Scandinavian Art Weaving

NORWEGIAN ÅKLAE TECHNIQUE

BY ELMER WALLACE HICKMAN

I CHOSE to write about Norwegian Åklae rather than Swedish Röllakan because the finished fabric is more satisfying, even though the working process is a trifle more intricate. (Åklae is pronounced aw-kli.)

The information given in this article is, to the author's knowledge, the first time that such material has appeared in print in the English language.

In this Art Weaving technique one can create both in form and color any design that can be put on cross-section paper. With any type of weaving there arises the question: whether to imitate the designs of the past, or create ones anew. Eventually and unavoidably, imitation becomes commonplace, but, again, creation may be just as undesirable if, in creating, there is no reflection in our designs from that which is characteristically distinctive of that type of weaving. Let us, then, *sanely* adapt designs that are nationalistic to our needs.

Instead of working with a few colored yarns as we often do in some of our own American weaving, one has the opportunity of working with as many colors as a painter might use on his palette. One is not inhibited in the design by the harnesses of the loom, but only inhibited by the extent to which the design fits onto the graph paper. No curve can be simulated as in real tapestry, but an approximation of curved lines can be approached as is shown in the illustration of the Viking. This special design is somewhat unique for this type of weaving since the designs are ordinarily geometric, consisting of squares and star-shaped figures. Mr. Gene Johnson, a Norwegian artist, of Brooklyn, New York, especially designed this Viking so that I might weave it to have for this article in THE WEAVER. Although it is woven with vegetable-dyed wools imported from Den Norske Husflidsforening in Oslo, Norway, the color key that I give in Bernat's French Tapestry wools for the chart approximate the original exquisitely.

The loom for the Norwegian Åklae can be any loom that permits the making of two sheds or plain weave. There are looms, both table and treadle, primarily made for this work in the Scandinavian countries. Any of our table or floor looms can be most satisfactorily used. A loom, however, on which the warp stands upright is a little more easy to operate for this type of weaving, principally because the numerous bobbins remain out of the way and the weaving can be more readily seen. If a two-harness loom is used, thread the heddles as for plain weaving. If a four-harness loom is used, thread the loom with a twill threading or any pattern threading that will produce the two sheds necessary for plain weaving.

In making the designs, cross-section paper with eight divisions to the inch is preferable, as a No. 8 reed is ordinarily used. I would suggest that a beginner put his design on a four to the inch cross-section paper, as the design can be more easily followed. This is, of course, not absolutely necessary. Let each square on the paper represent your smallest unit of warp threads (i.e., two warp threads to a square, or four warp threads to a square, etc.). In weaving pictures in this technique, as the Viking, one square of the graph paper should represent one warp thread. This is necessary in order to get a better form to the figure. In less complicated designs — especially geometric forms — this would really be a waste of paper. The usual unit of warp threads is four — two front threads and two back threads. This unit can be clearly represented by one square on the cross-section paper. In the design for which the detailed working process is given — Pattern No. 1 and Illustration No. 1 — one square represents four warp threads.

The warp used in Norwegian Åklae should be of a stout cotton twine. For experimental work ordinary carpet warp may be used, but only for experimental work. The Scandinavians use a 12/6 soft Fiskgarn twine, but it is practically impossible to get that count in this country. The nearest twine procurable, I have found, is a "20/9 Cable Thread." There is very little difference in the two twines, except that the imported Scandinavian Fiskgarn is a trifle thicker and

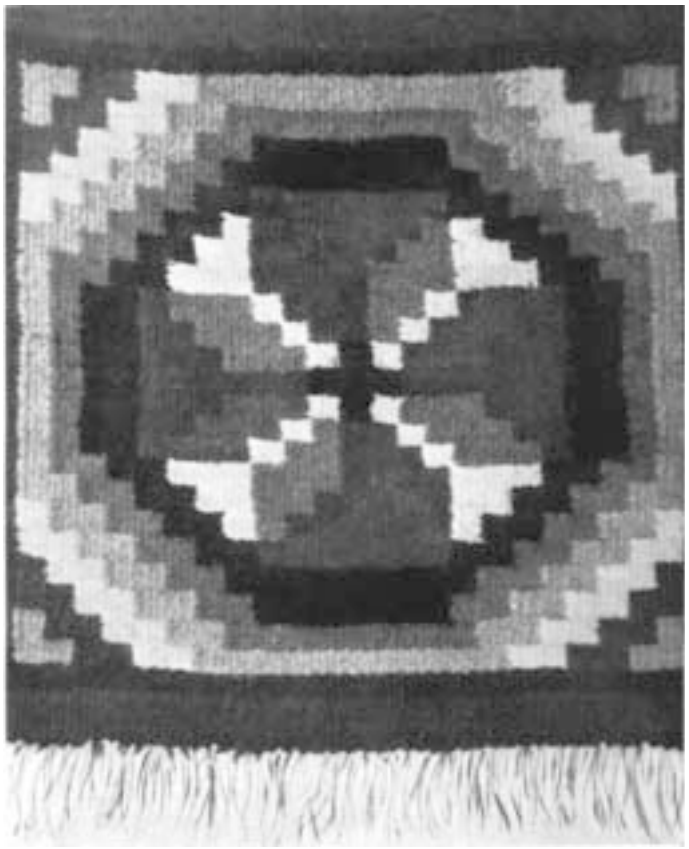
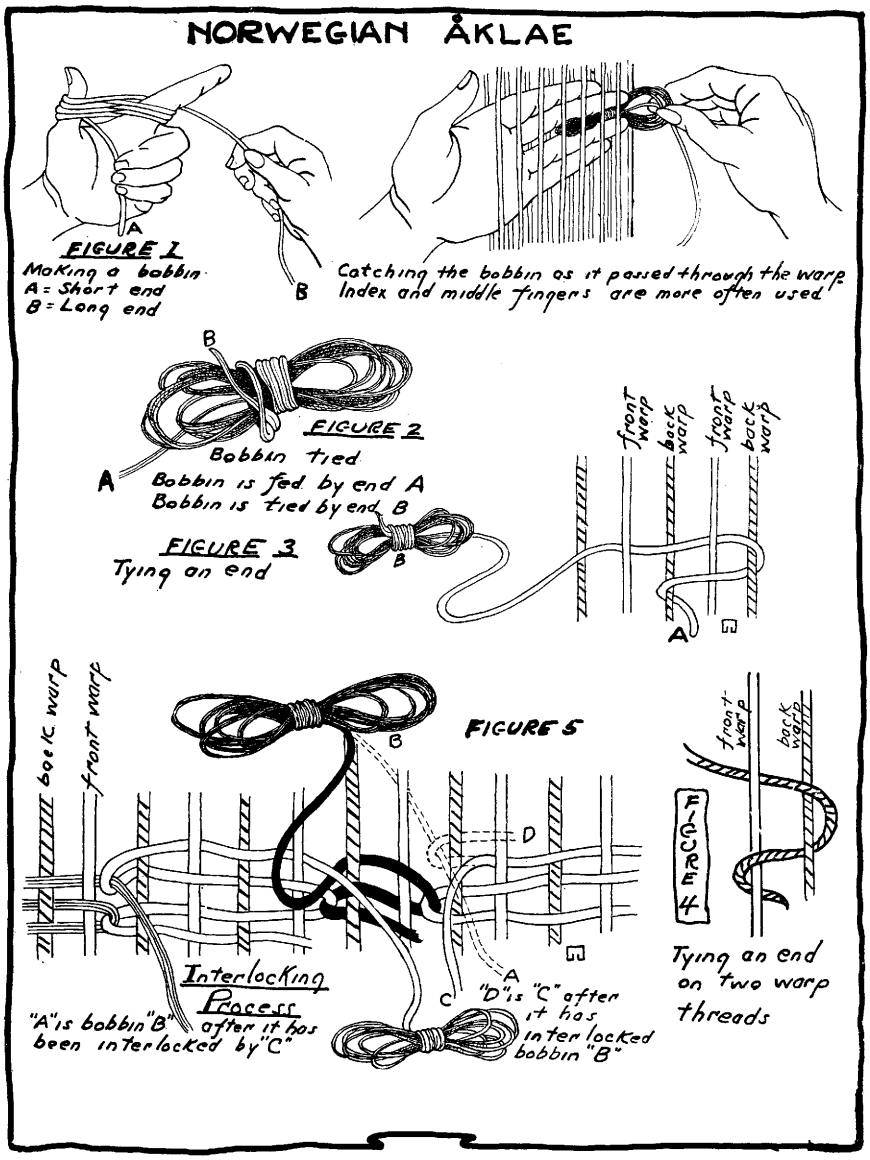


