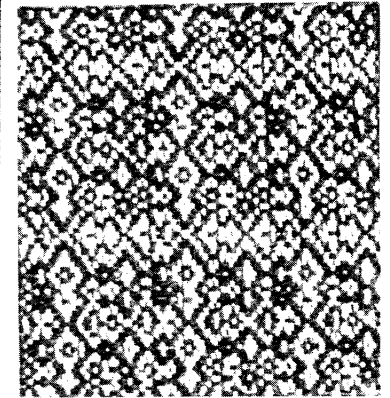
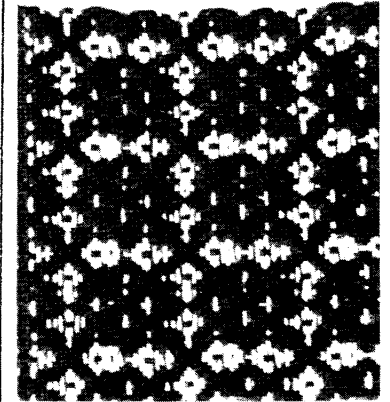


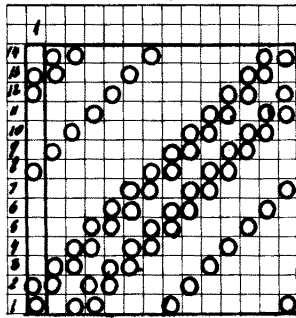
Photo by Nancy M. Searles



Detail of the point twill threading woven as drawn in with the three different tie-ups.

● Conventional tie-ups can be derived from the schematic tie-ups.

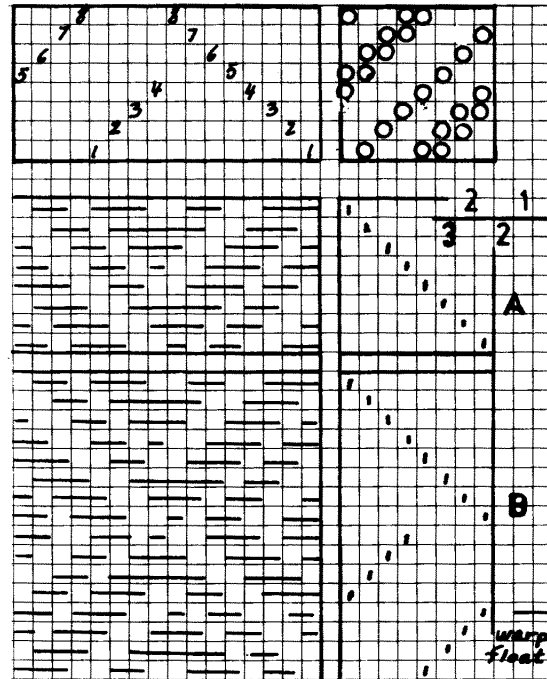
Example 1: $\frac{2 \quad 1 \quad 2}{5 \quad 3 \quad 1}$



The first treadle is tied so it lifts the first 2 harnesses, (marked by o's), leaves the next 5 down, lifts the next one, leaves the next 3 down, lifts the next 2 and leaves the last one down. The tie-up of the other treadles is derived from the first, by one step progressions of the same pattern.

● Each vertical column in a conventional tie-up represents a combination of harnesses which will be lifted together to form a shed. The handweaver opens each shed by pressing on a treadle. A treadle number is associated with each one of these harness combinations, starting at the left with treadle 1. The treadling is the sequence in which these treadles are used, and the sequence is usually drafted under the tie-up.

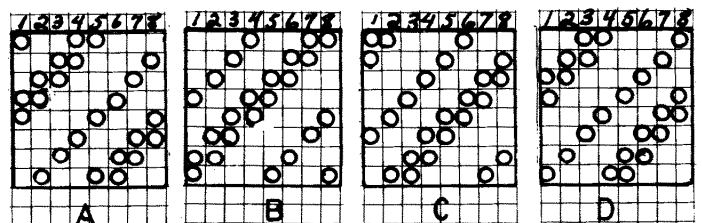
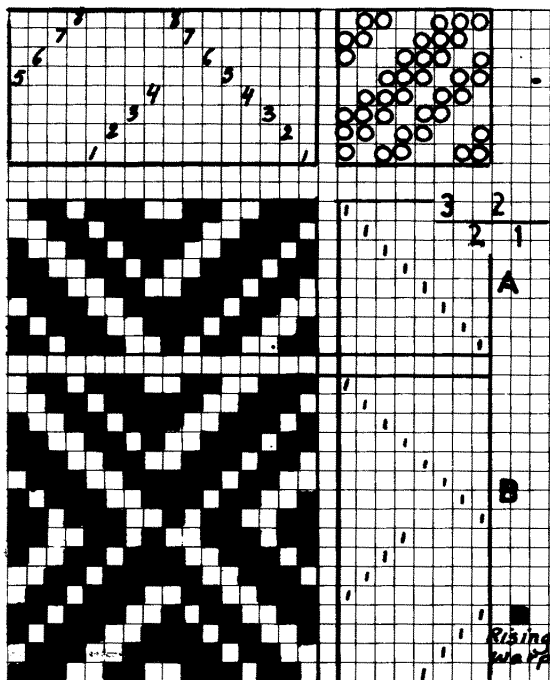
For our 8 harness example we have chosen broken twill threading, the warp twill tie-up $\frac{3 \quad 2}{2 \quad 1}$ and its opposite, the weft twill tie-up $\frac{2 \quad 1}{3 \quad 2}$.



A shows a straight twill treadling sequence.

B shows a "as-drawn-in" treadling sequence in which the pattern line of the treadling is the same as the pattern line of the threading.

● $\frac{2 \quad 1}{3 \quad 2} \quad \frac{2 \quad 1}{2 \quad 3} \quad \frac{1 \quad 2}{2 \quad 3} \quad \frac{1 \quad 2}{3 \quad 2}$

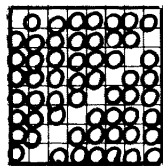


All these tie-ups are the same. What seems to make them different is that some treadle numbers are given to different harness combinations. Compare tr 1 in all four tie-ups. The association of a treadle number to a particular harness combination will affect the pattern if the only treadling instruction given is "treadle as drawn in". Of all the choices, the handweaver will choose tie-up A to treadle "as drawn in" because treadle 1 starts out with the longest weft float (over Hs 1, 2 and 3).

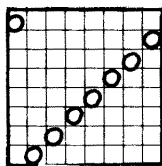
SATINS

Satin is a twill derivative weave whose tie-ups are based on a $\frac{n-1}{1}$ or a $\frac{1}{n-1}$ twill tie-up if the total number of harnesses is n.

For an 8 harness loom, n = 8, thus the tie-up twill tie-ups are $\frac{7}{1}$ and $\frac{1}{7}$.



$\frac{7}{1}$



$\frac{1}{7}$

Satin is a warp satin based on $\frac{7}{1}$.

Sateen is a weft satin based on $\frac{1}{7}$.

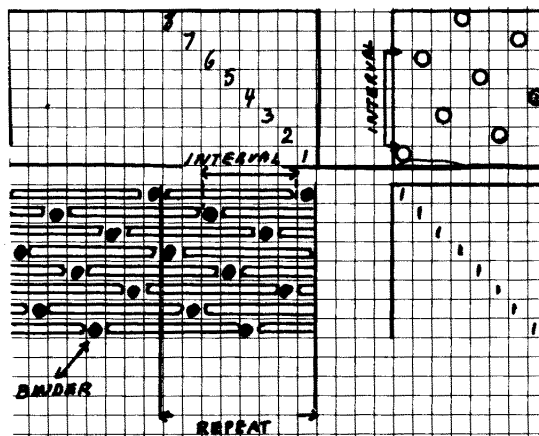
There are two approaches to designing satins:

1. Use a twill threading and rearrange the twill tie-up.
2. Rearrange the threading and use the twill tie-up as is.

The first method is used more frequently because the twill threading is more versatile than any rearrangement of that threading. The tie-up has to be rearranged so that, when the weaver treadles tr 1, tr 2, tr 3, tr 4, tr 5, tr 6, tr 7, tr 8, consecutively, neither the weft nor the warp produces diagonal lines of floats. The long floats should appear scattered when looking at the weave structure. This results in a smooth texture with special light reflecting properties.

In the case of sateen (weft satin) a single warp end, called the binder, holds down the weft float. The position of these binders give the scattered appearance of the weft floats. The spacing of these binders from one pick to the next is called an interval. In our example, the interval is 5.

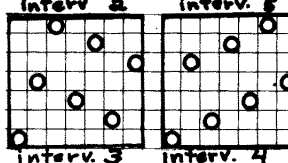
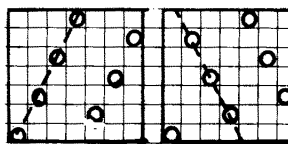
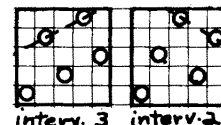
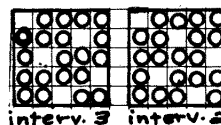
The interval is determined by the following rule: Divide the number of harnesses on which a satin or sateen has to be made into two unequal parts, so that



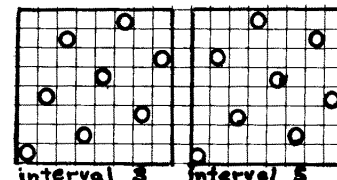
one shall not be a measure of the other and not divisible by the same number. One of the numbers cannot be 1.

- Examples: 4 harnesses - no intervals
 5 harnesses - 2 + 3
 6 harnesses - no intervals
 7 harnesses - 2 + 5, 3 + 4
 8 harnesses - 3 + 5
 etc.

For 5 harnesses there is one warp satin and one weft satin tie-up. The interval is 2 (or 3). The difference between interval 2 and interval 3 is in the direction in which the binder points are oriented.



7H Sateen



8H Sateen

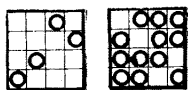
For 7 harnesses there are two warp and two weft satin tie-ups.

Interval 2 (or 5). Interval 3 (or 4).

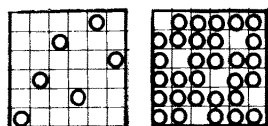
For 8 harnesses there is one warp and one weft satin tie-up.

Interval 3 (or 5).

On 4 and 6 harnesses there is no regular satin but, a satin effect is produced by using the following broken twill tie-ups.



4H irregular satin

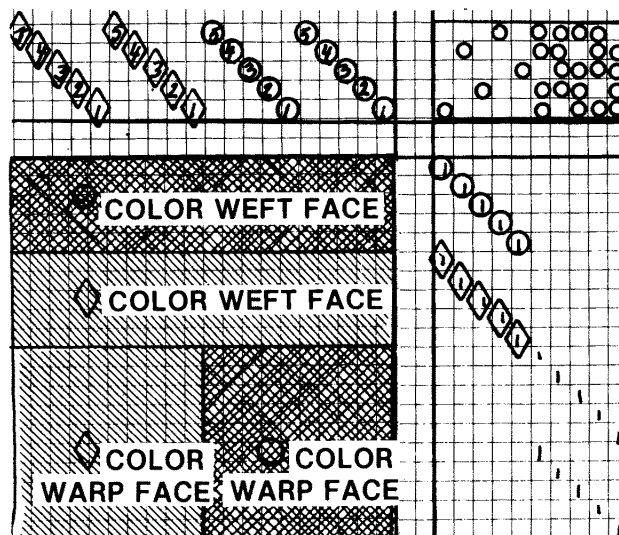


6H irregular satin

Satin weave has many practical uses for the handweaver. One can produce a warp face or a weft face fabric that is not stiff and tight. In fact, one can produce a warp face and a weft face fabric on the same warp. See 5 harness example.

The sett for satin should be somewhat closer than for twill.

Satin has its greatest application in damasks which are fabrics in which a pattern of weft satin stands out against a background of warp satin. Pick-up damask can be done with a small number of harnesses. A form of irregular pick-up damask using 4 harness irregular satin can be done on a 4 harness loom.



5H Example of satin and sateen woven on the same warp



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Inkle Pattern for Belts and Neckties

Usually when one weaves inkle bands, every other warp thread passes through a string doupe.



Fig. 1

Fig. 1 shows an inkle band threading diagram in which sometimes two adjacent warp threads are threaded through doupes while other adjacent threads are not. These double threads cause patterns to stand out better against the background as shown in the close-up of Plate 2.

These double threads are also useful when shaping inkle woven neckties; see Plate 3.

Start weaving at the widest end of the tie. To shape the tie one can decrease the number of warp threads by gradually cutting the second warp thread of the pairs. The pattern and the necktie will narrow down without altering the continuity of the design. These cut warp threads are later darned back in. The necktie is also shaped by pulling the weft tighter. To broaden the tie at the other end, the weft is relaxed again. A row of fine machine stitching prevents the tie from unravelling. The belt and necktie illustrated here are woven with $2/2\frac{1}{2}$'s tapestry worsted.



Plate 1

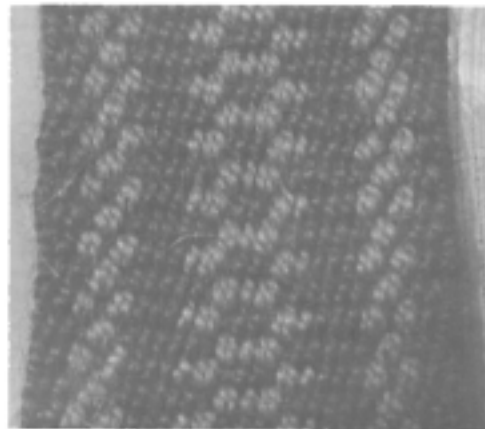


Plate 2 - Close-up

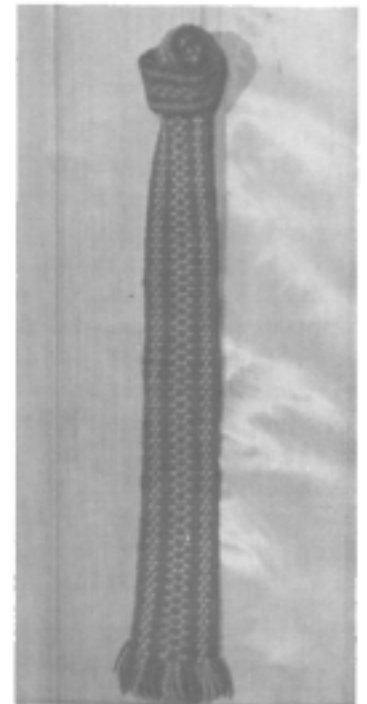


Plate 3 - Necktie

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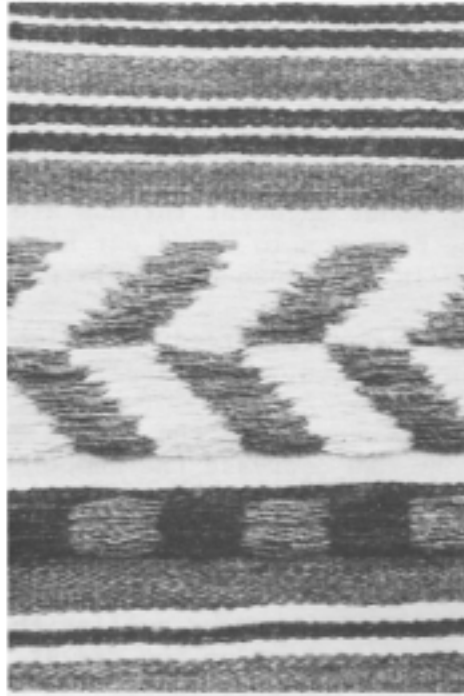
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Complimentary-Weft Plain Weave— A Pick-up Technique

by Janet Hanley



Birdwalk



Back: showing weft floats



Amtrak

The past summer I attended a workshop on rug weaving given by Ed Oppenheimer. I was particularly interested in the possibilities created by using pick-up techniques on a straight draw twill. The technique which I used to weave the tapestries illustrated here is referred to by Irene Emery as "two-faced weave with complementary sets of weft with plain weave on one face", and by Peter Collingwood as "skip plain weave." It can be woven on a plain weave threading and on straight draw twill. (See Fig. 1.)

