REFERENCES to the "Girdle of Rameses" occur frequently in weaving literature, but unfortunately, these references, which appear in so many different contexts, are not very explicit about what the girdle actually is or how it was woven. My curiosity was piqued, and I set out to find some answers.

Historical Background

The Girdle of Rameses is a linen belt five inches wide and seventeen feet long. At one end of the belt is a painted cartouche containing the hieroglyphic characters for the name of the Pharaoh, Rameses III. Using this Pharaoh's name, Egyptologists estimate that the girdle was made near 1200 B.C.

The Girdle of Rameses would be a remarkable textile even if it came from a later time period. It is woven from 3-ply linen yarns which are like fine sewing thread. These yarns, in addition to natural white, are dyed in four colors: red, blue, green and yellow. This, in itself is surprising, since linen is a very difficult fiber to dye with natural dyes. However, the interest of the girdle extends far beyond the magnificence of the yarns contained in it. The weave structure is very complex and has been a source of controversy among textile historians for many years.

The first person to analyze the girdle was Thorold D. Lee, who determined that the weave was an unusual warp-faced double cloth. Drawings A and B in Figure 1 show cross-sections of the two weaves used in the belt. In the outside borders a stripe and spot design is woven in a four-thread construction carried on four shafts. The most interesting part of the piece, however, is the center which has an Ankh design. This center portion requires a five-thread construction carried on five shafts. Photo 2 shows a woven sample of this portion of the girdle pattern.

Some time after Lee's analysis, other researchers attempted to duplicate the girdle using card weaving techniques. The attempt was not a complete success, because only one side was correctly reproduced. Following this attempt, Grace M. Crowfoot studied the girdle and successfully duplicated a portion, both front and

Figure 1. Structure of Girdle of Rameses.
- weth
- warp #1
- warp #2
- warp #3
- warp #4
- warp #5
A = four shaft structure
B = five shaft structure.
back, using pick-up sticks and heddle rods on a two beam ground loom similar to that used by ancient Egyptians and modern Bedouins. From her experience, Crowfoot estimated a weaving time of three or four months for completion of the girdle. Given the fact that there are 1689 warp threads in the piece (272 epi to 340 epi, depending on the construction) and that the weft is beaten in to 60 ppi, this time estimate does not seem farfetched.

Recently, Peter Collingwood has studied the "Girdle," and in Appendix 3 of his book, *The Techniques of Tablet Weaving*, he presents a very strong, perhaps definitive, argument that the textile is not tablet woven.

**Weaving the Girdle**

The drafts for the *spot* pattern and for the *ankh* pattern given in Figures 2 and 3 make use of Crowfoot's analysis. Because the weave is so densely warp-faced, the threading draft notation is "squashed" together so that the squares representing the shafts are arranged one above the next in a single column. Crowfoot did not indicate how the threads in the threading draft were to be picked up nor how the shafts, if any, were to be lifted. By using the interlacement in Figure 1 and the appearance of the designs, I deduced the lift sequences shown in Figure 5.

The literature about the girdle indicates that the front and the back of the cloth are alike. The same
pattern does appear on both sides, but if the girdle could be made transparent, the patterns on front and back would appear to overlap by half a repeat. The center of the Ankh on one side coincides with the space between two Anks on the other. Figure 4 gives a weave draft which shows what happens at the back of the piece while the front is being woven. To prove this to yourself, use two-sided graph paper to do the threading draft and weave draft for the face taking only the lift for the face from Figure 5B. Next, turn the paper over and trace the drafts as they show through from the other side. When the treadling for the back is put in, the result will be clear.

Neither Lee nor Crowfoot specifically mention the pattern overlap on the two sides, but when I applied a lift sequence to the structural analysis presented in the papers and did drawdowns for both sides, this was the result.

With the threading drafts and lift sequences, it is easy to weave either the 4 shaft spot design or the 5 shaft Ankh design alone. Weaving the two together as in the original girdle, with the spot design as borders and the Ankh design in the center is another matter, however. The two structures are quite unlike each other, and their lift sequences coincide at only a few points. Two simple methods exist for weaving the complete girdle on only five shafts. The first method calls for pick-up sticks and is comparable to ordinary double weave pick-up.

The pick-up stick method is as follows: For the face, treadle whatever shaft the Ankh requires (for example, #5) and insert a pick-up stick. Drop that shaft and treadle the shaft needed by the spot design (for example, #3). Use a weaving sword to pick up the threads in the four shaft section (#5 in this example); at the same time pick up the threads from the pick-up stick. Turn the sword on edge and insert a weft. For the back, follow the same procedure except upside down. That is, lift all shafts except the one which must remain down to make the back side of the cloth, and put the pick-up stick over the appropriate warp threads. To find the exact weaving order, simply follow both lift sequences simultaneously.