Illustration No. 1



of a different twist. A linen warp is absolutely unsuitable because it lacks elasticity. A wool warp is also undesirable, for it would hardly stand the continuous pulling on the warp threads that the work demands. A No. 3 Perle cotton might prove satisfactory.

The weft yarn used by the Scandinavians is a three-ply wool yarn, rather tough but soft. The yarn should not have a glossy appearance. Vegetable-dyed wools are greatly used and their colors blend beautifully. Knitting wool or Zephyr yarn would do to experiment with. Bernat's Peasant wool can be very successfully used. The all-over Norwegian star piece was woven of this yarn. Although the Peasant wool is less expensive, a more suitable yarn is Bernat's French Tapestry wool because the colors more closely resemble the imported yarn. Since there are several hundred beautiful tones in Bernat's French Tapestry colors one can very easily approximate the vegetable-dyed wools. A softness, both in coloring and texture of the yarn, is necessary to duplicate the ancient weavings of Norway and Sweden and give to the finished product the appearance with which those weavings were invariably associated. And this appearance is a "homespunny" one. Some Scandinavians use a single-ply wool, similar to Bernat's Homespun, winding two or three strands on a bobbin. Many claim that a single-ply weft yarn gives a more satisfying result in any of the Art Weaving techniques.

As has been indicated above, a No. 8 reed is used.

It is well to surmise that the person who begins to weave this technique knows nothing about it. Therefore, for the sake of clearness, the following seemingly inexpedient directions will be greatly in detail:

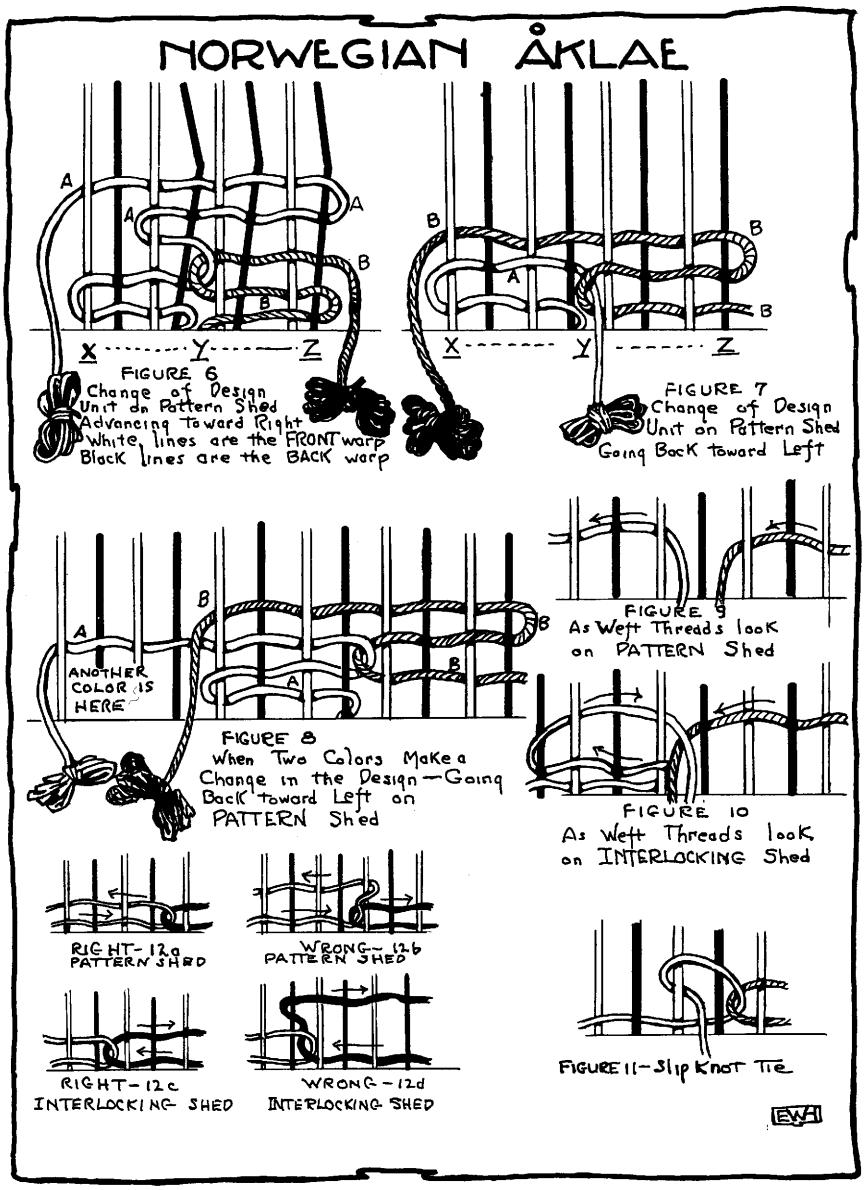
The first step is to learn to wind a bobbin (Figures 1 and 2). The word "bobbin" is used to mean a small hand-made shuttle of wool. A length of yarn about ten or twelve feet long is unwound from the skein. We shall designate the end of the yarn that one picks up first as A, and after the yarn is put in the left hand we shall call the remaining thread B. The left hand is held as in the illustration, stretching the thumb and the index finger as far apart as possible. End A is taken by the right hand and put in the palm of the left hand, allowing the end A to extend about eight inches below the palm of the left hand. The end B is put back of the thumb and brought around the thumb to the front. The last three fingers of the left hand now hold the A end of the yarn while the right hand takes the end B and brings it over to the index finger, back of it, around the index finger to the front, between the index finger and the second finger — which is now bent over — and is then crossed over the thread now between the thumb and the index finger as before. Then the process continues — always making a cross between the thumb and the index finger. A figure "8" is thus formed. When the yarn has been wound to nearly its full length, the thumb and the index finger are relaxed, permitting the group of crosses to be easily removed from the hand. This cross is like the Portee cross used in making a warp. This group of crosses is now grasped in the center by the thumb and the first finger of the right hand; transferred to the left thumb and left first finger, held securely, and wound around with the remaining B end several times and finally fastened with a slip knot so that all the crosses will be held firmly. The end A, which hung below the palm of the left hand, is the end that is pulled from the bobbin and is the end that is attached to the warp threads when beginning to weave.