For a pick-up stick I used a 3/8" (9.5 mm) wooden dowel sanded to a point at one end. Also at the lumberyard I found an inexpensive shed stick; a 2 1/4" (67 mm) wide length of door molding. (See Fig. 2.)

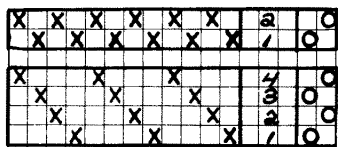


Fig. 1

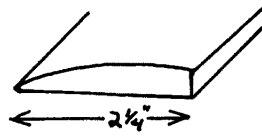


Fig. 2

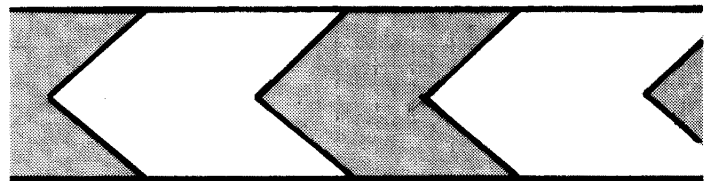


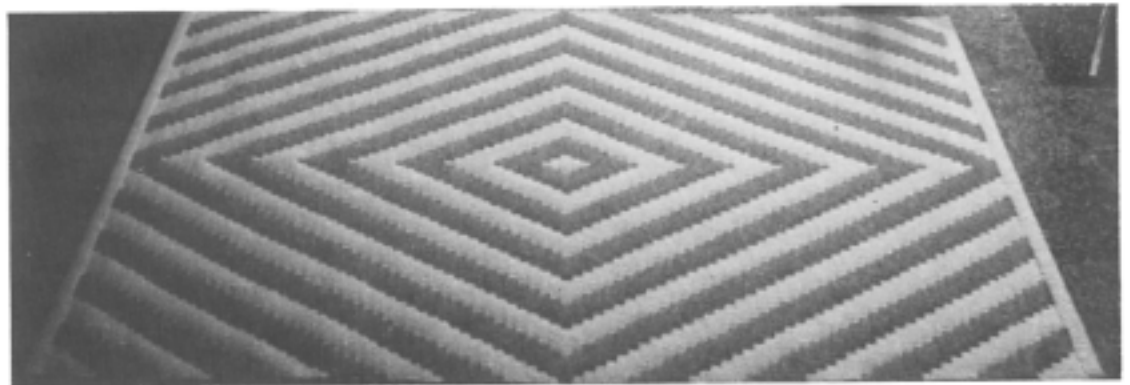
Fig. 3

My loom was warped at 5 epi (20/10 cm) with 2/12 wool from Clagsens and was ready for a weft-face, plain weave rug with complementary wefts A and B, using my own handspun dark and light gray Romney and white Border Leicester. I am sharing my experiences of weaving the tapestries illustrated here with pick-up designs.

A design, such as the one in Fig. 3, is woven with two wefts which together are equivalent to one plain weave pick. When the plain weave shed *a* is opened, weft A passes in and out of the bottom layer of the shed. This is followed by a shot of weft B which runs the opposite course. (See Fig. 4). The main limitation of this technique is that the unseen weft floats on the back should not be allowed to be longer than about two inches (5 cm).



Static



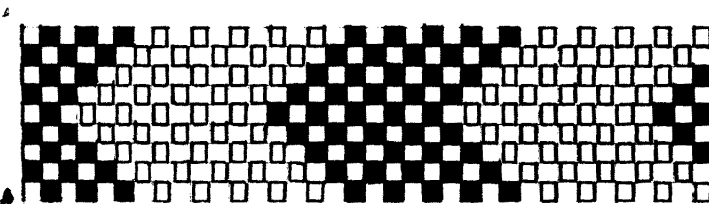
Switchback

For the tapestry called "Static" I used for weft a 3 ply rug wool from Henry's Attic.

Viewed from the side the bands look distorted; a fascinating bonus discovered only after the rug was taken off the loom! It is a very strong, vigorous design.

In the tapestry called "Switchback", the diagonal lines appear to be sculptured; this is obviously an effect due to the tension of the floating wefts on the back.

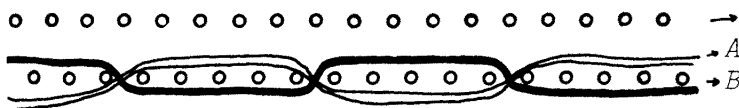
Due to the double thickness of weft, these rugs are most suitable for use on the floor. The ends have a tendency to curl so I begin and end the rug with 3" (7.5 cm) of plain weave which I hem under so that the double thickness matches the rest of the rug. Inside these hems I insert heavy steel rods; one with holes so the rug may be hung. A 38" x 60" (96 x 153 cm) rug uses approximately 9 lb. (4 kg) of weft.



Structure of cloth face



Structure of cloth back



Shed a - even warp ends up

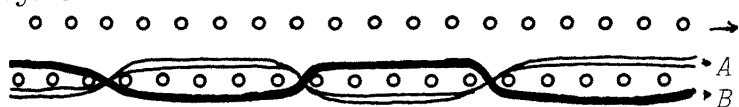
Top layer of plain weave shed

Bottom layer of plain weave shed



Cross section after shed a is closed

Shed b - add warp ends up



Top layer of plain weave shed

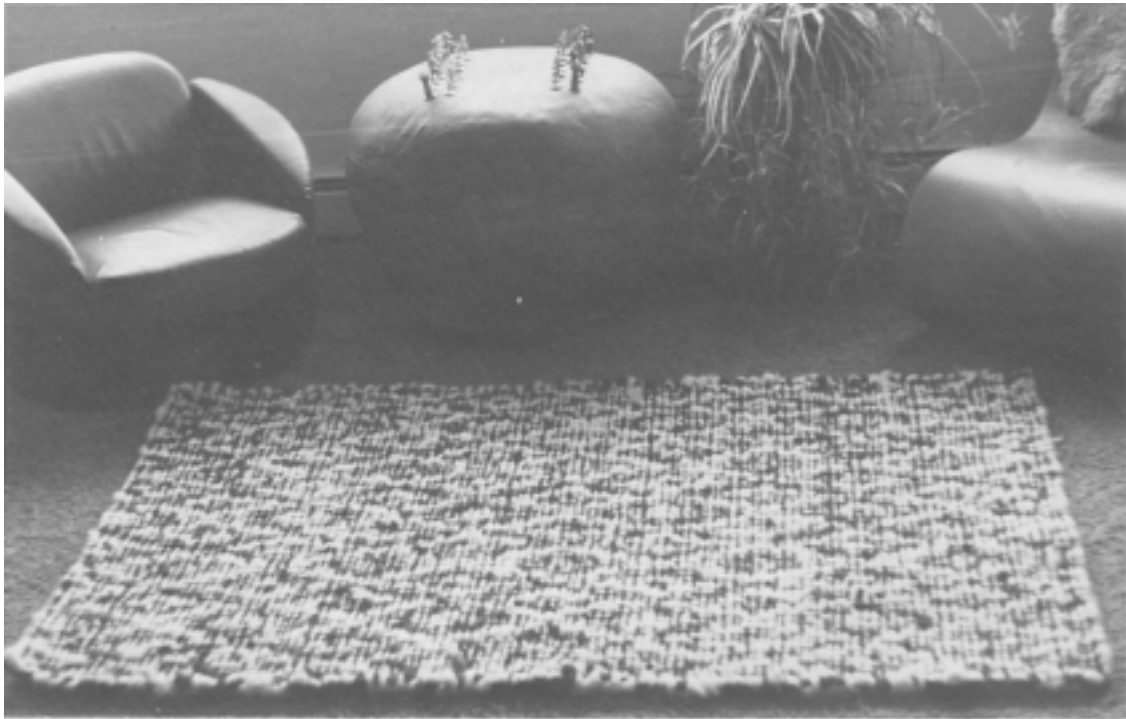
Bottom layer of plain weave shed



Cross section after shed b is closed.

Fig. 4

Shadow Weave Rug on Four Harnesses



The structure of shadow weave is basically plain weave with some short floats which are responsible for the pattern. Classically, it is a 50/50 weave with as many epi as ppi and there is an alternation of two colors, both in the warp and in the weft order.

Shadow weave can be woven weft face to make rugs. It is an ideal weave for very thick yarns and a strong linen warp.

The weft in the rug illustrated is Alpen Light Wollspinnerei yarn from Green Tree Ranch, Colorado, in natural white and natural dark brown. These wefts are alternated during the weaving in a pick and pick order. When plain weave is woven in pick and pick, one creates a design with vertical pinstripes. In shadow weave the short floats in the weave structure cause these pinstripes to shift during the weaving process; this creates subtle designs very suitable for rugs. The heavy slubs of the Alpen Light yarn give additional texture to the pick and pick stripes.

WARP: 8/3 or 8/5 linen used twofold
(approx. 1 lb. (450 g.))

WEFT: Alpen Light Wollspinnerei yarn
in white and dark brown, (approx.
7 lbs. (3.2 kg) of each).

SETT: 3 doubled warp threads per inch.
(12/10 cm).

SELVEDGES: The first two and last two
warp ends are quadrupled, no
floating selvedge is used.

WIDTH IN THE REED: 50" (125 cm)

LENGTH OF THE WARP: 3 yards (2.74 m)

LENGTH OF THE FINISHED RUG: 6½'
(1.96 m)

THREADING AND TIE-UP: (See Fig. 1).

Note: The threading shows dark and light squares so that the weaver can recognize the two superimposed twills of the shadow weave draft design, but in weft

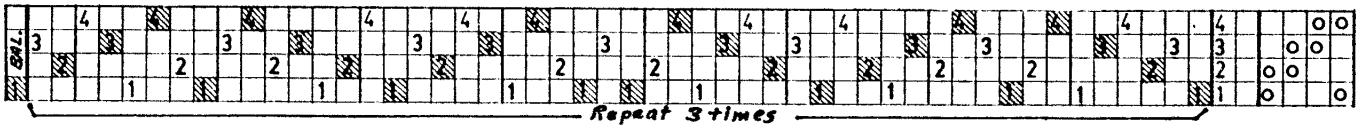


Fig. 1

face shadow weave all the warp threads are the same yarn and color.

The last pick is the center of the rug; at this point, go through the entire sequence in reverse order.

TOTAL NUMBER OF ENDS: 151 double threads plus 8 double threads to reinforce the selvedge.

SELVEDGES:

The weft yarn A which would normally lie on top of the outer warp end (See Fig. 2) is brought under that warp end (Fig. 3a). After B has been woven (Fig. 3b), the weft yarn A is wrapped around the first warp end to compensate for B (Fig. 4).

WEAVING:

- tr 1 Wh tr 3 Dk 3X
- tr 2 Wh tr 4 Dk 3X
- tr 3 Wh tr 1 Dk 3X
- tr 4 Wh tr 2 Dk 3X
- tr 1 Wh tr 3 Dk 3X
- tr 4 Wh tr 2 Dk 3X
- tr 3 Wh tr 1 Dk 3X
- tr 2 Wh tr 4 Dk 3X
- tr 1 Wh tr 3 Dk 3X
- tr 2 Wh tr 4 Dk 3X
- tr 3 Wh tr 1 Dk 3X
- tr 4 Wh tr 2 Dk 3X
- tr 1 Wh tr 3 Dk 3X, tr 1 Wh
- tr 2 Dk tr 4 Wh 3X
- tr 1 Dk tr 3 Wh 3X
- tr 4 Dk tr 2 Wh 3X
- tr 3 Dk tr 1 Wh 3X
- tr 4 Dk tr 2 Wh 3X
- tr 1 Dk tr 3 Wh 3X
- tr 2 Dk tr 4 Wh 3X
- tr 3 Dk tr 1 Wh 2X

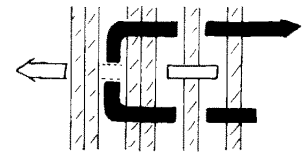
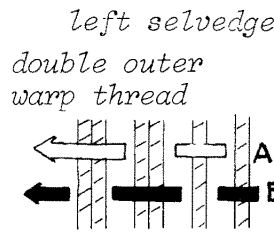


Fig. 3b

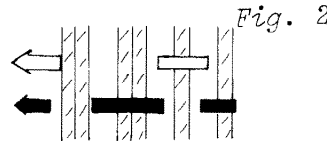


Fig. 3a

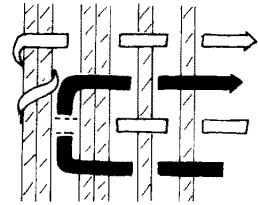


Fig. 4

FINISHING:

A double strand of warp yarn was twined over the fringe. The fringe was then knotted to form a Damascus edge. The ends were darned back into the rug.

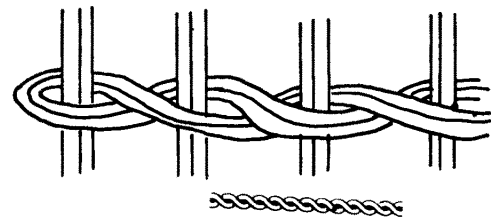


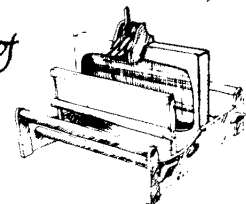
Fig. 5

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Vancouver, B.C., Canada V6R 2G5



Write for our FREE catalogue on our large selection of spinning and weaving equipment.
Sturdy Drum Carder \$95. in kit form.
22" Table Loom \$160. in kit form. Folds flat like a suitcase while warp is on.



Book Reviews

A HISTORY OF TEXTILES by Kax Wilson, 1979. Westview Press, Inc., Boulder, Co. Hardbound, 357 pp. \$25.00.

This book is designed as a textbook to be used by students in many disciplines such as anthropology, sociology, archaeology, economics, and history. Yet the persons involved directly with textile art and production, whether they be craftspeople, collectors or curators will find this well-documented reference book invaluable. The book is well illustrated with drawings and photographs.

Part I deals with the history of fibers, textile equipment and techniques. Part II deals with "world textiles." Here, the author elaborates on the textile development in selected places during times of history when textiles had far-reaching artistic, economic and social impact. These places include the Near-East, Southern Europe during medieval times, the Far-East, Northern Europe, Colonial America, 19th Century America, the American Southwest and South, and Middle America.

Great emphasis is put on the manufacture of textiles and the evolution thereof.

Each chapter of the book has its own extensive bibliography which enables the reader to do further research on the subject matter that has been discussed.

WEAVE WITH STYLE by Jean Wilson, 1979. Madrona Publishers, Inc. Seattle, WA., paperbound, 90 pp. \$7.95.

This book deals with wearable weaving. It does not contain patterns although the numerous illustrations (some in color) show the construction of the garments with enough detail that patterns could be made from them. The author deals with the thought processes that a weaver should follow in order to produce successful woven garments. She emphasizes the planning aspect; not only should one think of the function of the garment but also its compatibility with the weaver's style. She

also stresses the importance of basically classic garments which can be adapted to changing fashion trends. The author discusses the structure of certain fabrics and gives many helpful hints for weaving, sewing and finishing. She has also suggestions for incorporating other fiber techniques such as crochet and embroidery.

WEAVE AND WEAR IT by Ellen Andes, Penelope Drooker and Gene Andes, 1979, Andes Quality Yarns, New Hampshire, 24 pp. paperbound, \$4.25.

This 8½ x 11" magazine size book has a subtitle "Projects for the Handweaver I: Outerwear", which suggests that this is the first of a series of "how-to-do-it" publications. This part deals with warm sportswear woven with wool. There are eleven projects, some with variations. Most are ponchos, vest and tabards. They all are woven with Harrisville Designs yarns.

The instructions are easy to follow except that the tie-up uses X for rising and o for sinking shed which is the opposite of the standard convention.

BASKETRY TODAY WITH MATERIALS FROM NATURE by Dona Meilach and Dee Menagh, 1979. Crown Publishers, Inc., N.Y., 200 pp. paperbound. \$7.95.

