1980

An Approach to Wire Using Textile Techniques

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AN APPROACH TO WIRE USING TEXTILE TECHNIQUES

(TITLE)

BY

TONI VALLETTE-SATTERFIELD

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

MASTER OF ARTS

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

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AN APPROACH TO WIRE USING TEXTILE TECHNIQUES

BY

TONI L. VALLETTE-SATTERFIELD

B.A. in Art Education, Eastern Illinois University, 1978

ABSTRACT OF A THESIS

Submitted in partial fulfillment of the requirements
for the degree of Master of Art at the Graduate School of
Eastern Illinois University

CHARLESTON, ILLINOIS

1981

Wire can be used in the same way as fiber in many textile processes. Wire is used to gain the same richness of texture that is exhibited in fibers and to capture the light reflective quality of the textile techniques.

The following processes are not for beginning students. Much experimentation went into the research for each technique. The first method is coiling. This technique is a single-element stitch process (without the needle), worked continuously over a core. The second technique is crochet, involving a single-element structure in which loops are interlocked in a continuous manner. The third technique is loom weaving. It is the interlacing of two separate sets of elements to produce a fabric. The fourth technique is knitting, a single-element technique in which a series of loops are worked vertically through the repetition of knitting stitches placed on some kind of tool.

Yarn is the most flexible of materials, and when using metal in its place, the artist should always consider strength in determining the suitability of material to process. In determining the working properties of the metal, the thickness or gauge of the wire is always considered for the manipulation of the metal.

Although textile constructions in metal use basically the same tools and implements as those in yarn, there are a few metal working tools that are essential for cutting, bending, and forming the metal. They are wire cutters, round nose pliers, flat nose pliers, files and gloves. The equipment used in textile techniques are a harness loom, a crochet hook, and a set of knitting needles.

Open patterns such as weaving, crochet, knitting and coiling, can be tedious when repeated. When the process is completed the wire enriches the surface and a refreshing quality is created.

PREFACE

This thesis is a summary of four techniques investigated in working with wire. The purpose of this paper, in the following investigation, is to explore designs in textile techniques using wire and to also gain the same richness of texture that was exhibited in fibers.

The first method is coiling. This technique is a single-element stitching process (without the needle), worked continuously over a core. The second technique is crochet, involving a single-element structure in which loops are interlocked in a continuous manner. The third technique is loom weaving. It is the interlacing of two separate sets of elements to produce a fabric. The fourth technique is knitting, a single-element technique in which a series of loops are worked vertically through the repetition of knitting stitches placed on some kind of tool.

These processes are not for beginning students. Much experimentation went into the investigations. Included in this thesis are photographs of the finished investigations.

ACKNOWLEDGEMENT

I am very grateful to Ms. Suzan Braun and Mr. Garret DeRuiter for all the help they have given me during the past years. I wish to thank Dr. Carl Emmerich for his sincere interest and suggestions during the writing of this thesis and an inspiring thanks to Ms. Mary Lee Hu, for her correspondence. A special thanks goes to Mr. Dale Satterfield for his patience and help during the research for this paper. I would also like to thank my parents for their encouragement over the years.

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LIST OF COLOR PLATES

INTRODUCTION

The idea that metals can be structured in the same manner as textiles is certainly not original. It has existed for centuries in many different places and cultures. Throughout history, legends, tales and some recorded facts surround fabrics made with material other than yarn. One of these ancient legends tells of Montezuma; the Aztec ruler, and his cape of gold. Although Montezuma's golden cape is an unverified legend, many early records exist describing the use of gold and silver threads in weaving. The earliest description of the interweaving of gold and linen is given in the book of Exodus. "And he made the ephod of gold, blue and purple and scarlet, and fine twined linen. They did beat the gold into thin plates and cut it in wires, to work in the fine linen, with cunning work."[1]

"In Medieval times the fabrics of India and China in the East, and of Cyprus and Sicily in the West were frequently interwoven with gold and silver threads."[2] Each hand weaver must experiment with the materials to personally find out

[1]The Holy Bible, King James Version, Zondervvan Publishing Company, Exodus 39:4.

[2]Richard L. Glazier, Historic Textile Fabrics (New York: Charles Scribners Sons, 1923), pp. 4.

information that may have been known centuries ago. This is a slow process and much time could be saved if more information were available.

The jewelry craftsman, who had inherited a mountain of tradition, began to crochet, knit, braid, knot, weave, and bend materials that were completely new to him in a wire versus fiber context. No stone was left unturned in order to create change within the medium.

Gradually, various ways were explored for substituting metal for fiber in weaving, to produce a self-supporting structure without the benefit of any metalworking process in crochet, knitting and coiling. For a craftsman with enough patience and resourcefulness, all textile methods would be possible to execute in metal. Some techniques require movements in opposition to natural behavior of metal. They can be used, of course, if the material is fine in size and handled very gently and carefully. Included in the textile methods are the single-element structures of crochet and knitting which are very simple to execute in wire and have the advantage of not requiring a frame or large implements for production. The fact that they can be constructed directly off a spool of wire makes them both portable and easy

to handle. Structures which involve multiple elements, such as braiding, are more complex because they require either a frame or a base. Using textile techniques in metal does not constitute a movement or a style, just inexhaustible possibilities.