At first this bobbin winding will seem laborious, but one will find that instead of actually winding the yarn with the right hand in the path that the yarn follows around the thumb and index finger of the left hand, an extremely rapid winding will result if the left hand is rocked back and forth, picking up the yarn with the thumb and index finger while the right hand remains practically still and only feeds the yarn. About six bobbins of each color should be made before beginning to weave so that one will have a sufficient number on hand.

Two sheds are necessary in order to weave this technique. For convenience, let us call them "the first or Pattern shed"

and "the second or Interlocking shed." This will facilitate matters. All starting bobbins and newly added bobbins — those added during the progress of the work — are tied onto the warp in this first or Pattern shed. The bobbins on this Pattern shed run in the direction of right to left of the loom. The bobbins returning on the Interlocking shed run in the direction of left to right of the loom. In starting to weave, see that the sheds are arranged thus: the Pattern shed must have the first warp thread on the left of the loom in *front or on top* of the shed; the last warp thread on the right is at the back or on the bottom of the shed. Of course the Interlocking shed will be just the reverse. This arrangement is necessary in order to save complications later.

The first or Pattern shed is now on the loom. The first bobbin — starting from the right of the loom — is put in the shed from the right to left as far as the unit of design requires. If the unit of design is eight threads — four front and four back warp threads — the left hand pulls out the four front warp threads; the right hand inserts the bobbin; the first and second fingers of the left hand catch the bobbin — the third and fourth fingers of the left hand are still holding out the four front warp threads — and the bobbin is pulled through until the yarn is within two inches of the end of the thread (Figure 3). The bobbin is held in the left hand and the weft thread in the shed is pushed upward so that the end A may be tied in. The right hand now takes the end of the weft thread; turns it under the back warp thread that is to the right of your unit; brings the yarn around over the next front warp thread which lies to the left of the back warp thread just used, then over the next back warp thread, around it and out to the front. All this is pushed down with the fingers to the already finished work — whether that finished work be the plain tabby that is first put in for a heading or some completed part of the design. This tying must always be done when a bobbin is added, and is one of the important first steps to know thoroughly.



When the unit of designs covers only two warp threads and it is necessary to tie in a bobbin, the tie to the warp threads is like that in Figure 4. The bobbin is put in the shed; pushed upward and the end A wound around the two warp threads — around the back warp thread, over and in front of the front warp thread, around it to the back and pulled out to the front in between the two warp threads.

When a bobbin runs out and you wish to tie off the end, the following is the procedure: Allow the end to be long enough to carry through the Interlocking shed — say two inches — so that it can be tied off in the Pattern shed (Figure 11). The end is tied to the front warp thread in the Pattern shed by a slip knot. This is pulled down rather tightly. If this method is followed a great deal of trouble will be saved the weaver. This same system applies also to tying off a color bobbin that is no longer needed in the design. The reason for tying off the yarn in the Pattern shed is because, by doing so, the yarn has been interlocked before it is tied off, causing no hole or slit in the weaving and making for greater security. Some weavers object to using this slip knot. They simply let the end hang.

When you put in all the bobbins in the Pattern shed you will find that there is one back warp thread that appears to be empty between the two front warp threads — where one bobbin ends and the other begins. This must always be apparent throughout the weaving (Figure 9). If it isn't, then you have made the mistake of wrapping a bobbin *around* a front warp thread instead of simply laying the weft thread forward in the shed. Figures 12a and 12b show the right and wrong way of laying the weft in the Pattern shed. By wrapping around a front warp thread means that you have picked up a front warp thread that belongs to the previous unit. This applies to both directions of sheds. If this is done your design will be ruined. When you come back from left to right on the Interlocking shed the weft thread will be as in Figure 10. The weft thread just brought forward will fall beside the old one that was there from the previous Pattern shed with no back warp thread between