This is one of the most useful and inspiring books published on basketry in recent years. It is mainly written for the contemporary craftsperson who wants to learn about natural materials suitable for making baskets and about the techniques to create three dimensional forms. The book deals with the gathering, storing, preparing and dyeing of numerous plants for basketmaking, many of which are easily accessible. Among the many basketry techniques described are weaving, plaiting, twining, coiling, and pine needle baskets. The excellent instructions are enhanced by drawings, photographs and charts. This book is a good source for the "how-to-do-it" but also stimulates the creativity of the craftsperson. Many illustrations show new and exciting approaches to basketmaking.

Clotilde Barrett



Boundweave rug woven on opposites using the "Wheels of Fortune" threading draft.

Designing Rugs for Harness-Controlled Weaving

The design ideas for rugs and tapestries often come from nature or from our man-made environment. Landscapes, scenes, people, animals, and flowers are usually translated into figurative weavings or are abstracted to various degrees so that the original images become merely a composition of lines and shapes. This is mostly true for hand manipulated tapestries. However, if one designs for loom control, the approach toward design is somewhat different. Although the weaver still finds inspiration in nature, he has to accept the fact that the images that can be produced by loom control are limited to certain types of patterns.

Harness controlled weaving results in specific fabric structures with characteristic textures that are caused by warp and weft floats. These fabric structures and the color effects on them are the

foundation of the design and are directly related to the number of available harnesses. The loom determines the type of patterns on which the design of a rug should be based.

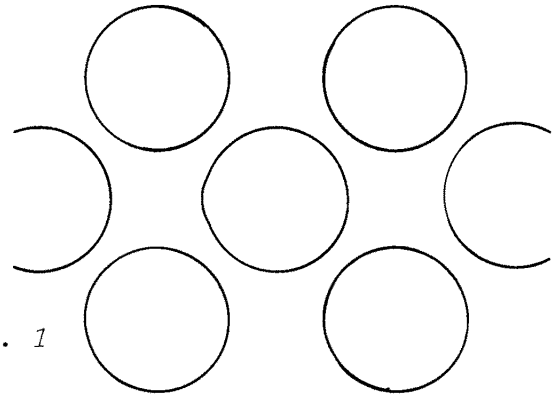


Fig. 1

This article is going to explore the design possibilities of one such pattern: The circles of Fig. 1. The overshoot

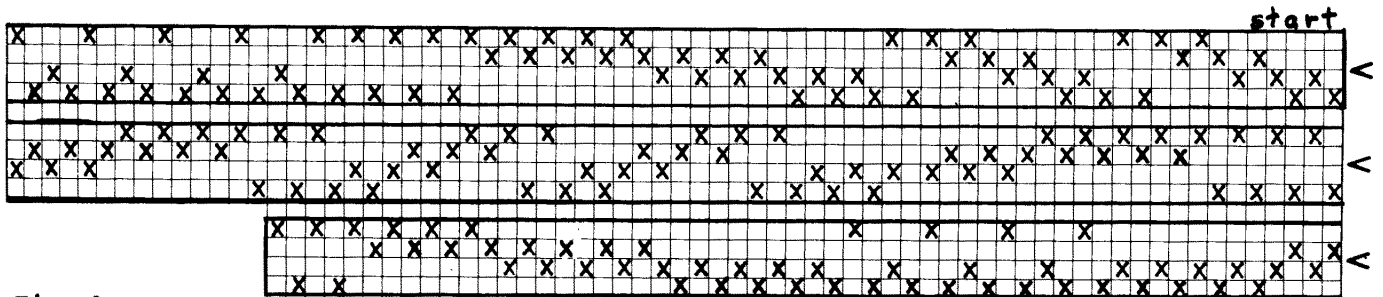


Fig. 2

version of this pattern is known as "Wheels of Fortune" or "Cup and Saucer."* The overshot draft is shown in Fig. 2. This study will deal with weft face structures whose design is based on this draft.

FOUR HARNESSES

WEFT FACE STRUCTURES BASED ON OVERSHOT THREADING USING THE PATTERN OF THE "WHEELS OF FORTUNE"

With setts of 5 or 6 epi (20 or 24/10 cm), which are recommended for these rugs, the threading of Fig. 2 has to be modified to avoid long weft floats. Fig. 4 shows a variation of the "Wheels of Fortune" draft suitable for various types of boundweave rugs.

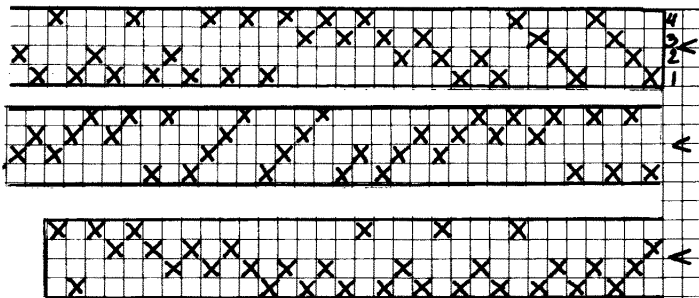
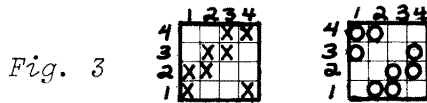


Fig. 4

A. BOUNDWEAVE

When the threading of Fig. 4 is woven as boundweave, the warp is set far enough apart so that the fabric is weft face. One uses the standard twill tie-up of Fig. 3 and weaves without tabby.

BOUNDWEAVE RUG WOVEN ON OPPOSITES.

This type of rug is woven with two shuttles, one carrying color A, the other, color B. Color B always follows color A and is thrown in the opposite shed.

Treadling order with tie-up shown in Fig. 3:

* Atwater, Mary Meigs, *Shuttle Craft Book of American Hand Weaving*, The Macmillan Co., N. Y. Seventh Printing, 1966.

Col. A	Col. B	Col. A	Col. B
tr 1	tr 3	tr 1	tr 3
tr 2	tr 4	tr 2	tr 4
tr 3	tr 1	tr 3	tr 1
tr 4	tr 2	tr 4	tr 2
tr 1	tr 3	tr 1	tr 3
tr 2	tr 4	tr 2	tr 4
tr 3	tr 1	tr 3	tr 1
tr 4	tr 2	tr 4	tr 2

continue next column

center of 1st wheel

At this point, reverse the treadling sequence, i.e. start reading from bottom to top and from right to left: tr 1 (A),

tr 3 (B)	tr 1 (A)	tr 2 (B)	tr 4 (A)
3X		6X	

etc., then continue as follows:

Col. B	Col. A	Col. B	Col. A
tr 2	tr 4	tr 2	tr 4
tr 1	tr 3	tr 3	tr 1
tr 4	tr 2	tr 2	tr 4
tr 3	tr 1	tr 2	tr 4

continue next column

center of 2nd wheel

At this point reverse this section of the treadling sequence. This completes a full repeat.

BOUNDWEAVE RUG, WOVEN ITALIAN FASHION.

This type rug is woven with three shuttles, one carrying color A (the dominant color), the others B and C.

There are several treadling methods for weaving this type of rug. The treadling for the rug illustrated is given here.

Treadling order with tie-up shown in Fig. 3:

Color A	Color B	Color C	Color A
tr. 1	tr. 2	tr. 4	tr.
1	2	4	
1	2	4	1
2	3	1	
2	3	1	2
3	4	2	

continue next column



Three-color boundweave rug woven in Italian fashion using the "Wheels of Fortune" threading draft. By Clotilde Barrett

Color A	Color B	Color C	Color A
3	4	2	3
4	1	3	
4	1	3	4
1	2	4	
1	2	4	1
2	3	1	
2	3	1	2
3	4	2	
3	4	2	3
4	1	3	
4	1	3	
4	1	3	4
1	2	4	
1	2	4	
1	2	4	1
2	3	1	
2	3	1	
2	3	1	
2	3	1	2
2	3	1	
3	4	2	
3	4	2	
3	4	2	
3	4	2	
3	4	2	3
3	4	2	
4	1	3	
4	1	3	

continue next column

Color A	Color B	Color C	Color A
4	1	3	
4	1	3	
4	1	3	
4	1	3	
4	1	3	4
1	2	4	
1	2	4	
1	2	4	
1	2	4	
1	2	4	1
4	1	3	
4	1	3	
4	1	3	
4	1	3	4
1	2	3	
1	2	3	

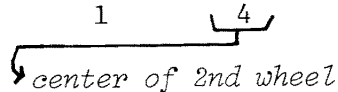
center of 1st wheel

At this point, reverse the treading sequence by reading from bottom to top and from right to left, thus read tr 3 (C), tr 2 (B), tr 1 (A), tr 3 (C), tr 2 (B), tr 1 (A), etc. Always check at the top of the columns to see what color should be thrown in the shed. Then continue as follows:

Color A	Color C	Color B	Color A
tr. 4	tr. 3	tr. 1	tr.
4	3	1	

continue next column

Color A	Color C	Color B	Color A
4	3	1	
4	3	1	4
3	2	4	
3	2	4	
3	2	4	
3	2	4	
3	2	4	3
2	1	3	
2	1	3	
2	1	3	
2	1	3	
2	1	3	2
1	4	2	
1	4	2	
1	4	2	
1	4	2	
1	4	2	
1	4	2	1
4	3	1	
4	3	1	
4	3	1	4
1	4	2	
1	4	2	
1	4	2	1
4	3	1	
4	3	1	4



At this point, reverse this section of the treadling sequence, thus reading: tr 1 (B), tr 3 (C), tr 4 (A), etc., and throw the color marked at the head of the column. This completes a full repeat.

BOUNDWEAVE RUG EXPLORING OTHER DESIGN POSSIBILITIES OF THE WHEEL OF FORTUNE THREADING.

In order to study fully the design possibilities of a given threading it is useful to start out by weaving a "key" to the design using two contrasting colors, A (dark) and B (light). The "key" will show the block arrangement of the draft.

Treadling to weave a "key" with the tie-up shown in Fig. 3:

	tr. 1	tr. 2	tr. 3	tr. 4	
Color	A	B	B	B	3X
	B	A	B	B	3X
	B	B	A	B	3X
	B	B	B	A	3X

The design thus woven is copied on graph paper. (One square equals approximately 2 warp ends). Fig. 5 shows one repeat of the "key". Below this block diagram one creates original designs which can be woven on the same draft as the "key".

Section I shows a two color design.

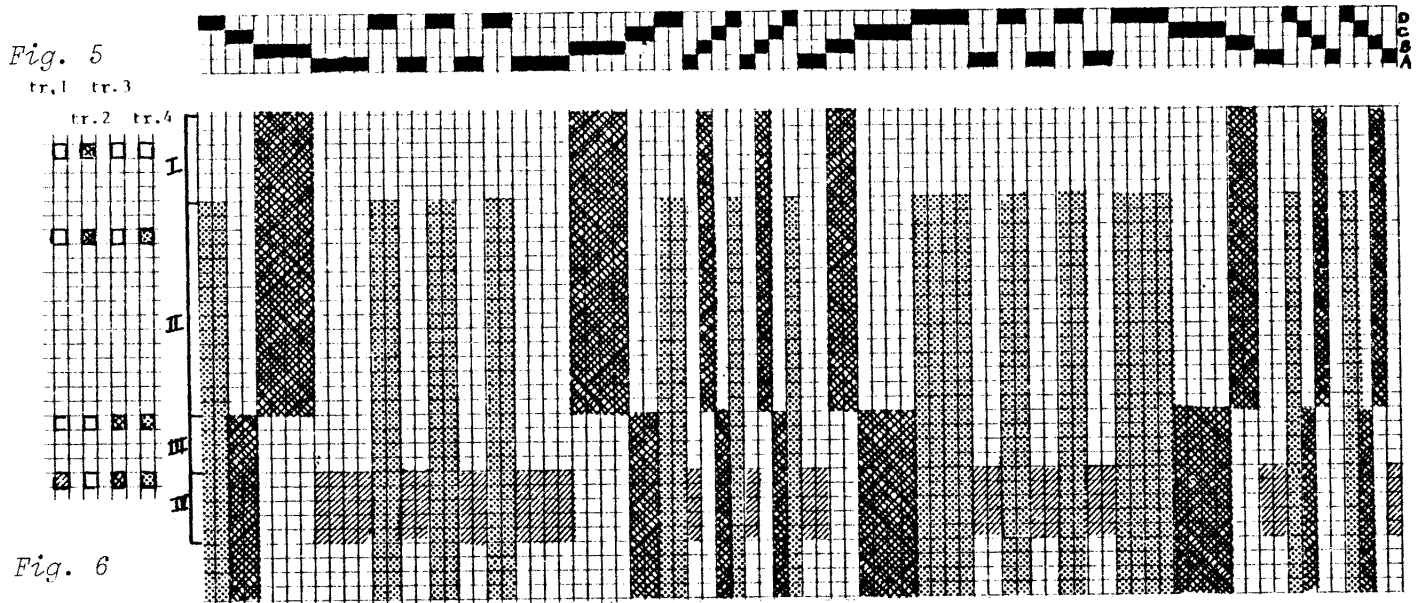
Blocks A, C and D are color
 Block B is color

Section II shows a three color design.

Blocks A and C are color
 Block B is color
 Block D is color



Boundweave rug using the threading draft of "Wheels of Fortune". Original design using a "key". by Clotilde Barrett



Section III shows a three color design.

- Blocks A and B are color
- Block C is color
- Block D is color

Section IV shows a four color design.

- Block A is color
- Block B is color
- Block C is color
- Block D is color

The treadling sequence for this type of weaving is tr. 1, tr. 2, tr. 3, tr. 4, throughout. Refer to tie-up of Fig. 3. The pattern is derived from color effects. At the left of Fig. 6 the colors are shown for each of the sections of the design.

All the boundweave rugs illustrated here are woven with a linen warp size 8/5 sett at 5 epi (20/10 cm). There are two full repeats and the pattern is balanced. The width in the reed is 52½" (133 cm). Floating selvages have been used. All boundweave rugs are started and finished with 2 picks of tabby in the background color.

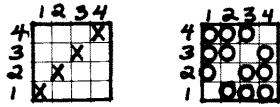
B. COMPLEMENTARY WEFT TABBY

This is another technique that can be used to design rugs in the threading shown in Fig. 4. The tie-up is shown in Fig. 7. Rugs woven in complementary weft tabby have no floats on the face and long floats on the back. It is not a reversible fabric. This type of rug is woven with two shuttles, one carrying color A, the other color B.



Complementary weft tabby rug using the "Wheels of Fortune" threading draft.

Fig. 7



Treading sequence for complementary weft tabby using the tie-up of Fig. 7:

Color A	Color B	Color A	Color B		
tr. 1	tr. 3	tr. 2	tr. 4	2X	
1	3			} repeat 2 times	
2	4	3	1		2X
2	4				
3	1	4	2		2X
3	1				
4	2	1	3		2X
4	2				
1	3	2	4		5X
1	3				
2	4	3	1		5X
2	4				
3	1	4	2	8X	
3	1				
④	2	①	3	8X	
④	2				
①	3	②	4	3X	
①	3				
④	2	①	3	3X	
④	2				
①	3	②	4	2X	
①	3				

This pair of picks is the center of the 1st wheel.

At this point, reverse the treading by reading the pairs from bottom to top and from right to left. The left treadle of the pair is woven first (A), then the right treadle (B). Thus, after the center pair tr.1, tr.3 is woven, reverse by weaving tr.2 (A) tr. 4 (B), then tr. 1 (A) tr. 3 (B), etc.

Then continue as follows:

Color A	Color B	Color A	Color B
tr. 4	tr. 2	tr.	tr.
1	3	4	2 5X
3	1		
4	2	3	1 5X
2	4		
3	1	2	4 8X
①	3		
②	4	①	3 8X
④	2		
④	3	④	2 3X
①	3		
②	4	①	3 3X
④	2	①	3 2X
4	2		

This pair of picks is the center of the 2nd wheel.

At this point, reverse this treading sequence by reading the pairs from bottom to top and from right to left. The left treadle of a pair is woven first (A), then the right (B).

This completes a full repeat.

The rug illustrated is woven on the same warp as the boundweave rugs. Three different colors have been used for A. This is indicated by □ and ○ in the treading sequence.