The second method, without pick-up, is as
follows: treadle the desired lift for the four shaft section and put the shuttle into the shed. Bring the shuttle out of the warp between the last thread of the four shaft section and the first thread of the five shaft section (as though you were weaving tapestry). Treadle the correct lift for the five shaft section and put the shuttle back into the shed between the same two warp threads where it came out. Put the shuttle through the five shaft section. If the four shaft section were on both sides of the five shaft, the shuttle would have to come out of the warp once more at the end of the Ankh, the lift for the four shaft border would have to be treadled again and the shuttle reinserted into the last unwoven section of the warp. Because the points where the shuttle comes out of the warp never change, loops of thread could be tied around the warp to separate the sections.

For weavers who have enough shafts and treadles available, Figure 6 shows a tie-up for weaving the entire girdle using nine shafts and eight treadles. For a completely loom controlled weave, the five shaft structure is threaded on shafts 1-5 and the four shaft structure on shafts 6-9. To weave, thread 1, 2, 3, 4, 1, 2 and then 3, 6, 7, 8, 5, 6. A weaver having an eight shaft loom might be able to rig a rod with string heddles to take care of shaft #9.

### Drafting Patterns With the Girdle of Rameses Weave

The two weave structures in the Girdle of Rameses are worth further study to explore design possibilities.

Two sets of drafts are needed because one of the structures was woven on four shafts and the other on five. We will start with the four shaft weave because it is the simpler one. A careful examination of the lift sequence for the face (Figure 5) reveals a simple and regular pattern—3, 1, 3 followed by 4, 2, 4, arranging colors in the warp according to that lift sequence will produce different designs. Making all of the 1’s and 3’s black and all of the 2’s and 4’s white produces horizontal stripes. Reversing this arrangement periodically produces the checkerboard in Figure 7A. With a little more thought, a weaver can have a chain pattern like Figure 7B, and further elaboration yields the lattice in Figure 7C. Figure 8 shows the possibilities when more colors are introduced, and photo at left shows a woven sample with four colors. In Figure 10 the Ankh is drafted onto the four shaft structure. Mary Atwater, in *Byways in Hand Weaving*, also drafts the Ankh figure on four harnesses, but her threading draft and treadlings do not produce the original structure found in the Girdle of Rameses, and they do not produce the ankh figure on both sides.

With the exception of the checkerboard, none of the 4 shaft patterns presented here are reversible. This may explain why the weaver of the original girdle chose to use five shafts for the center; this structure does allow for reversibility.

Patterns in the five shaft Girdle of Rameses weave work essentially the same as those on 4 shafts, but the numbers are different—5, 1, 5 followed by 4, 2, 4 for the face of the cloth. Figure 11 shows an algorithm which will change any four shaft Girdle of Rameses draft to a five shaft one and vice versa.

A long look at the weave cross sections will explain why this transformation works. In the five shaft weave, the threads on shaft 4 always work in the top layer (face) and never go to the back. Likewise, the ends on shaft 3 never come to the front. When this fact is considered, along with the motion of the other warp threads, the net result is clear: the 5, 1, 5 sequence appears alternately on face and back, and the 3, 2, 3...
sequence on the back performs the same function as the 4, 2, 4 sequence on the face. Hence, the color arrangement on shafts 2 and 3 is always identical.

Anyone who wishes to weave the drafts shown here should note the following: For the chain, lattice and colored patterns, the color sequence represented by each vertical column should be repeated three times. For the ankh, spot and checkerboard, the color sequence should be threaded only once. A weaver with time and ingenuity can develop many beautiful patterns with the Girdle of Rameses weave structures.

Technical Notes

Like many other warp-faced belt weaves, the Girdle of Rameses is best woven without a reed. Use a weaving sword to bear in the weft and adjust the width of the piece by tensioning the weft. Achieving an even width in the belt and a consistent size in the pattern may take a little practice.

The Girdle of Rameses structure can cause trouble with jack type looms when 4 of the 5 shafts are lifted. To keep the shafts not lifted from rising with the others, try either of the following remedies: Lift the shafts one at a time; tie a slack cord from the bottom of the offending harness to one of the treadsles for the shed in question. The cord should be just long enough to be tight when the treadle is depressed.

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Figure 9. Ankh figure on four shafts.

Figure 10. Algorithm for changing four shaft Girdle of Rameses draft to a five shaft, and vice versa.

Bibliography


About the author

Patricia Hilt's interests include weaving, spinning, natural dyeing and bobbin lace. She currently writes a weaving column in *Handwoven* under the name "Aelred," and has published historical articles in leading magazines. She is now studying the European origins of American coverlet patterns. An award winning coverlet and several large commissions in the Madison, Wisconsin area are among her weavings. She lives in Marshall, Wisconsin.

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