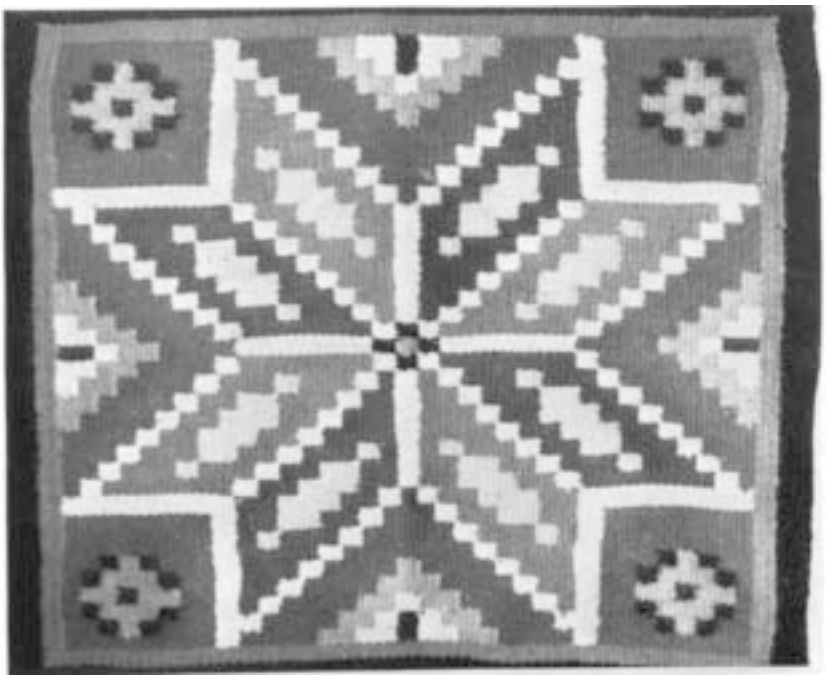


Illustration No. 2

the two weft yarns. This may sound complicated, but it isn't. Figures 12c and 12d show the correct and incorrect way of laying the weft in the Interlocking shed. The above hints will help eliminate constant mistakes that happen at first unless one is ever watchful.

When both the Pattern and Interlocking sheds are put in, the weft threads must form an arc upward in the shed — the longer the length of the unit, the greater the arc. This is to allow for the extra weft taken up by covering the warp threads. This will also keep your work from "pulling in at the waist." On the Interlocking shed, especially, the weft is permitted to lie loosely in the shed with no excess loop at the point where the interlocking was done. But in working on the Pattern shed a slight pull is given each bobbin as it is put in the shed so that the design will have a straight vertical edge between each pattern unit. Although this "pull" is necessary on this Pattern shed, the arc must still be preserved in order that the weaving will not be "drawn in."

In Swedish Röllakan the interlocking takes place in both directions. This is compulsory so that changes in the design can be made. But the wrong side of the Swedish Röllakan is a mass of interlocking threads caused by the technique process, thus preventing the use of the wrong side of the fabric. The Norwegian Åklae, because of the process now to be described, eliminates this condition on the back of the work and permits not only a clean cut appearance on the back of the fabric but also the use of that side of the weaving. If the work is done well it is difficult to tell which is the right or wrong side.

The ingenious method that the Norwegians employ is this: in making a design change in the weaving, that is, if you wish to advance a white weft thread over to the right for, say, four warp threads and this advancing falls over a black unit of four warp threads, the following process takes place. In Figure No. 6 consider the space of eight warp threads lying between X and Z. A is the white weft thread and B the black weft thread already put into the weaving. At Y the interlocking had taken place from the previous shed. You now have treadled for the Pattern shed. *All pattern changes in the design must take place on the Pattern shed.* The white thread A is put back one front warp thread in the Pattern shed — that is, to the left — and brought around this same front warp thread. Then, using the fingers of the left hand you will pull out three *back* warp threads clear out in front of the front warp threads (the drawing represents these back warp threads by black broken lines) and the white weft yarn A is put in back of these back warp threads to the right. This makes the white weft yarn A lie in front of the original front warp threads. You then let the three back warp threads return to their places. The white weft yarn A is now caught by the last back warp thread. This advances the white block design four warp threads — two back and two front warp threads. This white weft thread A *must now* be brought back toward the left to its original unit block which is within the space of the four warp threads X and Y. The three back warp threads were pulled out because the first belongs to the old unit of design and the other two to the new advancing unit. What is really done, when the back warp threads are pulled out to the front with the fingers, is simply making the other shed (the Interlocking shed) without taking the trouble of changing the complete width of the warp with the use of the treadle or hand levers. Your white weft now covers space XZ.

If the black block ends in the design, you will already have slip-knotted the end and cut it off, leaving about an inch of yarn hanging. But if the black block advances in the design similar to the white unit of design, then the same principle must be followed as was described for the advancing of the white unit. And, in this case, the black unit must be advanced *before* the white unit is advanced.

Should the unit of design go back toward the left the method outlined by Figure 7 is used. The unit of black is between Y and Z and the unit of white is between Y and X. If you wish the black weft yarn B to go from Z to X, then you just lay the black weft thread in the Pattern shed back toward the left from Z to X. This makes a unit of black over eight warp threads (four front and four back).

If the white unit of design ends after having completed its height in the weaving, then the white yarn A is slip-knotted and cut off, *but* if the white part of the design continues toward the left, then the white weft yarn A must first be taken back to where it belongs before the process with the black yarn B is carried out. This is shown in Figure 8. You will find, in a case like this, that you will have two weft yarns in the same shed for a certain distance (white and black), but this is all right. However, unless — in a case like this — you change the white first, your weft threads will lie in the shed in a white-black-white order. This will cause a mixture of color, and is not good. Therefore, the order of the weft in the shed must be white-white-black. This occurs where the colors overlap in the same shed. This seems confusing telling it, but one will readily see, and quite easily, what is meant by the above when the work is in progress.

If the design advances toward the right *and* toward the left, both principles of advancing just described are employed. These few "secrets" of the working technique make possible the really desirable Norwegian method.

It is unwise to advance on the Pattern shed for more than five back warp threads (this means advancing the design for a unit of four back warp and four front warp threads, one back warp belongs to the old unit). It is unwise, because too much overlapping weft yarn will lie in the Pattern shed, and this looks bad. If too long an advance is taken you will find also that you have an extra weft thread in your block which keeps from squaring the block neatly. Rather than advance too far, tie and cut off the bobbin and tie it in again at the right at the place where you wish to begin or advance the unit of design.