FOUR HARNESS WEFT FACE STRUCTURE BASED ON THE PATTERN "WHEELS OF FORTUNE" USING A "CRACKLE" THREADING.

In order to derive a crackle weave threading that produces a pattern of the "Wheels of Fortune", one has to start out by drafting the block structure of the pattern.

Figs. 5, 8 and 9 show several profile developments or block structures based on the "Wheels of Fortune." By replacing the units of these blocks by the appropriate units of "Crackle" weave and adding the necessary incidentals, one derives a four harness threading draft suitable for weft face weaving.

Fig. 8

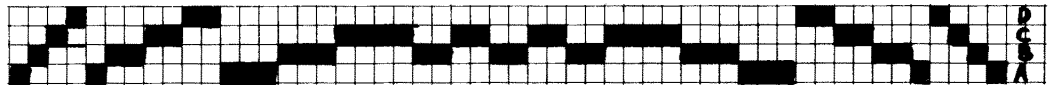




Fig. 9







The crackle units are:

Unit A , at the end of the A block an "incidental" warp end is added, threaded on H1.

Unit B , at the end of the B block an "incidental" warp end is added, threaded on H2.

Unit C , at the end of the C block an "incidental" warp end is added, threaded on H3.

Unit D , at the end of the D block, an "incidental" warp is added, threaded on H4.

*Crackle rug woven in blocks with the "Wheels of Fortune" pattern.
by Jean Anstine*

The resulting thread-by-thread draft is shown in Figs. 10 and 11. Threading 10, derived from profile 8, is suitable for a 40" (101 cm) rug sett at 6 epi (2510 cm). Threading 11, derived from profile 9, is suitable for a 45" rug sett at 6 epi (25/10 cm).

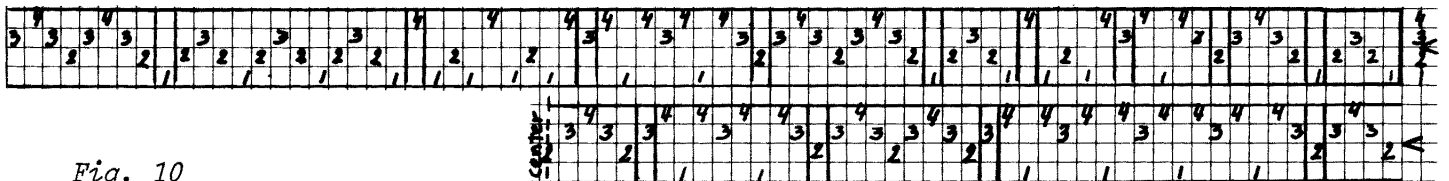


Fig. 10

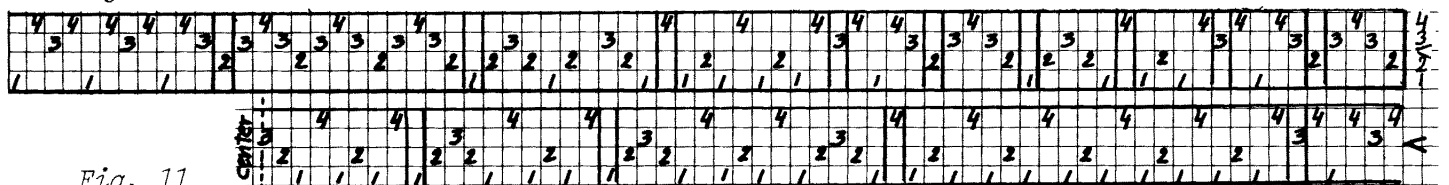


Fig. 11

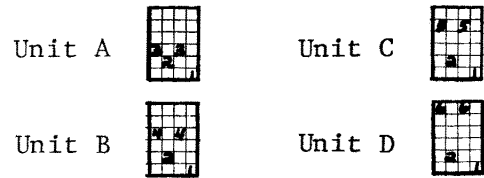


SIX HARNESS WEFT FACE STRUCTURE BASED ON THE PATTERN "WHEELS OF FORTUNE", USING A SUMMER AND WINTER THREADING

In order to derive a Summer and Winter threading for a pattern based on the "Wheels of Fortune" one has to start out by drafting the block structure of the pattern. Figs. 5, 8, 9 and 13 show several profile developments or block structures based on the "Wheels of Fortune". By replacing the units of these blocks by the appropriate units of "Summer and Winter" weave one derives a six harness threading draft suitable for weft face weaving.

*Crackle throw woven in blocks using threading 10.
by Nancy Commings*

The "Summer and Winter" units are:



CRACKLE RUG WOVEN IN BLOCKS:

Use two shuttles, one with color A, the other with color B. Follow each pick with color A by a pick in color B in the opposite shed.

If a seventh harness is available, an additional block E is added on each side for a solid background border. See Fig. 13.

Treadling sequence for the draft of Fig. 11 and the tie-up shown in Fig. 12.

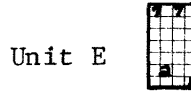


Fig. 12

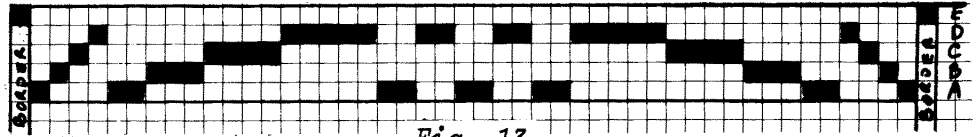
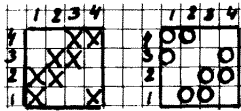
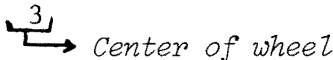


Fig. 13

Color	Color	Color	Color	Color	Color
A	B	A	B	A	B
tr. (1	3	2	4)	4X	1 3
(4	2	1	3)	4X	4 2
(3	1	4	2)	4X	3 1
(2	4	3	1)	4X	2 4
(1	3	2	4)	4X	1 3
(4	2	1	3)	4X	4 2
(3	1	4	2)	4X	3 1
(2	4	3	1)	8X	2 4
(1	3	2	4)	8X	1 3
(4	2	1	3)	12X	4 2
(3	1	4	2)	16X	3 1
(2	4	3	1)	20X	2 4
(1	3	2	4)	4X	1 3
(2	4	3	1)	4X	2 4
(1	3	2	4)	2X	} 3X
1	3	2	4)	2X	

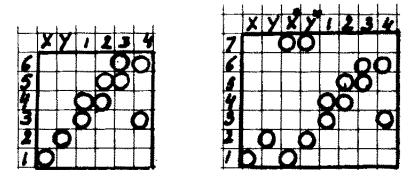


A solid border can enhance the design of the rug but most of all it gives a consistent and neater selvedge.

The thread-by-thread draft resulting from the profile 13 is shown in Fig. 14.

This threading is suitable for a 32" (81 cm) rug sett at 6 epi (25/10 cm). The tie-up is shown in Fig. 15.

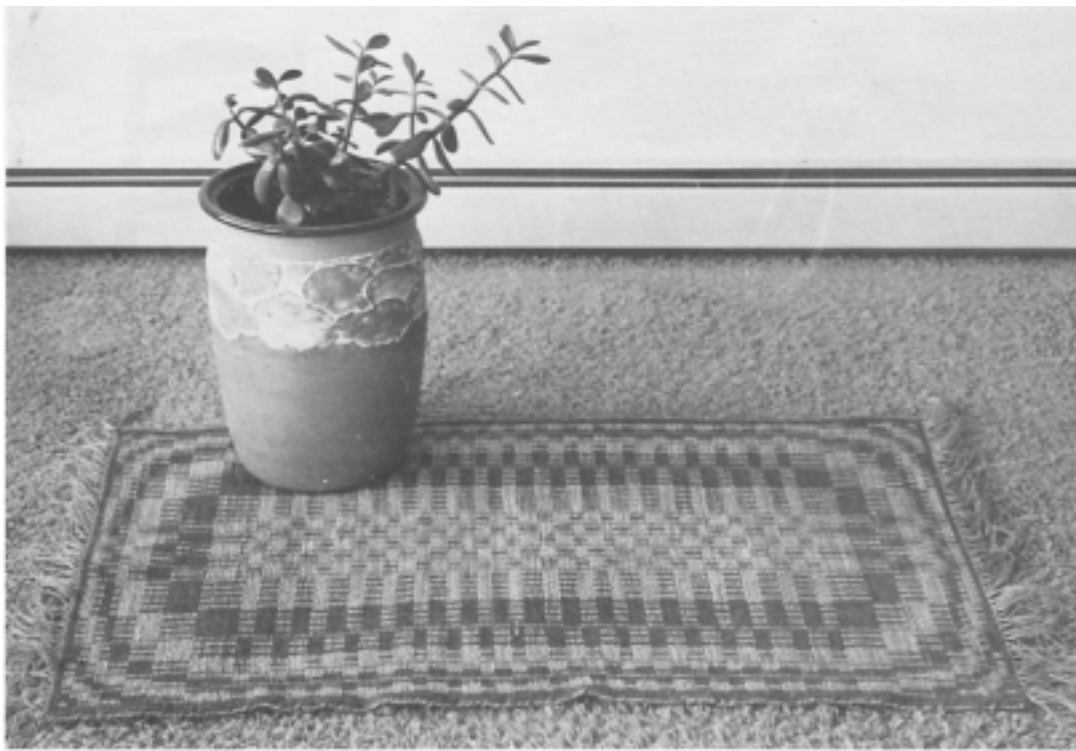
Fig. 15



6H tie-up 7H tie-up

At this point, reverse the entire treadling by reading from bottom to top and from right to left.

Treadling sequence for 6H or 7H rug referring to tie-up 15A and 15B for the treadles.



Summer and Winter rug based on the pattern
of "Wheels of Fortune" 6 or 7 harnesses.
By Clotilde Barrett

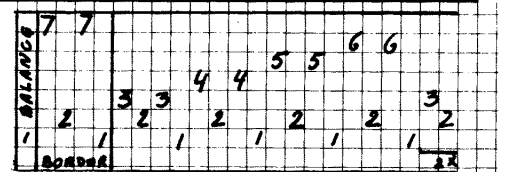
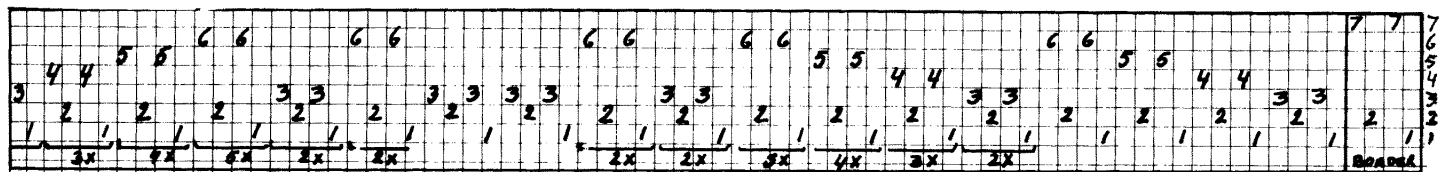


Fig. 14

	Color A	Color B	Color A	Color B	
tr. I	X + 4	X* + 2	Y + 3	Y* + 1	2X
	X + 4	X* + 2			
II	Y + 3	Y* + 1	X + 2	X* + 4	2X
	Y + 3	Y* + 1			
III	X + 2	X* + 4	Y + 1	Y* + 3	2X
	X + 2	X* + 4			
IV	Y + 1	Y* + 3	X + 4	X* + 2	2X
	Y + 1	Y* + 3			
V	X + 4	X* + 2	Y + 3	Y* + 1	5X
	X + 4	X* + 2			
VI	Y + 3	Y* + 1	X + 2	X* + 4	7X
	Y + 3	Y* + 1			
VII	X + 2	X* + 4	Y + 1	Y* + 3	9X
	X + 2	X* + 4			
VIII	Y + 1	Y* + 3	X + 4	X* + 2	11X
	Y + 1	Y* + 3			

IX	X + 4	X* + 2	Y + 3	Y* + 1	4X
	X + 4	X* + 2			
	Y + 1	Y* + 3	X + 4	X* + 2	4X
	Y + 1	Y* + 3			

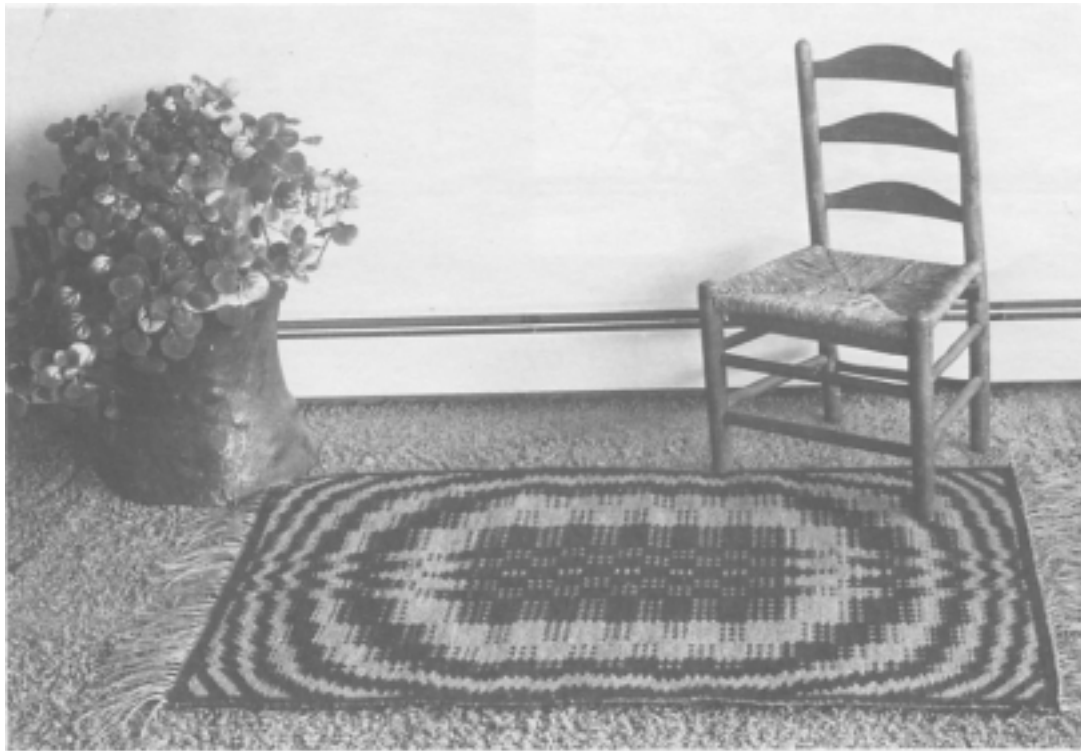
Repeat Section IX 17 times

X	X + 4	X* + 2	Y + 3	Y* + 1	4X
	X + 4	X* + 2			

Repeat sections VIII, VII, VI, V, IV, III, II, and I.

For 6H rug, ignore the *; for 7H rug, add a border!

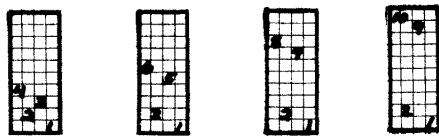
Color A	Color B	Color A	Color B
X	X + 5	Y	Y + 5 2X



Double Summer and Winter rug based on the pattern of "Wheels of Fortune" 10 or 12 harnesses. By Clotilde Barrett

TEN HARNESS WEFT FACE STRUCTURE BASED ON THE PATTERN "WHEELS OF FORTUNE" USING A DOUBLE SUMMER AND WINTER THREADING.

Using the block structure of the "Wheels of Fortune" shown in Fig. 13, one replaces the units of these blocks by the appropriate units of "double Summer and Winter". The double Summer and Winter units are:



Unit A. Unit B Unit C Unit D

If 12 harnesses are available, an additional block E can be added on each side for a solid background border.

Unit E is threaded



The resulting thread-by-thread draft is shown in Fig. 16. The tie-up for the rug illustrated is given in Fig. 17.

Treading sequence for a 10H or 12H rug is shown in Chart 1. Refer to the tie-ups of Figs. 17A and 17B for the treadles. Note that for a 10 harness loom, Y and Y*, X and X* are the same.