Peasant wool and French Tapestry yarn require about eight or ten double shots of weft to complete a square — that is, this number of shots on the Pattern shed and the same number on the Interlocking shed. There must be, of course, two shots of weft made — one on the Pattern shed and one on the Interlocking shed — to cover the front and the back of each warp thread in each row.

The following notes from experience will prove beneficial to the beginner of this Norwegian Åklae technique:

1. You change design *only* on the Pattern shed — the same shed as you started with when you begin to weave.

2. After you have woven an inch or so of web, the ends that are hanging may be cut off — if they have been properly tied in with the slip knot. This slip knot does not show, if it is pulled sufficiently tight, as it is beaten down by the reed.

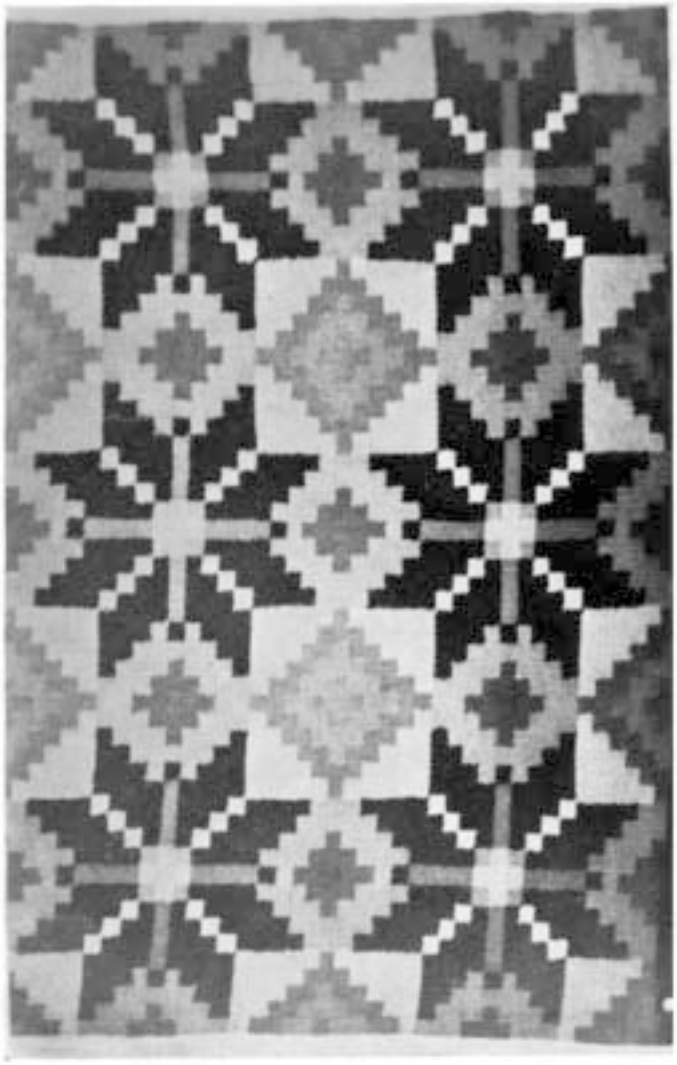


Illustration No. 3

Illustration No. 4

3. It saves time and is easier to work from the left side of the loom to the right, regardless on which shed you are working.

4. It is well to draw a line through each row of squares on the cross-section paper when you have finished that particular row.

5. If possible, do not leave the loom until you have finished all the shots of color in a full row. If necessary to do so, stick the bobbin to be used next in between the warp threads so that you will know where you have left off.

6. It takes one shot of weft to the left and one shot of weft to the right to make one covering of the warp threads. When you go to the left on the Pattern shed you must return to the right on the Interlocking shed in order to complete one row of weaving. Remembering this will save many discouragements.

7. In making design changes — either to the left or to the right — do the farthermost advancing one first. This will eliminate a great deal of confusion to the beginner and keep each weft color to itself.

8. To acquire speed: when a bobbin is caught — coming from left to right — by the right hand, speed is gained by holding that bobbin and putting it in place while the left hand picks up the next bobbin and interlocks over the weft thread just brought from the left and just put into place. That is, the right hand is holding a bobbin while the left hand proceeds to pick up a new bobbin. A rhythmic movement is thereby acquired together with less entanglement

Illustration No. 5

of the bobbins. (Don't worry about the bobbins getting tangled — they are easily put right.) Of course when the left hand has picked up its bobbin, the right hand lets go of the bobbin it was holding in order to take hold of the front warp threads and pull them out so that the left hand can pass, through the shed thus made, the bobbin which it holds. The right hand at this point catches the bobbin as it comes through the shed and the same process is repeated for the width of the weaving.

9. Wrap bobbins about twenty times (twenty figure "8's"). Do not have them too bulky, as they will be inconvenient to handle.

10. A new thread may be tied-in *anywhere* in the design on the Pattern shed as long as it is tied by the method given. When tying-off an end pull the yarn tight around the front warp thread, otherwise a bulky loop will show in the weaving. When this is done and a new bobbin of the same color is added to that unit, you may either tie the new end over the end that you have just slip-knotted or tie the new end beside the slip knot. The front and back warp threads have been covered by the slip knot. If the new end is tied over the slip knot — even though it appears bulky at the time — it will not matter as the reed will finally beat these "ties" down so that they will not be noticeable.

11. Sometimes the yarn, while being fed from the bobbin, will get entangled by a loop in the bobbin — a little patience will easily remedy this by untangling the caught loop.

12. Adjust a white cloth under the entire width of the warp threads so that, while working, there will be no strain on the eyes.

13. Each unit of design requires a separate bobbin.

14. Clip off the ends, that hang from the weaving, very closely.

Detailed Directions for Weaving Pattern 1

Enlarge the design from the cut in the magazine and color it with colored pencils. This will make any design easier to follow. Use Bernat's Peasant wool yarn. The different colors of the yarn are indicated on the pattern draft. Carpet warp will do for the warp. Use a No. 8 reed or a No. 15 with the warp threaded through every other dent. In fact this No. 15 reed is the equivalent to the 10/30 reed (30 dents in 10 centimeters) that the Scandinavians use.

There are 29 squares in the design, each requiring 4 warp threads. This will necessitate having 116 threads in your warp. You will be working on the *wrong* side of your weaving — the under side will be the resulting right side. Have your warp stretched tightly.

Get your Pattern shed to begin with, and weave a heading of plain weaving for about an inch. Be sure that this plain weaving ends with the Interlocking shed as you must have your Pattern shed on which to begin the actual weaving of the design. The bottom border of Black (I shall spell the colors with capital letters) is more easily put in — since it is a long stretch across the entire warp — if the width of the warp is divided into three sections, say, 36 threads and 36 threads and 44 threads. When you have the Pattern shed open this makes 18, 18 and 22 front warp threads. The back warp threads of the same numbers make up the entire number of warp threads. Have 3 bobbins of Black yarn. These three divisions will make it necessary to interlock at two different places.

A. Have the Pattern shed open. Now begin to tie in the three Black bobbins. Beginning at the Left of the loom, count to the Right 18 front warp threads. Put your first bobbin in this division by taking the bobbin between the 18th and 19th front warp threads and putting it through the shed toward the Left — End A will be between the 18th and 19th warp threads and the bobbin will hang out at the Left selvage of the warp threads. The direction, remember, on

Illustration No. 6

Illustration No. 7

Illustration No. 8

this Pattern shed is that the weft goes from the Right to the Left. Tie in the end A as indicated in Figure 3. Next count to the Right 18 more front warp threads — that will be beginning with the 19th front warp thread on the loom. This will take up 36 front warp threads. Put in your second bobbin between the 36th and 37th front warp threads, letting the end A hang out about 2 inches to the front or top of the loom; carry the bobbin through the shed to the Left and bring the bobbin out where you tied in the A end of the first bobbin — that is, between the 18th and 19th front warp threads. Tie the A end of your second bobbin. Now, beginning at the Right-hand selvage, put your third bobbin of Black through the shed to where the second bobbin was tied in. The bobbin will come out between the 36th and 37th front warp threads. Tie the A end of this third bobbin around the last three warp threads of the Right-hand selvage. Let the weft of these three bobbins lie loosely in the shed; change to the Interlocking shed and beat well, twice. (Make it a point to change your shed before you beat with the reed and give the web two good hard beats.) The new shed now is the Interlocking shed. You will now have to interlock the weft threads because you are going in the Left to Right direction. Starting at the Left of the loom, take the first bobbin; put it through the shed to where the second bobbin was left hanging. Leave a fairly good arc in the weft thread — this is a large area to cover — and let the bobbin No. 1 fall over the weft thread of bobbin No. 2. Take bobbin No. 2 and bring it up around the weft thread of bobbin No. 1 and put it through the shed over as far as the bobbin No. 3 is. Interlock in the same way here — bringing bobbin No. 3 around and up over the weft thread of bobbin No. 2, through the shed and out to the Right selvage. Change the shed and beat. Be sure that you make a good arc with the yarn on this Interlocking shed. This completes one row of weaving, or the covering once of the warp threads. To complete a row of weaving you must go over the warp once from Right to Left and once from Left to Right. (See Figure 5.)

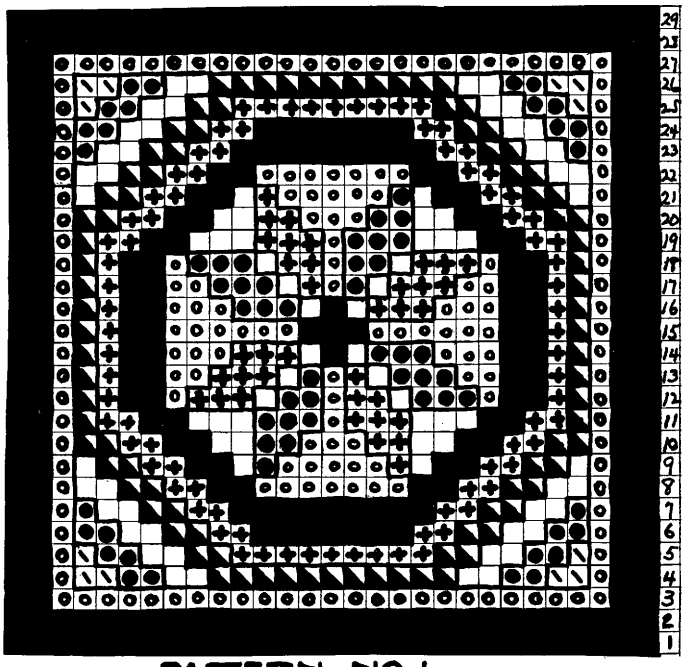
B. You now have the Pattern shed. Continue this process as you did on the first two sheds for about 16 double rows — 16 shots on the Pattern shed and 16 shots on the Interlocking shed, clear across the loom. This should give you the bottom border — the squaring of two blocks. If not, add more weft shots clear across the loom, as some yarns require more or less weft shots to make a block square. By a block I mean the height of one of your squares on the graph paper. Tie off

Illustration No. 9

bobbins 1 and 2. Bobbin No. 3 is in place for the Black side border. Discard one of the Black bobbins and tie the other one to the warp on the Left side of the loom. This is for the 8-warp thread unit of the Left side Black border.

C. You now have the Pattern shed. When tying in the Black bobbin at the Left side border you will count 4 front warp threads toward the Right — 4 front and 4 back warp threads make this 8-warp thread unit, or two squares on your pattern paper. Let this Black bobbin hang out from the Left-hand selvage. Now take 3 Rust color bobbins. Divide the 50 front warp threads into three divisions — 17 and 17 and 16 front warp threads. This takes care of the 100 warp threads in the 25 squares of design — 50 front and 50 back warp threads, that the Rust color is to cover. Tie these three Rust bobbins in as you did the Black ones. You now have 5 bobbins on the loom — from Left to Right you have bobbins of Black, Rust, Rust, Rust, Black. Your first Black bobbin at the Left of the loom is going in the correct direction as also your three Rust bobbins should be — the weft yarn going toward the right from where the end was tied in. Your other Black bobbin at the extreme Right is now brought into and through the shed back of four front warp threads to where the end of your third Rust bobbin was tied, and out onto the top of the weaving. You now have a Black bobbin hanging from the Left-hand selvage, a Rust bobbin hanging between the 4th and 5th front warp threads from the Left, a Rust bobbin hanging between the 21st and 22nd front warp threads, a Rust bobbin hanging from between the 38th and 39th front warp threads and a Black bobbin hanging from between the 54th and 55th front warp threads. Change your shed and beat. You now have the Interlocking shed. Starting at the Left of the loom, bring the Black bobbin through and interlock with the first Rust — don't forget the arc for each weft thread — bring the first Rust bobbin through the shed and interlock with the second Rust bobbin; then interlock the second Rust with the third Rust and finally interlock the third Rust over the Black — of course, taking each of these through the shed before interlocking. This completes one row of the third block. Continue with these 2 Black and 3 Rust bobbins for 8 double shots in order to complete the third block of design. Tie off Rust bobbins 1 and 2 and let Rust bobbin 3 hang on the Right side of weaving.