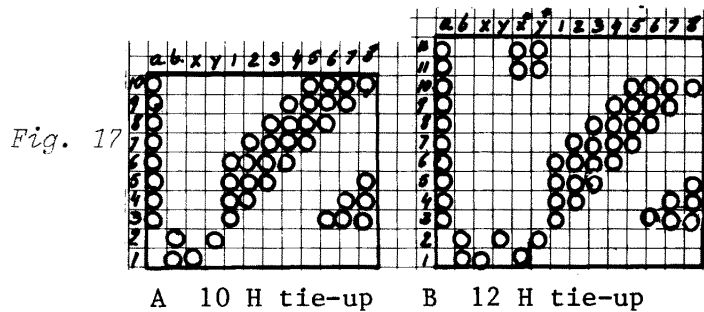
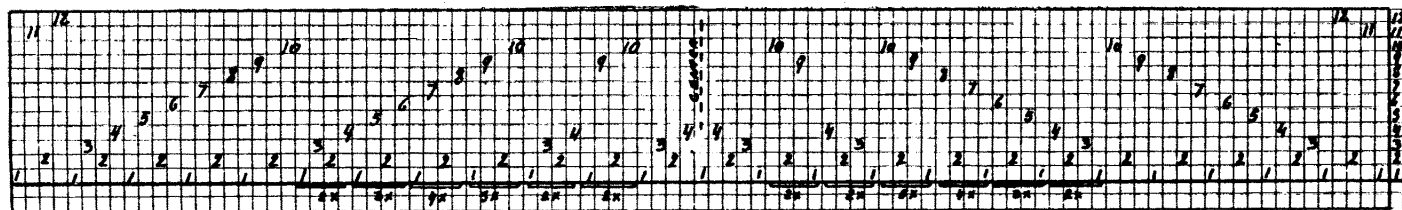


Fig. 17

Fig. 16



	Color A	Color B	Color A	Color B	Color A	Color B
	X + 5	X* + 1	Y + 4	Y* + 8	X + 3	X* + 7
	Y + 4	Y* + 8	X + 3	X* + 7	Y + 2	Y* + 6
	X + 3	X* + 7	Y + 2	Y* + 6	X + 1	X* + 5
	Y + 2	Y* + 6	X + 1	X* + 5	Y + 8	Y* + 4
I	X + 1	X* + 5	Y + 8	Y* + 4	X + 7	X* + 3
	Y + 8	Y* + 4	X + 7	X* + 3	Y + 6	Y* + 2
	X + 7	X* + 3	Y + 6	Y* + 2	X + 5	X* + 1
	Y + 6	Y* + 2	X + 5	X* + 1	Y + 4	Y* + 8

2X

	Color A	Color B	Color A	Color B	Color A	Color B	Color A	Color B	Color A	Color B	Color A	Color B
	X + 5	X* + 1	Y + 5	Y* + 1	X + 4	X* + 8	Y + 4	Y* + 8	X + 3	X* + 7	Y + 3	Y* + 7
	X + 4	X* + 8	Y + 4	Y* + 8	X + 3	X* + 7	Y + 3	Y* + 7	X + 2	X* + 6	Y + 2	Y* + 6
	X + 3	X* + 7	Y + 3	Y* + 7	X + 2	X* + 6	Y + 2	Y* + 6	X + 1	X* + 5	Y + 1	Y* + 5
	X + 2	X* + 6	Y + 2	Y* + 6	X + 1	X* + 5	Y + 1	Y* + 5	X + 8	X* + 4	Y + 8	Y* + 4
II	X + 1	X* + 5	Y + 1	Y* + 5	X + 8	X* + 4	Y + 8	Y* + 4	X + 7	X* + 3	Y + 7	Y* + 3
	X + 8	X* + 4	Y + 8	Y* + 4	X + 7	X* + 3	Y + 7	Y* + 3	X + 6	X* + 2	Y + 6	Y* + 2
	X + 7	X* + 3	Y + 7	Y* + 3	X + 6	X* + 2	Y + 6	Y* + 2	X + 5	X* + 1	Y + 5	Y* + 1
	X + 6	X* + 2	Y + 6	Y* + 2	X + 5	X* + 1	Y + 5	Y* + 1	X + 4	X* + 8	Y + 4	Y* + 8

sets of 4 picks

sets of 4 picks

sets of 4 picks

III Same as II but repeat each set of 4 picks 2 or more times:

Color A	Color B	Color A	Color B
X + 5	X* + 1	Y + 5	Y* + 1
X + 4	X* + 8	Y + 4	Y* + 8

2X

2X etc.

Color A	Color B	Color A	Color B
X + 2	X* + 6	Y + 2	Y* + 6
X + 3	X* + 7	Y + 3	Y* + 7

VI

2X

2X

3X

Repeat V, VI, V, VI

Color A	Color B	Color A	Color B
X + 5	X* + 1	Y + 5	Y* + 1
X + 4	X* + 8	Y + 4	Y* + 8
X + 3	X* + 7	Y + 3	Y* + 7

IV

2X

2X

2X

Color A	Color B	Color A	Color B
X + 2	X* + 6	Y + 2	Y* + 6

X + 2 X* + 6 Y + 2 Y* + 6

X + 2 X* + 6
Center of rug

Color A	Color B	Color A	Color B
X + 4	X* + 8	Y + 4	Y* + 8
X + 3	X* + 7	Y + 3	Y* + 7

V

2X

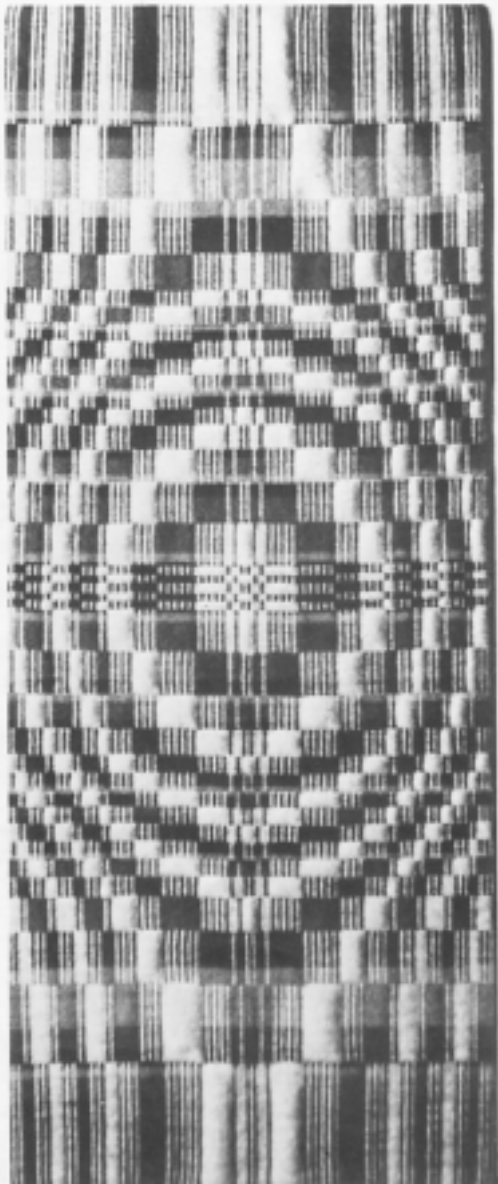
2X

3X

At this point, reverse the treading, reading from bottom to top and from right to left; thus, Y* + 6, Y + 2, X* + 6, X + 2, etc.

Chart 1

EIGHT HARNESS WEFT FACE STRUCTURE BASED ON THE PATTERN "WHEEL OF FORTUNE" USING DOUBLE WEAVE.



On the surface this double weave rug appears as plain weave but the fabric is definitely double cloth and the block area may be stuffed as shown in the tapestry illustrated. In order to derive a double weave threading for the "Wheels of Fortune" pattern one has to start out with the profile development or block diagram. See Fig. 18.

Figs. 5, 8, 9 and 13 show such block diagrams. Fig. 18 shows another variation which is used for the tapestry illustrated here. Each unit consists of 4 warp ends, two for each layer of the fabric. The warp ends of the upper layer have been circled.

The units are shown in Fig. 19.

However, when one works with a symmetrical pattern as in Fig. 18, adjustments have to be made to the unit at the point of reversal and on the left hand side of the pattern in order to maintain the symmetry of the pattern when it is woven.

Fig. 20 shows the thread-by-thread draft for one complete wheel. The entire pattern requires 286 ends plus reinforcement threads for the selvages. The warp is 20/2 linen sett at 12 epi (50/10 cm) (in a 12 dent reed, sley 2 ends per dent and skip a dent). The weft is a single spun tapestry yarn. Use a floating selvedge.

8 Harness double weave with the pattern of the "Wheels of Fortune".
By Clotilde Barrett

Fig. 18

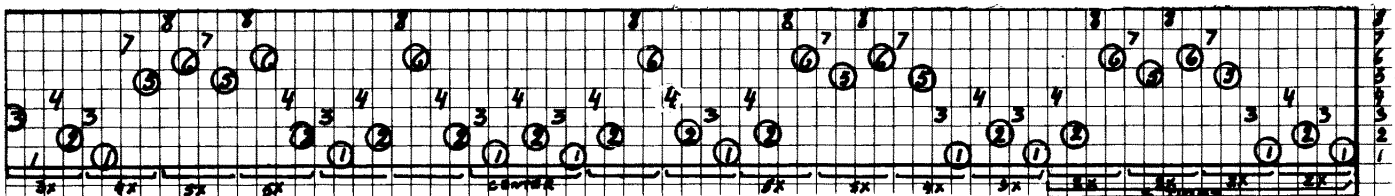


Fig. 19

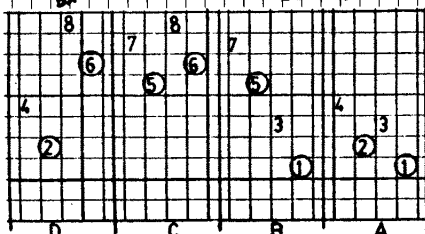
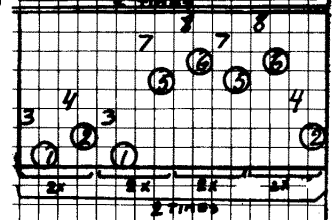


Fig. 20



The treadling order remains the same throughout: tr 1, tr 2, tr 3, tr 4. Refer to Fig. 21 for the tie-up. The rug is woven with two shuttles; one carries color B1, the other Wh and both shuttles are started on opposite sides of the rug.

To weave black in block A (pick and pick in blocks B and D and white in block C), weave:

tr 1	tr 2	tr 3	tr 4
B1	B1	Wh	Wh

To weave black in block B (pick and pick in block A and C and white in block D), weave:

tr 1	tr 2	tr 3	tr 4
B1	Wh	B1	Wh

To weave black in block C (pick and pick in blocks B and D and white in block A), weave:

tr 1	tr 2	tr 3	tr 4
Wh	Wh	B1	B1

To weave black in block D (pick and pick in blocks A and C and white in block B), weave:

tr 1	tr 2	tr 3	tr 4
Wh	B1	Wh	B1

The cloth is double with narrow columns running lengthwise. These can be stuffed. If one desires to close off the columns and make pockets, one could tie up an additional treadle to form a shed that is the opposite of one of the sheds of Fig. 21. For instance tie treadle 5 to Hs 1, 3, 4, 7. This shed can be woven with a fine neutral weft whenever one wishes to close off the columns.



Fig. 21

The production of all the rugs described here does not exhaust the study of weft face fabrics based on the "Wheels of Fortune" pattern. Through the interplay of color and changes in size and proportions, many variations are possible.



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How to Scour Silk

by Kay Bromberg

Silk is one of the most elegant and durable of all natural fibers, yet unfortunately it is missing from the vast array of materials available to American weavers. As a result, little is known here about silk weaving techniques. In Japan, however, despite the development of synthetic fibers and increasing mechanization, the tradition of weaving silk by hand still flourishes. A Japanese woman may choose a polyester dress for excursions around town, but when it comes to formal occasions, only a silk kimono will do--and preferably one that is hand-woven and hand-dyed. Thanks to millions of women like her, techniques for preparing and working with silk are still very much a part of the modern Japanese weaver's skills.

Professional and amateur weavers in Japan can obtain silk yarn in a variety of sizes (from 21D and up), and textures, from companies which specialize in silk. Usually when silk is ordered directly from a yarn company, it will be delivered in its untreated or "raw" form; very stiff, hard, and ranging in color from dark beige to white. It looks and feels much like linen. Raw silk is actually an animal fiber which consists of two protein substances, sericin and fibroin. Only after it has been treated and the sericin removed does it become soft, lustrous, and change color to pure white. This treatment to remove the sericin is called scouring. Upon request, the yarn company will scour an order of silk yarn--usually quite satisfactorily. But occasionally, when large quantities are processed, the yarn may be scoured too much or unevenly. Consequently, many weavers prefer to scour their own silk, particularly if they want only a partial scouring, removing some, but not all, of the sericin. A partial scouring results in a somewhat stiffer, fuller-bodied fiber, one which is more appropriate for certain uses and fabrics. Depending on how much sericin is removed, this process is referred to as half-scouring or quarter-scouring or other fractional scouring. Silk can also be scoured after it has been

woven into cloth, but it is much more likely that the resulting finish will be uneven. This technique is, however, used to make certain types of crepe.

HOW TO SCOUR SILK

The following information is based mainly on a book by Murano Keiichi of the Sericulture Experimental Station, Tokyo.¹

Although there are a number of different scouring methods, soap scouring is the most widely used. The following materials are necessary:

sodium carbonate crystals
($\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$)
lye soap (alkaline)
water
cloth bag
stainless steel vat

First, prepare a bag made of loosely woven linen or cotton; cheesecloth, for example. The bag should be about six inches longer than the skein being treated and wide enough to hold up to 400-500 grams of silk. See Fig. 1. The bag minimizes tangling and damage to the yarn. (It is important to remember that silk yarn is very fine and tangles easily. Rough treatment can do irreparable damage.)

"Hard" water, water containing calcium or magnesium, reduces the effectiveness of the soap and can result in uneven scouring and dyeing. It can also adversely affect the texture and luster. Boiling the water will soften it considerably, but chemical softening is the most reliable method.

In the following recipes, the numbers show the proportion to the weight of fiber.

Water softening

2% sodium carbonate crystals (2 parts sodium carbonate to 100 parts fiber)

40 X water (40 parts water to 1 part fiber)

Boil vigorously in a stainless steel vat for twenty minutes.

Prepare the yarn by passing a thick cotton string through two or three skeins. Make a generous loop with the string and

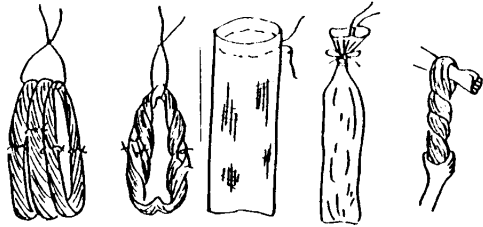


Fig. 1

knot it so that the skeins are held, but not bound together. See Fig. 1. Twist all of the skeins together, loosely turning them inside out several times. Place the yarn in the bag, but leave the ends of the knotted string outside. Tie another string tightly around the mouth of the bag and the knotted string inside, making sure that the skeins will not fall completely into the bag or out of it. If that happens, the silk will tangle into tight little balls.

Scouring

20% lye soap (shaved into flakes)
40 X softened water

Add the soap to the softened water. When the soap has dissolved, gently place the bag into the water. Reduce the heat so that the water does not boil over. Briquettes are better than gas for producing just the right kind of slow, dull heat. Simmer for one to two hours. The bag must be turned over periodically and submerged to prevent an uneven scouring which will result if air gets into the bag or the bag floats to the surface. Turn it over every ten or fifteen minutes. Be sure to handle the bag gently.