D. The Pattern shed is now open. Put the Left-hand Black bobbin through the shed out to the Left-hand selvage. Tie a Rust bobbin in behind 2 front warp threads (there are 2 back warp threads included in this unit, making the 4-warp thread for the square). A new Buff color bobbin is added and tied-in to account for the 2 Buff squares on the design. This Buff weft will be behind 4 front warp threads and going in the Right to Left direction. Next a new Blue bobbin is tied-in to take care of the 2 Blue squares on the design. A White bobbin is tied-in next for the space of 4 front warp threads. Then comes a space of 11 squares of Buff color. Use one bobbin to take care of the 11 Buff squares. These 11 squares will mean the space of 22 front warp threads and 22 back warp threads. A White bobbin is tied in next for a distance of 4 front warp threads; next a Blue bobbin for a distance of 4 front warp threads, and then a Buff bobbin for the distance of 4 front warp threads. The Rust bobbin is hanging on the loom at this point. Bring the Rust bobbin through the shed for the distance of 2 front warp threads or to where the last Buff bobbin was tied. And finally the Black bobbin for the remaining 4 front warp threads is brought through the shed to where the Rust color begins. Change your shed and beat. You now have the In-



terlocking shed. Starting at the Left, bring each of the bobbins through the shed to where the next bobbin lies, interlocking each where it meets the other. Change the shed and beat. This will complete one row of the weaving in that combination. Repeat this until 8 double shots are complete. You now have completed the fourth block of your design.

E. You are now ready to weave the fifth block of design. On the Pattern shed bring through at the Left of the loom the Black bobbin for 4 front warp threads; a Rust bobbin for 2 front warp. Then comes a pattern change. Look first at Figure 8 drawing. Lay in the Buff bobbin from where it ended. As it is now to cover only 2 front warp, bring it into the shed the same as you did for the 4-warp unit. But the difference will be that the Blue bobbin will start from where it ended and extend farther to the Left behind 2 more front warp and on top of the Buff weft thread. Pull the Blue bobbin through to the top of the warp. So far, then, you will have a Black bobbin extending out from the Left selvage, a Rust bobbin coming out between the 4th and 5th front warp threads from the Left-hand selvage, a Buff bobbin coming out between the 6th and 7th front warp threads from Left selvage and a Blue bobbin coming out between the 8th and 9th front warp threads. Next the White bobbin will have to advance and it will overlap the Blue weft and come out between the 12th and 13th front warp threads from the Left selvage. Now a Buff bobbin advances toward the Left and the Buff bobbin will come out between the 16th and 17th front warp threads. A new Green bobbin will have to be tied-in at a distance of 20 front warp threads from the 20 front warp already used, which are carrying 6 bobbins. This new Green bobbin is brought through the shed and comes out between the 20th and 21st front warp.

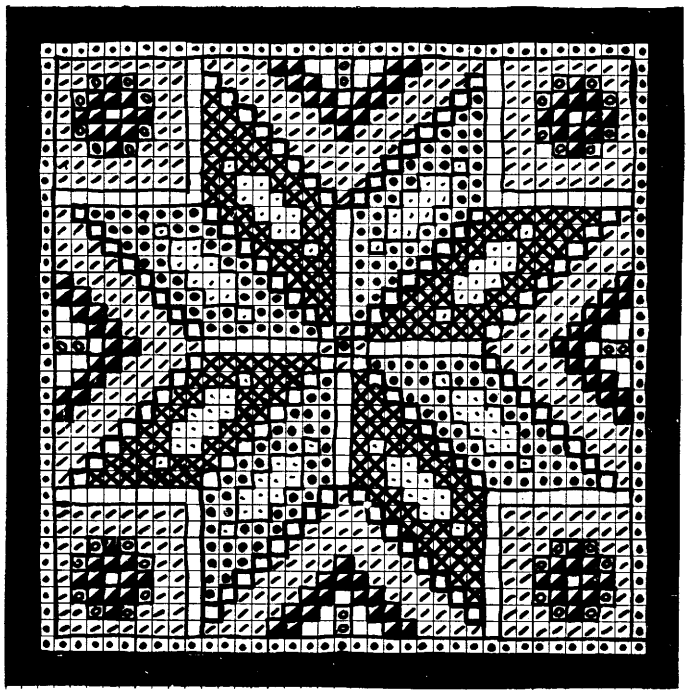


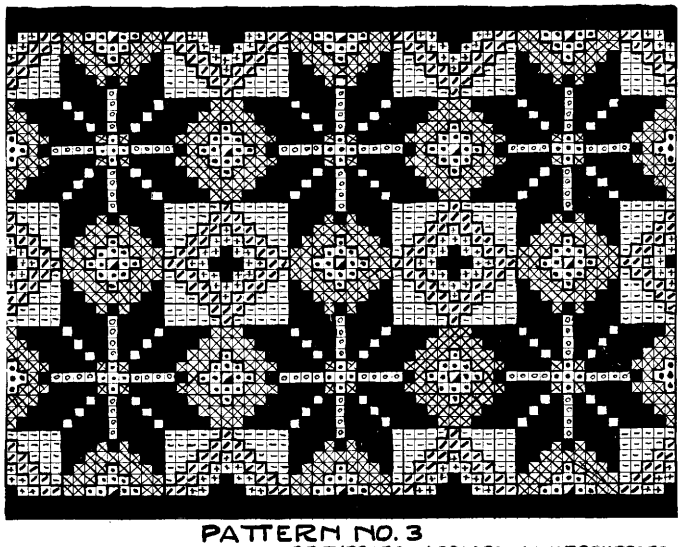
Illustration No. 10

The next step is to advance your Buff, White, Blue and Buff bobbins towards the Right of the loom. Look at Figure 6. The easier and less confusing way to do this will be to advance your farthermost Right Buff bobbin first, the one near the Rust color. Advance next the Blue, following with the White, and the last the Buff bobbin beside the Green color. Make this design change in this seemingly backward order because it is easier to do at first. However, try making the design change in the order that the bobbins are lying from Right to Left. This is probably what you will eventually do, after you have become acquainted with the working principle. It is not so difficult — in this particular instance — to make the design change in the order last spoken of, because each bobbin is visible and uncovered. If your first Buff bobbin advanced two squares (four front warp) instead of one square, your next bobbin would be covered and cause confusion.

Weave this combination for 8 double shots, and the fifth block of the design is finished. When this fifth block is completed you have accomplished all that is necessary to finish the entire design and any design — no matter how intricate or complicated — in Norwegian Åklae technique that is made up of square block designs.

I hope, in other articles, to make our American weavers acquainted with the other interesting Scandinavian techniques.

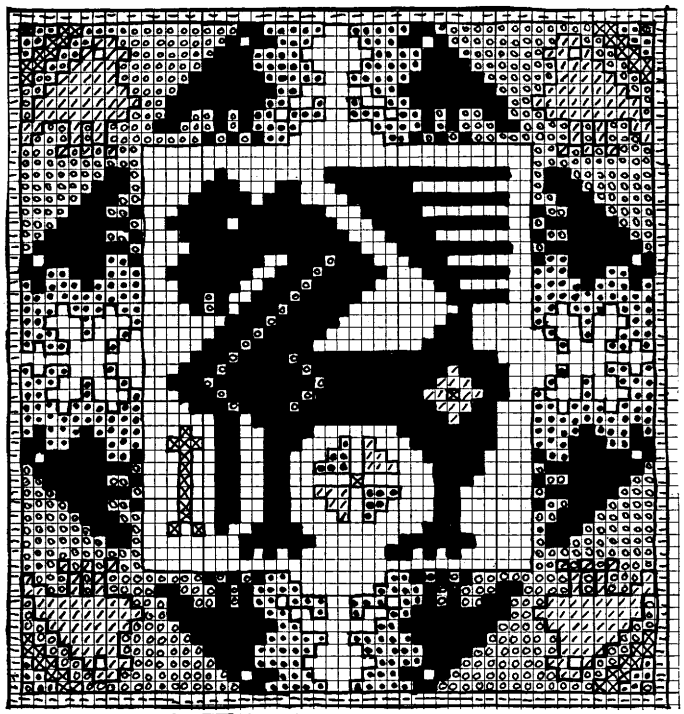
The weavings, from which the accompanying illustrations were taken, were woven by the author, with the exception of Illustration No. 6, which was woven by Mrs. Kindleberger.



PATTERN NO. 3
PEASANT WOOL-236 WARP THREADS - 1 SQUARE = 4 WARP THREADS
GREEN-183 BLUE-191 RED-186 BLUE-192 RUST-179
BLACK-196 TAUPE-199 NATURAL-197 BUFF-168

The design of the Viking was made by Mr. Gene Johnson, and appears in print for the first time. The other pattern designs are adaptations, by the author, from old Norwegian books and weavings.

A description of the "Viking" is as follows: the weaving measures about 23 x 40 inches, required 180 warp threads, allowing one warp thread to each square on the graph paper and a No. 8 reed was used. One illustration shows the front of the weaving and the other illustration shows the back of the weaving before any of the ends were clipped off. These ends were purposely left on for the entire length of the weaving so that the photograph might give some idea of what the technique looks like during the process of weaving. At one place in the weaving of the boats 66 bobbins hung from the loom. There are 23 colors in the design and it will be necessary to translate the design numbers into the color numbers of the Bernat's Tapestry wool: (1) Gobelin Blue 855, (2) Bottle Green 634, (3) Bottle Green 632, (4) Tete De Negre 676, (5) Gothic Red 646, (6) Greenish Gold 943, (7) Red 765, (8) Golden Brown 903, (9) Golden Brown 905, (10) Gothic Red 647, (11) Yellow Green 866, (12) Olive Green 684, (13) Terra Cotta 924, (14) Terra Cotta 925, (15) Powder Blue 652, (16) Wood Brown 627, (17) Golden Brown 906, (18) Leaf Green 616, (19) Reseda Green 952, (20) Reseda Green 954, (21) Gold 502, (22) Golden Brown 904, (23) Gold 504.



PATTERN NO. 4
FRENCH TAPESTRY WOOL-108 WARP THREADS - 1 SQUARE = 2 WARP THREADS
Y. RED-823 OL. GREEN-683 YEL. GOLD-943 POW. BLUE-655
CREAM-557 ANTQ. BLACK-806 SAGE GREEN-894

MORE DEVELOPMENTS

(Continued from page 4)

And the final step of the pattern is:

No. 4 with ivory
No. 3 with ivory
No. 2 with moss green
No. 1 with ivory

Completing the border, the plain weave with ivory, is indicated for two picks.

NOTE. — Any of the borders — the above, for instance — may repeat each complete step of the pattern treadling two or more times, depending on the desired size and height of the border. For example: The simplest treadling of Border B-2 is written above. An expanded treadling might be:

Plain weave with moss green — 8 picks.

First step of border	No. 4 with moss green No. 3 with moss green No. 2 with moss green No. 1 with ivory	Repeat through 2 times
Second step of border	No. 4 with ivory No. 3 with moss green No. 2 with moss green No. 1 with ivory	Repeat through 2 times
Final step of border	No. 4 with ivory No. 3 with ivory No. 2 with moss green No. 1 with ivory	Repeat through 2 times

Plain weave with ivory — 5 picks.

All of the remaining designs (Diagram C) will be given using this key. In general, each step of the patterns, because of the arbitrary limitations of the graph paper on which they are done, will be represented as occurring only once — and the plain weave areas in proportion. We think that by thus representing them, the true relation of width to height in the borders can best be shown. When the weaving is started the relative sizes of the warp and weft will determine quickly the number of repeats of each step necessary for the desired effect.

Colors, unfortunately, can be suggested in these diagrams only by an approximation of values in black, white and half tone.

But the writer hopes the material may prove inspirational and in some way provide that stimulus from which many new and lovely fabrics will result.