After about 45 minutes, remove the bag from the water and wring it lightly using rubber gloves. Open the bag and carefully rotate the yarn by a quarter turn. Shifting the position of the yarn gives it equal exposure to the restrictions of the bag and the cotton string holding the skeins together. At this time, also check the condition of the silk to see how far the scouring has progressed. The time required for scouring will depend on the type of silk and can be determined by feeling the fibers; the stiffer the fiber, the more time needed. On the other hand, if the fiber feels limp, it has been over-scoured. And if the fiber feels "squeaky" clean, then it has been fully scoured and needs no further scouring treatment. If the yarn requires more scouring, reclose the bag and return it to the vat. Contin-

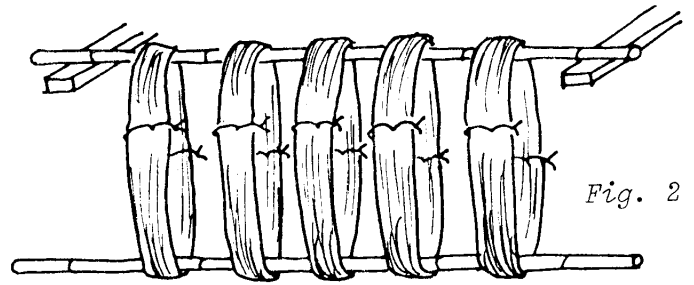


Fig. 2

ue to simmer, turning the bag over every ten or fifteen minutes until the silk has reached the desired degree of scouring. If the silk is to be dyed and starched, it is best to stop short of a full scouring, since these later steps will also remove sericin from the fiber.

When the yarn is ready, take the bag out of the water; let it cool, then wring lightly. Carefully remove the yarn from the bag. Since the soap leaves a residue, the yarn must be rinsed clean. Separate the skeins and hold them in one hand by the skein loop. Dip the skeins in the following solution and swish vigorously back and forth (not sideways):

Rinse

2% sodium carbonate crystals
40 X water
Warm to 30-40 degrees Centigrade (85-104 degrees F.)

Gradually rotate the loop around and continue to swish. Then rinse in clean water in the same manner; if possible, use warm water for the first and second times, and cool/tap water for the third, fourth, and fifth times. A running stream is ideal. Rinse well, because if soap remains it may cause the silk to turn yellowish and lose its luster. Wring the yarn either by hand or in the spin cycle of a washing machine.

While the yarn is still damp, loop the skein around both hands and pull sharply and tightly in opposite directions to straighten out tangles. Pass a rod through each skein loop and set in a breezy place to dry. Pass another rod through the bottom of each loop so that the weight of the rod on the skeins prevents tangling in the wind. See Fig. 2.

Alternative Method of Scouring²

If lye soap is unavailable, sodium bicarbonate (baking soda) Na_2CO_3 , anhydrous

sodium carbonate (soda ash) Na_2CO_3 , or sodium carbonate crystals $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ can be used for scouring instead. Although these chemicals eliminate the damaging effect of hard water, they may still harm the silk if the yarn is scoured too long. So, for these chemicals the timing is more delicate than for soap scouring. The proportions and times described below are only general guidelines to be modified by personal experience.

First, soak the silk in a 2% solution of sodium carbonate crystals at a temperature of 40 degrees centigrade (104° F.). This step softens the sericin. After thirty minutes remove the yarn and wring it gently. In the meantime, prepare the scouring liquid. Choose one of the following chemicals and dissolve it in water.

5% sodium bicarbonate (in proportion to weight of fiber)

or

2% anhydrous sodium carbonate

or

6% sodium carbonate crystals

40 X water

Heat the liquid in a vat and proceed exactly as described for the soap scouring. Simmer for one to two hours during which time the condition of the silk should be periodically checked. When the yarn is ready, remove it from the vat and let it cool slightly. Then rinse it in 40 degree centigrade water once or twice, followed by tap water four or five times. Wring the yarn well and dry it in a breezy place.

Partial Scouring

Partial scouring refers to the process of removing some of the sericin from raw silk. There is no infallible way of measuring how much sericin has been removed until the silk has dried, but it is possible to make an educated guess by looking at the silk and feeling it. Then, when the silk has dried, a more accurate calculation can be made. A full 100% scouring reduces the weight of raw silk by 22-25%. So, silk which has lost 11-13% of its original weight has undergone a 50% or half-scouring.

Since interrupting the full scouring process in the middle can produce uneven

patches, a partial scouring is best achieved by reducing the amount of soap by half, and keeping the temperature below 80 degrees Centigrade (176° F.). The rinse procedure is exactly the same as for a full scouring.

After a partial scouring either formalin or chrome alum ($\text{Cr}_2(\text{SO}_4)_3 \cdot \text{K}_2\text{SO}_4 \cdot 24\text{H}_2\text{O}$) can be used as a fixing agent to prevent greater loss of sericin than is desired in subsequent dyeing, starching and washing processes.

Formalin method

50 X water

3-5% formalin (in proportion to water)

Mix the formalin with the water. Soak the silk in the liquid for six hours, or overnight. It is not necessary to keep the temperature constant. Remove the silk and rinse it well in water. Dry.

Chrome alum method

50 X water

0.2-0.3% chrome alum (in proportion to water)

0.03% sodium carbonate crystals

Chrome alum is a stronger fixing agent than formalin, but since it leaves a bluish tinge on the silk it should not be used with white or light colored silk. Unfortunately, it may also weaken the silk fiber, and so must be used sparingly. Soak in the solution described above for two hours. Remove the silk, rinse it well in water, and dry. If the chemicals remain in the silk, the fibers may become brittle.

Every master weaver has his or her own recipe for scouring. However, the basic procedures and ingredients are the same, and this article is intended as an introduction to these fundamentals. Scouring is only the first step in the preparation of silk weaving. In the next article, dyeing and starching techniques will be taken up.

¹Keiichi Murano, Teori no Subete (All About Hand Weaving), Tokyo: Iseikatsu Kenkyukai, 1975.

²Keiichi Murano, personal communication.



Ethnic Inspired Jacket

by Doris Hurt



Plate 1

Plate 1 is a variation of a simple jacket woven on a pointed twill (rosepath) threading. The border designs are produced by using colored wefts. This jacket is simple to make. The sewing pattern used is Folkweave #104, which is an Egyptian slip-over shirt. The pattern was altered to make a jacket that opens in front.

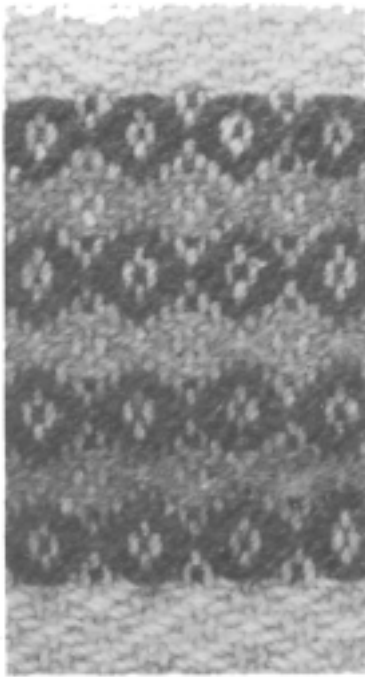
WARP: 2/7 wool in off-white (Cum).

WEFT: Same as warp. For the border design, the same wool was used in 3 other colors.

SETT: 10 epi (40/10 cm).

YARDAGE NEEDED: 4/5 yards (3.66 - 4.57 m) of 24" (61 cm) wide pre-washed fabric.

THREADING, TIE-UP AND TREADLING: See. Fig. 1.



Detail - Plate 1

PATTERN PIECES: For the jacket of Plate 1, see Fig. 2.

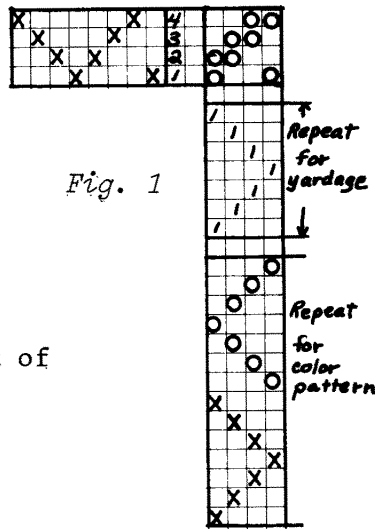


Fig. 1

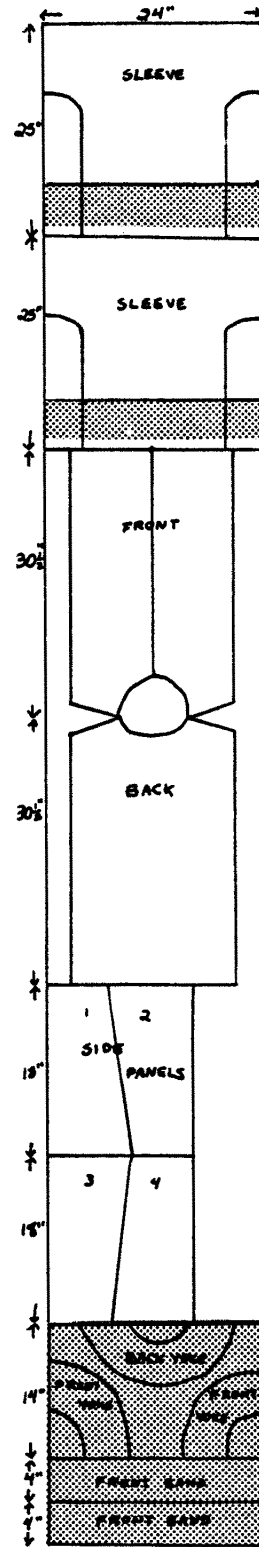


Fig. 2

ASSEMBLY: See Fig. 3.

1. Sew shoulder seams of jacket.
2. Sew the yoke and front trim pieces together.
3. Attach yoke and front trim to jacket.
4. Sew side panels together.
5. Sew underarm seams of the sleeves
6. Sew sleeves to side panels.
7. Sew sleeves and side panel to bodice.

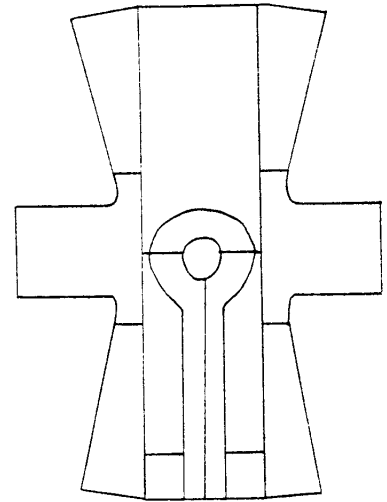


Fig. 3



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Techniques of Tapestry Weaves Part II: Making a Sampler

by Kate O'Callaghan



Measure the width of your sampler loom from the inner edges. Now find the center and measure off 4 inches on either side of it, to make an 8 inch wide warp. Warp the loom per instructions in Part I of this series of articles, then either chain or twine across the warp and you will be ready to begin. In order to begin weaving, you must first make a butterfly of weft yarn. Drape your weft yarn over your left hand, with a long tail hanging down between your index finger and your thumb. Then, extending your little finger and thumb as far apart as you can, wind the yarn in a figure 8 around them, and repeat until you have a thick butterfly stretching around the two fingers. Now take this off, holding it tightly at the cross of the 8. Wind the yarn around the center several times and then tie it. The long end that you had left hanging to begin with will be the end which you work from, and should pull out easily as you weave.

TABBY: The first thing to do is to make a small sampler of tapestry techniques. Begin by weaving a heading. To do so, begin at the right selvedge, and with your left hand begin picking up every other warp, for about 3 or 4 warps, leaving your hand palm up in the shed created. Then with your right hand, pass your butterfly from right to left in the warp, leaving a short end (2") hanging out at the right selvedge, and bringing the butterfly itself gradually through and across the warp. As you do this, *bubble* the weft yarn as you place it in the shed (see Fig. 1), to keep it from getting too tight, then beat the weft down with your fingers or with a table fork.

To weave well, keep the following in mind: only pick a few warp threads at a time, as otherwise weft yarns may get too tight and will not pack down tightly or will draw the warp yarn in, creating un-

even edges. Furthermore, always bubble your weft yarn in the warp.

When you reach the other side of your warp on this first row, switch your butterfly to your left hand and begin picking the opposite warps with your right hand, placing the butterfly through the shed created with your left. Proceed this way across your warp. Learn to use both hands dextrously in tapestry weaving, and you will eventually be able to work with great speed and deftness; an absolute necessity for the dedicated tapestry artist! Begin correctly, as in learning any skill. During this process your sampler loom should be propped on your knees or thighs, the top of it resting against a wall or table about 30° from the perpendicular.

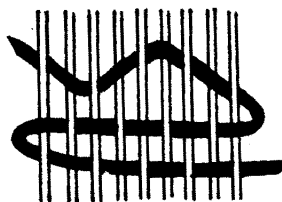


Fig. 1

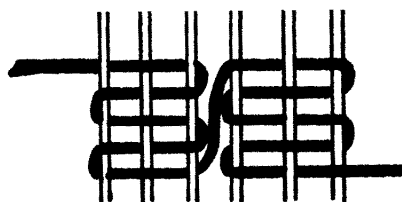
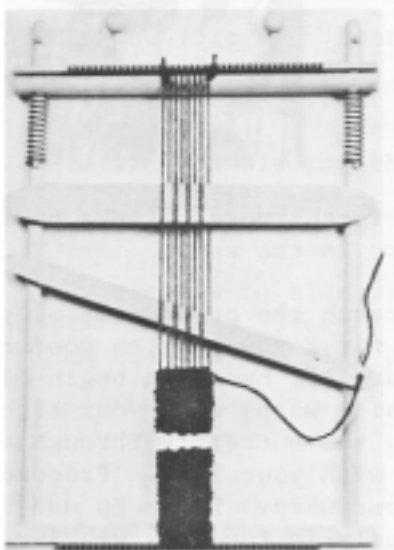


Fig. 2

A further note: when you are weaving a broad plain area of one color in tapestry, you should not weave all the way across the warp, as this tends to cause this area to draw in, especially when it is adjoined by areas where several colors or shapes are woven. To avoid drawing in, weave part way across the warp, then weave back on the same area, then go across again and on to the next section of the warp, back, and on again, weaving each area of the warp in sections, as illustrated in Fig. 2:

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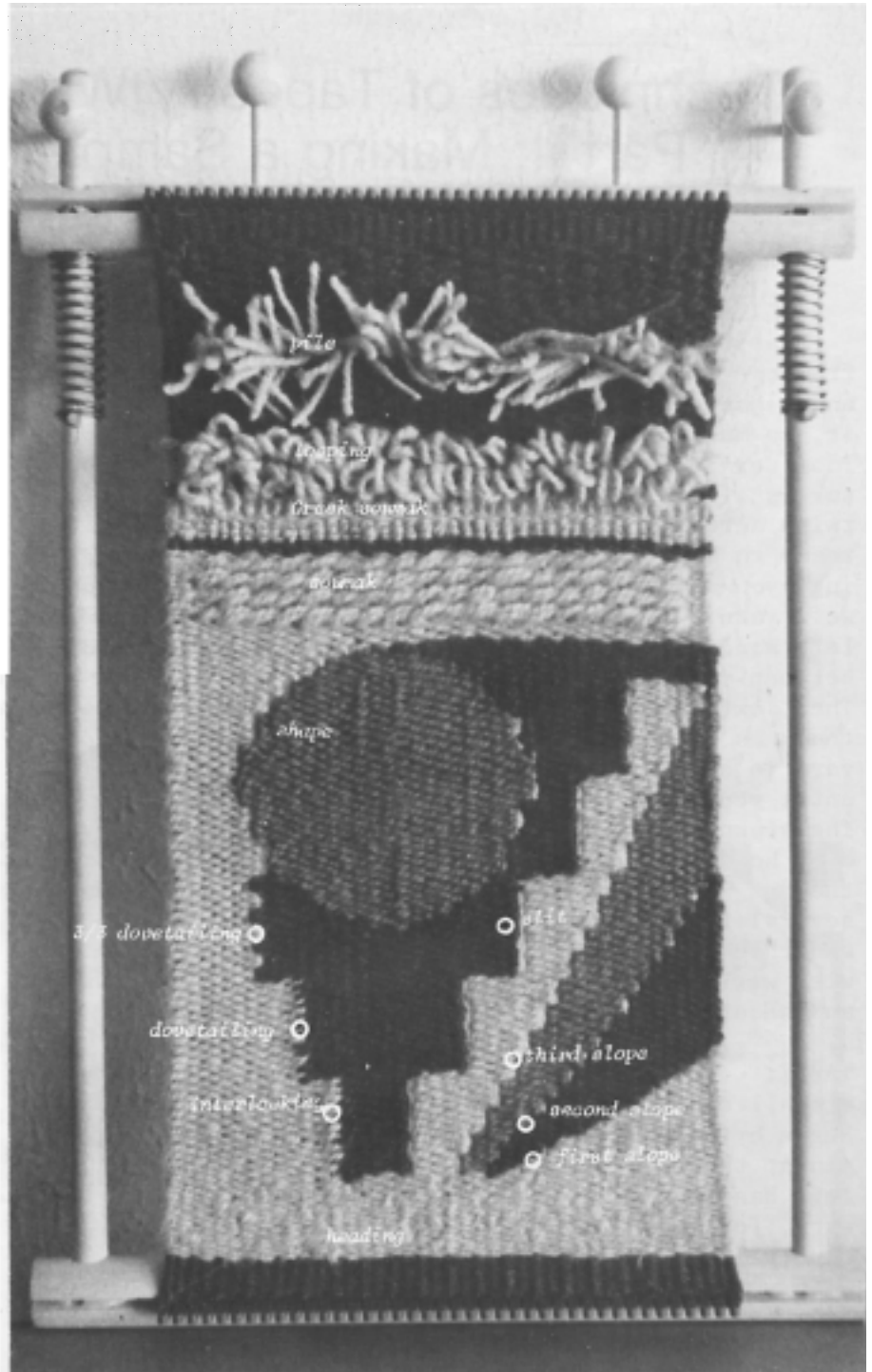
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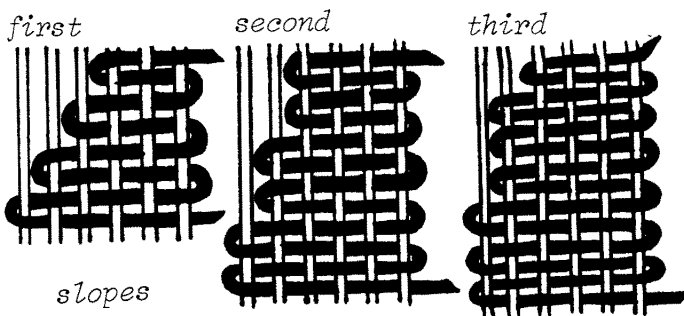
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Tapestry sampler showing the tapestry techniques taught in Part II of Techniques of Tapestry Weaves. Sampler is done on the Oola loom by Northfield.

Weave a heading of about two inches to begin your sampler, using the above techniques. When you reach the end of your butterfly, leave a 2" end hanging out on the backside of the warp (the side away from you) to be finished after the weaving process is finished. Begin a new butterfly by laying in the yarn next to the space where the previous butterfly ended, with another 2" tail hanging out the back, and continue your weaving. Do not tie these ends. Just leave them until the sampler is finished.

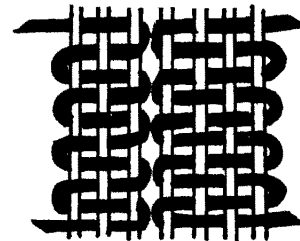
This is the Danish method, with the *finished* side of the weaving facing the weaver and weft ends left hanging on the *backside*. The reason for this is that Scandinavians use low pile weaves in addition to flat weaves; these must be woven from the front. The strict *Gobelins* style, which is flat woven, is woven with the *backside*, the side where weft ends are left hanging, facing the weaver. This is done because in flat tapestry weaving ridges tend to form at the edges of color areas on the side from which you weave. Therefore, for a more perfect finished side, the side away from the weaver is the finished side in Gobelins style.



SLOPES: Tapestry is basically shape weaving, as the techniques allow you to create pictorial images with graphic shapes. The first process in weaving shapes is the *slope* or *diagonal*: the obliquity of the slope is determined by the number of times you go around each warp thread. Decide where you want to put each slope, and weave each of the following slopes from some point within the warp, out to either the right or left selvedge. With the first slope, you decrease by one warp after every row (when both sheds have been woven) of weaving. With the second slope, you decrease by one warp after every *other* row of weaving, and with the third slope, you decrease by one warp after every *third* row of weaving.

Begin by weaving the first slope several inches in from either the left or right selvedge, and weave this diagonal area, decreasing by one warp with each row, until you reach the selvedge. Then weave the second slope beginning at the warp adjoining the first row of the first slope, and weave it to the opposite selvedge, decreasing by one warp thread after each two rows of weaving. Then weave the third slope next to one of the other slopes, decreasing by one warp every third row of weaving, as in the figure.

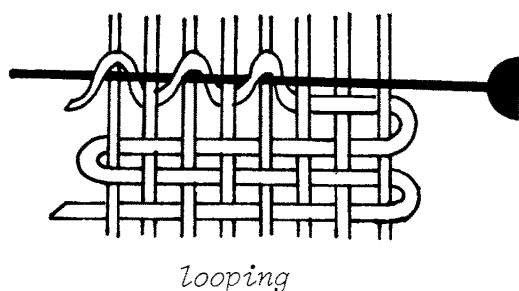
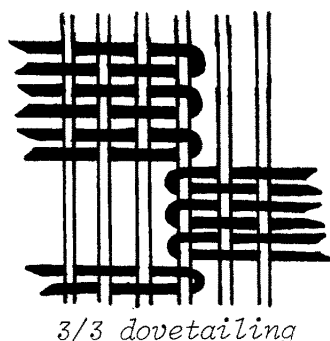
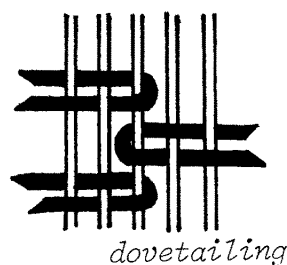
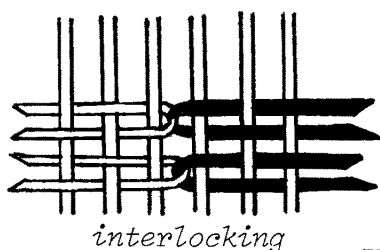
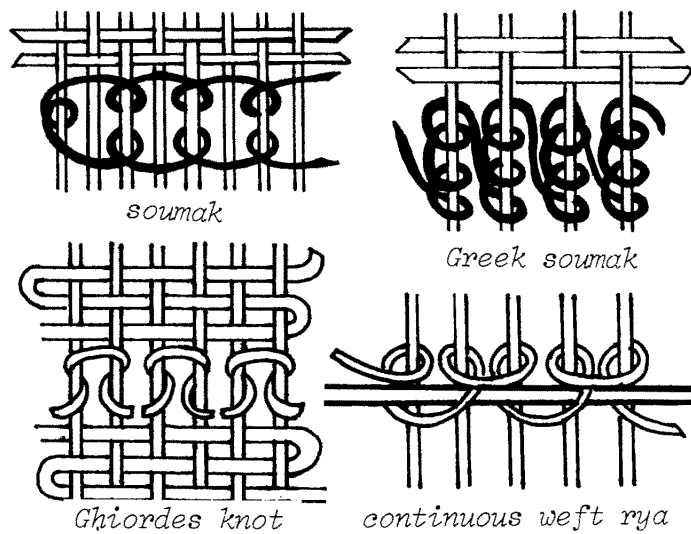
In tapestry weaving, you must weave the warp as though you were filling in a graph or a canvas of needlework; each row of weaving will equal one row of squares on the graph. Remember to fill adjoining color areas by duplicating the process exactly. Next to a slope where you have woven two rows around each warp thread, decreasing as you went, and weaving all the way to the selvedge, you must weave the adjoining area in the same way, increasing a warp every two rows, in order to completely fill that area of weaving.



SLIT: Now try the slit. Weave two vertical color areas next to each other, leaving a slit to form between the adjoining warps at the margin of each color area, as in Fig. 3. Vertical color areas occur very frequently in tapestry designs. There are several ways to deal with them. First, you may choose to weave a design that has a large number of vertical areas, sideways, 90° from the way it will hang, in order to avoid slits, which are basically weak areas in the fabric. Or you may choose to weave it as it occurs, allowing a slit to develop. Medieval (and modern) weavers would then reinforce the slit in the finishing process, sewing the slit up from the back with either an invisible stitch or a blanket stitch. Acrylic thread makes an excellent thread for reinforcing such an area. It would also be possible to embroider the slitted area from the front with a faggot or other stitch as part of your final design. Then

too, your design may incorporate slitted or unwoven vertical areas as an integral part of the finished work.

JOINS: To strengthen a vertical boundary so that the weaving will not have weak areas in it, you may wish to use joins, rather than letting a slit occur. Joins are simple methods of interlacing adjoining color areas as they are woven, to avoid the development of a slit. Try an area of joins at this point in your sampler, according to the following figures:

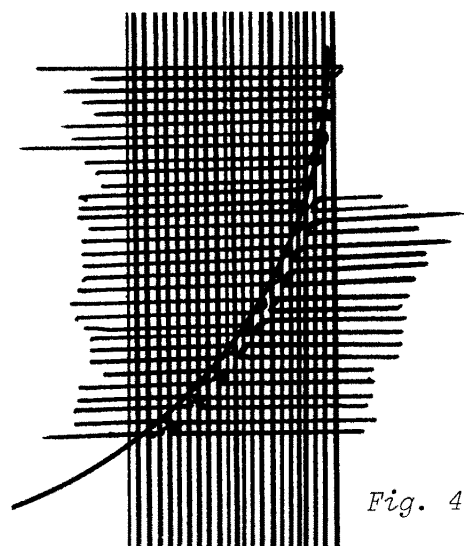


These are only a few of the many types of joins possible. You will find that interlocking is the most invisible join. Dovetailing leaves a ridge, which may be desirable. Joins and slits allow you to create clearly separated color areas.

SHAPES: Angular shapes are achieved by the use of the slopes (diagonals) discussed above. Rounded forms, however, are approximated. Remember, in the classical tapestry weave, the wefts are always perpendicular to the warp. Draw a circle on a piece of paper and pin to the back of your warp. Trace this circle directly on to your warp. (Use a permanent ink!) Find the center warp within the circle. When approximating the circle (see Fig. 4), begin by weaving the background surrounding the lower third of the circle first, decreasing the background symmetrically

PILE WEAVES: Next, you should try some of the Scandinavian-type pile weaves, which allow you to create low-relief and rich textural surfaces. Follow these diagrams carefully, but be certain to weave one row of plain weave (tabby) between each row of each of the pile weaves. Also, try each technique out for at least an inch or so of weaving so that the surface it creates is extensive enough for comparison with the other weaves.

Rya is a Scandinavian pile weave using the ghiordes knot. The pile weave itself will set off a shaped area from an adjacent area, giving it a three dimensional, low-relief effect.



from the central warp in the circle. Be very careful to beat evenly while weaving rounded shapes as uneven beating may tend to elongate or flatten out the curve. Next weave in the lower portion of the circle. The middle part of the circle's curve is usually straight, and falls along one warp; here you may leave a slit or use a join. Next weave in the upper third of the circle, decreasing symmetrically again from the center, and finally weave in the surrounding background. Once you have mastered the circle, you will be able to weave any curved shape.

The same method that is used here to weave a shape within a piece is used to weave a non-square hanging. If you wish to weave an oval or round or other curved shape, it is easily done by pinning a cartoon (an outline drawing) behind your warp with the final shape sketched on, and simply weaving within the shape. It helps to weave the adjoining areas with newspaper strips or some other filler yarn to keep warp tension even. For irregularly shaped weavings, finishing is simplified by weaving the warp ends back into the weaving. Twining around the outer edge of the weaving may also help stabilize the shape.

WEDGE WEAVE: The term *wedge weaving* will be used to define any weave where wefts are *not* at 90° to warps. Once you begin weaving shapes, you may weave on the slopes they form directly, as in Fig. 5. This method can be used to outline a shape, and indeed you can use soumak or twining, as well as plain weave, around the borders of shapes to give more definition to the shape. You can also wedge weave entire shapes. A classical shape of this type is the oval God's eye, which is woven according to the following diagram, in successive areas of color. (See Fig. 6).

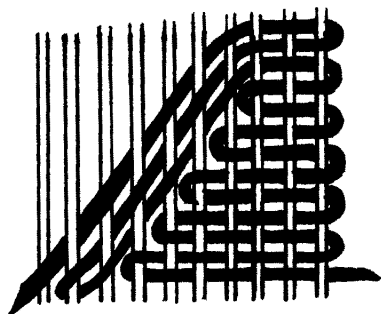


Fig. 5

First weave the background around the lower half of the shape, in the same manner you did with the circle; after draw-

ing the oval on your warp. Then wedge weave several rows of one color by laying the yarn into the shed in the whole lower half of the shape. Next wedge weave several rows of another color in the area of the shape, then weave the central portion of the shape in another color, up to the halfway point. Then continue the center, reversing by decreasing. Now weave the middle color for several rows in the upper half of the shape, and finally weave the outer color for several rows to complete the shape, and fill in the background around it.

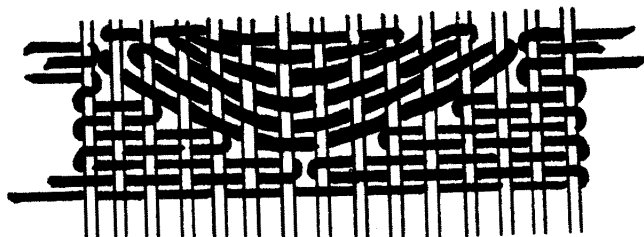
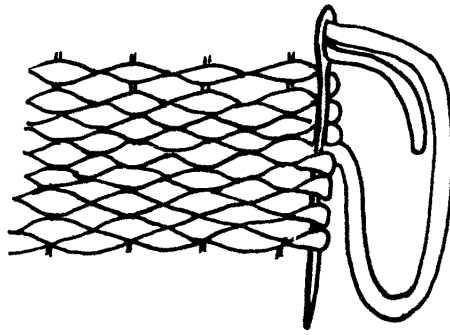


Fig. 6

IRREGULAR PLAIN WEAVES: So far you have been weaving over one, under one warp. You should now try an area of free weaves, to vary the surface texture. Begin with a *basket* weave: in this weave you weave two weft yarns together over two warps then under two warps. Then try some free weaves: under one warp over three, under two over one, and the like. Try some free soumak also. Let your hands work quickly, and let wefts float over the warps in some areas to create many types of visual texture in your weaving. It is only by experimenting this way that you will begin to discover the possibilities of surface variation.

We have now found many methods of creating clearly defined areas of texture and color. The next step is to learn how to soften, blend and shade color areas. But first, you are probably ready to take this sampler off your loom. Begin by finishing the back of the sampler while it is still on your loom (this may also be done after you remove it from the loom). Take a large-eyed tapestry needle (available at yarn shops and sewing notions) and thread it with one of the ends left hanging on the back of the sampler. Now insert the needle vertically into the weaving, pushing the needle down along one of the warps, under the wefts, and pull it through, as in Fig. 7. Now pull upward on the needle and snip the weft thread

Fig. 7



off close to the surface of the fabric, maintaining tension on the weft while you are cutting. The weft end will then disappear into the fabric. Finish all the ends in this manner. Then cut the warps off the loom close to the nails. Remove the chaining at the lower and upper mar-

gins of the weaving; tie the warps in knots or braid or wrap them.

Rewarp your loom, again with an 8" warp, to prepare for a sampler of shading, hatching and blending techniques. Mastery of these enables you to develop great subtlety of image and content in your visual designs, so you will want to spend some time learning them. These techniques, along with several other types of tapestry weaves, and also various methods of finishing tapestries, will be covered in the next article.

Copyright: Kate O'Callaghan



Josephina's Suit by Albertje Koopman

When Clotilde Barrett showed me the possibility of weaving a pile fabric on Summer and Winter threading with a flat woven backing (lining), it seemed the perfect technique for a reversible coat. Challenges are fun and I like to take them on. So I promptly said, "Fine. I'll make the coat for the magazine." The project turned out to be very special for very personal reasons.

After dressing the loom, almost without thinking, I took out my thrums and played with the colors. I decided, "Perfect for this project!" Thus Josephina's suit was woven.

When the piece was finished, I suddenly realized how symbolic this particular project was. Having gone through a very rough period in my personal life, I am just about winding and tying up the last odds and ends and getting ready to start a new chapter in my life. The scattered fragments of my life begin to join and form a new pattern -- a picture for a new adventure through life.

And here, just cut off the loom, was another pattern, multi-colored but harmonious, woven from odds and ends and forming a complete picture. The dis-

Before going into the technical description of Josephina's suit, I have to tell a little story. I am in the habit of saving the thrums of the warps I have worked on with pleasurable thoughts. Sentimental? Sure -- but then I am a little sentimental... Every now and then I take those collected thrums and weave them into a fun project. I call those pieces Joseph's coats (even if they turn into crazy pillows!)

covery of the harmony between my life and my work again proved that one expresses what one's thinking and actions in life are at the time. So much for (though valid) philosophy.

The original plan to weave a pile fabric was changed when I discovered that cutting the floats made the fabric too weak. The pile did not hold firmly. My thrums were a little too thick. Half the amount of strands would have been o.k. But I decided to leave the floats uncut; the result is a wonderful quilted-like look on one side with bright wool lining on the inside. I used an 8-harness loom. However, the project can also be woven on a 4-harness loom with even lengths floats. (See monograph on Summer and Winter by Clotilde Barrett¹).

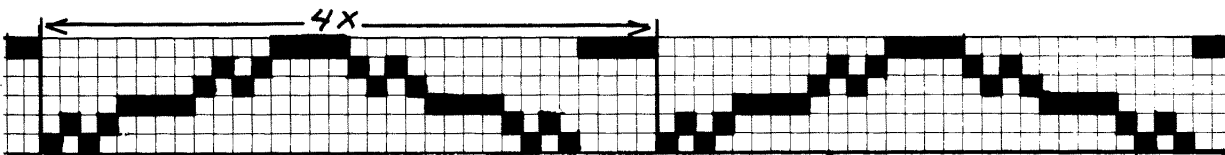


Fig. 1 Profile Draft

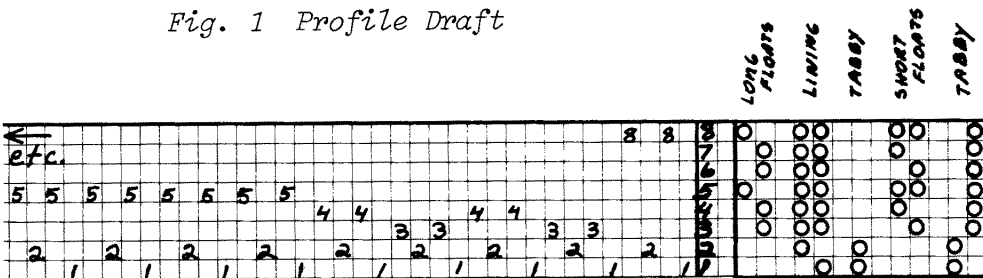


Fig. 2 Threading Draft

- thrums, multicolors medium wool, soft,
- ⊙ thin wool (or warp thread), purple
- medium wool, soft, dark blue
- X medium wool, soft, dark blue

Coat and bottom of skirt

Top part of skirt

Hem of coat and skirt

Warp: Thin mohair (purple) - 40" (101 cm) wide

Reed: 8 dents per inch (30/10 cm)

Sett: Double sleyed thus 16 ends per inch (60/10 cm) 640 ends total.

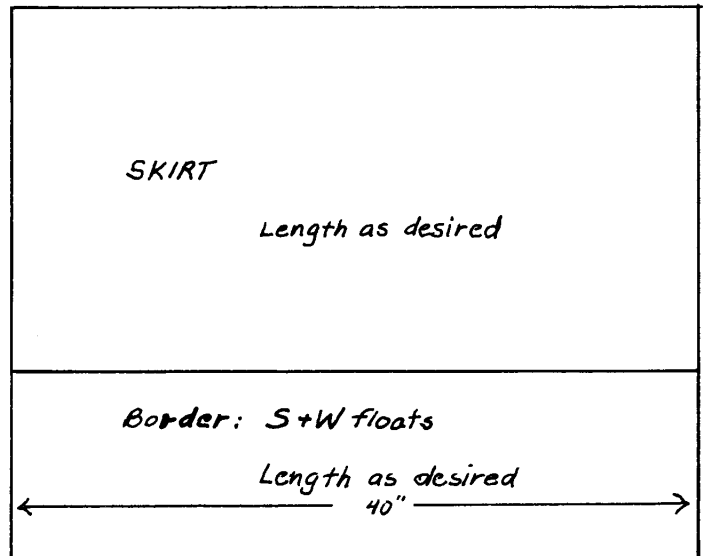
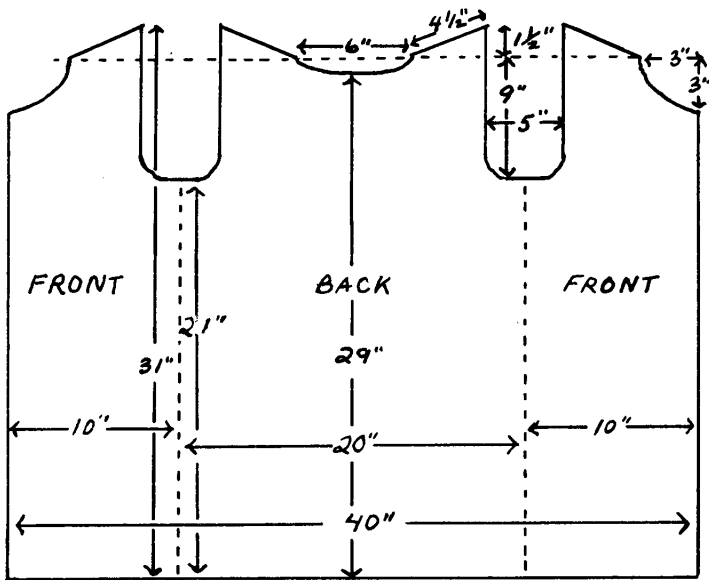
Weft for the coat:

- a) Thrums (multicolored - overtones of purple/blue/burgundy).
- b) A fine one-ply purple wool (or use same yarn as for the warp).
- c) Medium size soft wool (fuchsia)

Weft for the skirt:

Use a, b, c plus:

- d) Medium size soft wool (dark blue).



The outfit was woven as shown in the diagram; the coat complete with long and short floats and lining, the skirt with a border like the coat. The top part of the skirt was woven with blue (d) wool and fine (b) wool. The raw edges were stitched on the sewing machine to prevent raveling.

The finishing was done in crochet. Single crochet around all raw edges.

Coat: Neckline: 2" (5 cm) single crochet.

Armhole: 2" (5 cm) single crochet.

Fold over and sew to right side of weaving.

Front panels: 1½" (38 mm) single crochet
In the right panel make buttonholes: s. crochet, chain, s. crochet - next row all s. crochet.

Waistband: 2½" (63 mm) single crochet.
In the first round decrease the number of stitches so that the band feels snug around the waist and also gathers the skirt slightly.

Wash and press the garment and wear it with joy.

¹Barrett, Clotilde. *Summer and Winter and Beyond* 1979. Colorado Fiber Center, Inc., Boulder, Co.



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Nineteenth Century American Carpets

Photos courtesy of Smithsonian Institution

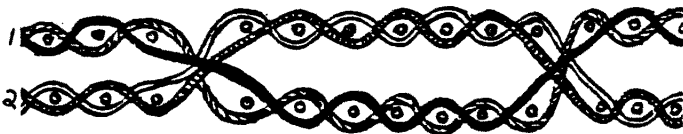


Carpet bag of printed velvet pile

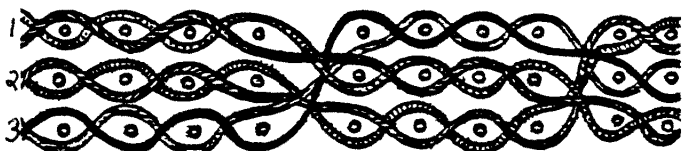
During the past year the Smithsonian's National Museum of History and Technology featured an exhibit, Nineteenth Century American Carpets, that showed a wealth of designs and weaving techniques. Although most of these carpets are the products of the development of the power and the Jacquard looms, the basic techniques remain within the scope of the handweaver.

In connection with the exhibit, the Division of Textiles of the Smithsonian Institution has published a leaflet explaining the seven major types of carpet shown. The following text is a reprint of that information sheet.

INGRAIN CARPETING

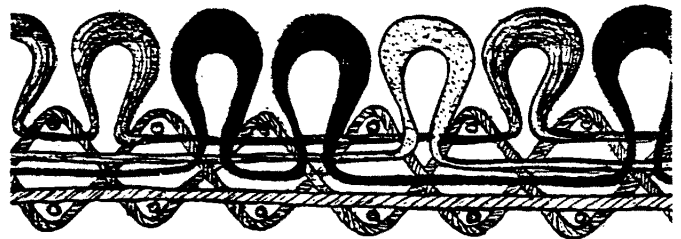


Ingrain has no pile. This reversible carpeting, usually made in 36-inch widths, consists of two or three different colored layers of cloth woven together along the edges of its design. In two-layer (two-ply) ingrain, the color that forms the de-



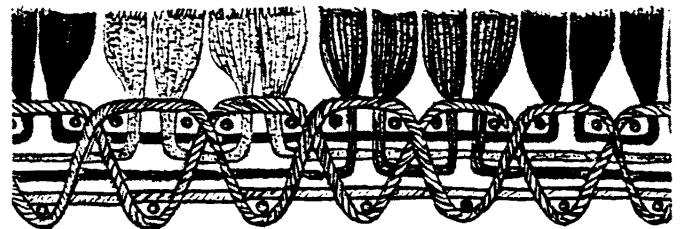
sign on one side is the ground color on the reverse side. This carpeting was the most popular type used in America during the nineteenth century. It was also known as Scotch, Kidderminster, union, two-ply, three-ply, and common carpeting.

BRUSSELS CARPETING



Brussels has a looped pile surface. The loops which form its surface (and pattern) are different colored warp yarns raised during the weaving process by insertion of slender metal (weft) rods. Where a color does not appear in the design on the surface, it is carried on the underside, adding body to the carpet's foundation. While Brussels wore very well, its construction limited its designs to six colors (six frames). It was also comparatively expensive, because much of its costly pile warp was hidden on the underside.

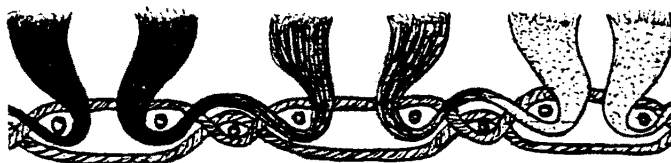
WILTON CARPETING



Wilton has a cut pile surface. Its structure is similar to Brussels'; however, the colored warp yarns which form its pile are cut to form a velvety surface. Like Brussels, where color does not appear in the design on the surface, it is carried along the underside, adding body to the carpet's foundation. It wears well, although it was considered less sturdy than Brussels. Its pattern was limited

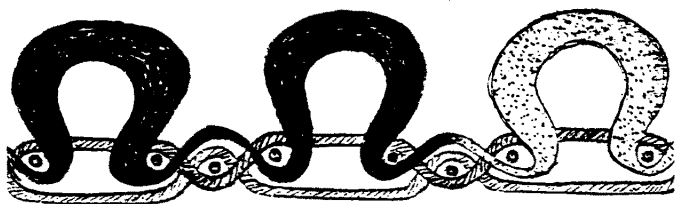
to six colors (six frames) and it was also fairly expensive. Its name is derived from the town of Wilton, England, where it was woven early in the nineteenth century.

VELVET CARPETING



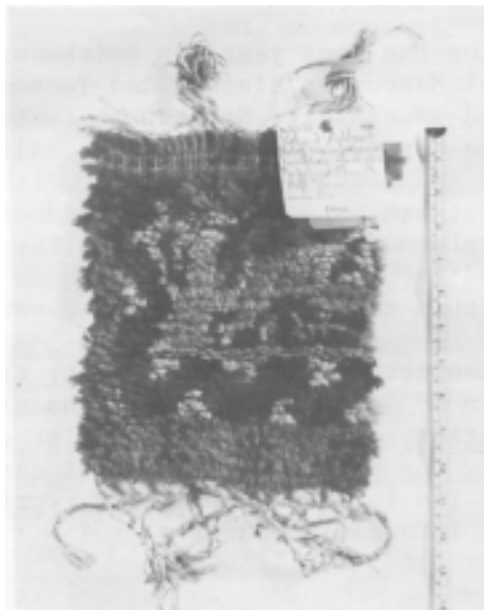
This cut-pile carpeting was a less-expensive imitation of Wilton carpeting. Unlike Wilton, whose individually dyed and selected pile warp yarns formed its design, Velvet carpeting's entire pile warp was stretched out and its design printed. After the warp was printed, it was wound on a large drum (warp beam), then woven. Its other characteristics were also comparable to those of Tapestry carpeting.

TAPESTRY CARPETING



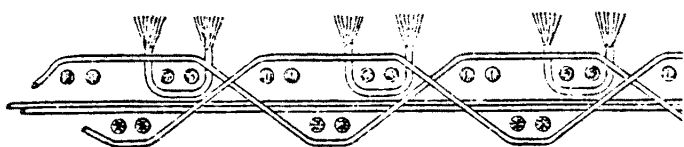
This looped-pile carpeting, introduced in Scotland during the 1830s, is a less-expensive imitation of Brussels carpeting. Unlike Brussels, whose individually dyed and woven pile warp yarns form its design, Tapestry's entire pile warp was stretched out and its design printed before it was woven. Although Tapestry carpeting designs had fuzzier edges than Brussels', its colors were virtually unlimited. It was also cheaper: it could be woven on a simpler loom, because during the weaving process its pile warp yarns did not have to be individually selected to form the pattern. In addition, less yarn was needed, since almost all the pile warp, with its printed pattern, appeared on the carpet's surface.

CHENILLE CARPETING

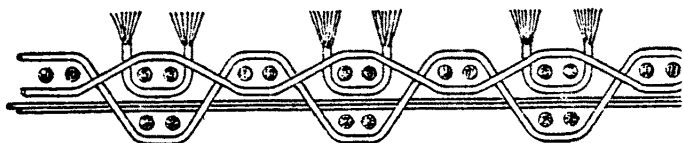


Chenille carpeting's cut-pile patterns were formed by thick, furry weft yarns. Chenille weft yarns were unusual because they were made up by being woven first, then cut in strips for weaving into carpeting. In producing (actually weaving) chenille yarns, cotton warps were arranged in groups of two, four, or six, with spaces between each group. Wool weft yarns, with colors in a pre-planned sequence, formed the web which was later cut into lengthwise strips, forming the furry yarn. The first system for manufacturing chenille carpet was patented in England in 1839. This carpeting was also known as "patent Axminster."

AXMINSTER CARPETING



Axminster's cut pile surface is formed by different colored worsted tufts mechanically inserted row by row between foundation warp yarns, then locked in place by the foundation weft. The Axminster loom's complex operation permits the use of Velvet carpeting's unlimited colors and large patterns, but with Wilton's sharply defined edges. Machine-made Axminster carpeting, called "moquette", was patented in America during the 1870s, and is still being produced.



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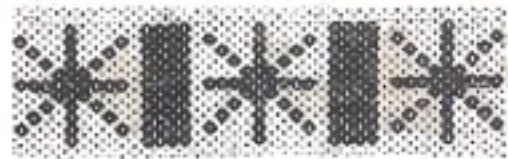
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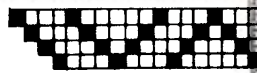
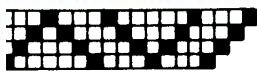
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