The finished wire structures have multiple possibilities dependent upon the intention and capabilities of the maker. They can be executed in any scale, from a ring for the finger to a relief for a wall. They can also be created by textile techniques. There is no one right way, only the artist's choice of direction to take.

And where are we moving now? Hopefully, the pages of this thesis will provide a few road signs. We are learning about basic materials, tools, and processes using metals in wire form.

The wires that would be needed for the investigations are a 12 gauge copper or brass wire for a core in coiling. Also needed is a second lighter gauge thin and flexible enough for knitting with enough strength to withstand the tension, such as 28 gauge magnet wire.

BASIC MATERIALS

Textile constructions involve a lot of bending, looping and interlacing, usually carried out under tension as in weaving or with the constant tugging and pulling necessary in crochet or knitting. Yarn is the most flexible of materials, and when using metal in its place, the craftsman must always consider malleability and strength in determining the suitability of material to process. Malleability refers to the manner in which metal can be manipulated and how long it can be manipulated before it breaks. Most nonprecious metals are supplied in a hard or semi-hard state unless otherwise specified.

The thickness or gauge of these wires is of the greatest importance in determining the working properties of the metal. The gauges range from 1 to 40, with the thickness diminishing as the number grows larger. Most textile techniques utilize the high end of the range which is more flexible for working.

The wires that are used in the investigations of this thesis are brass, copper, craftwire, and electrical magnet wire. Magnet wire is lacquer coated wire used for winding the electric magnets in motors. Magnet wire may be found at electrical supply stores.

TOOLS

Although textile constructions in metal use basically the same tools and implements as those in yarn, there are a few metal working tools that are essential for cutting, bending and forming the metal. Some of these tools may be found in local hardware stores:

1. Wire Cutters - for most of the soft, fine gauge wires, a small pair of four or four-and-a-half inch wire cutters is adequate.
2. Round Nose Pliers - for shaping loops and round bends.
3. Flat Nose Pliers: serrated and smooth - for pulling wire.
4. Files - for shaping metal and tapering ends of wire.
5. Gloves - for relieving the tension of wire around fingers.

PROCESS TOOLS

1. Harness Loom - for loom weaving.
2. Crochet Needle - for crocheting.
3. Knitting Needle - for knitting.

COILING

In using metal for coiling, a much broader interpretation of the various processes is possible. These techniques can be used to form dimensional shapes in jewelry, decorative sculptures, and containers of various functions and styles. Few tools are needed in coiling, and generally the work can be done in metal the same way as in fiber.

Coiling is primarily a single-element stitching or wrapping process worked continuously over a core. The core provides the bulk and the dimension in the form, and the wrapping element controls the structure and shape of the piece. The material is first wrapped a short way and then bent in on itself to form the beginning of the shape. Although these shapes are most often circular, the bases can be created in elongated oval shapes by folding a greater length of core in on itself. Next the weft is continuously wrapped around the core in a stitch and wrap pattern.

The form is raised by slowly spiraling the core material upwards in the desired curve securing it as the coiling progresses. When the form has reached the desired height, the core material is tapered to finish off evenly. In metal, this effect is achieved by filing the core into a long flat taper.

Artists are now using the coiling process to make all types of forms--flat, relief, symmetrical, polymorphous--and in every scale from one-inch containers to large wall reliefs. These complexities are possible because the structure is not hindered by a predetermined warp or particular frame or implement. The form is able to evolve as the structure grows. The core can be manipulated into spirals, straight lines, even self-supporting structures.

INVESTIGATION INTO A SPECIFIC PROCESS

PROJECT #1 - COILING

"It Won't Hold Water," - copper wire pitcher: core-12 gauge wire, wrapping material-22 gauge wire, with decorative feathers attached.

Objectives:

To create a form with a coiling technique.

Process:

The coiling process in the pitcher started in an elongated oval shape for the base. It was raised by slowly spiraling the core material upward in the oval shape and securing it with figure-eight stitches. At the widest part of the pitcher the pulled-up loops were added. (One in the first row, two in the second, three in the third, and so on.) Each one of the loops was twisted three times to secure them in place as the wire core was being spiraled inward. After the loops were formed all the way around the pitcher, the next row and proceeding rows were formed by coiling and figure-eight stitches extending upward and inward. The lip of the pitcher was made by slowly laying and stitching one side of the lip further and further on the outside of the coiled lip of the

pitcher. The handle core was then bent downward in a coiled curve. Another core piece was wrapped and incorporated in the handle to add another curve in the center of the coiled handle. The feathers were put on as the center of the pitcher was being closed up. The larger feathers were attached after the pitcher was finished by wrapping 18 gauge wire around the quill of the feathers.

Observations:

1. The piece has strength as well as being delicate.
2. A finer gauge of wire could have been used to make the coiling process easier and more precise.
3. The feathers on the handle seem to put a finishing touch on the pitcher.

Plate #1. Investigation #1
"It Won't Hold Water"

CROCHET

Crochet is an excellent technique for adaption in working in metal because metal offers more support than yarn, even the most lacy structure or the most varied shape can be readily adapted to jewelry and ornamental garments. Crochet is a single-element structure in which loops are interlocked in a continuous manner. No special tool other than a crochet hook is needed, although experimentation will be necessary to decide how large a hook is appropriate for the gauge of the wire. Crocheting requires both hands. One hand (left) holds the work and feeds the yarn or wire to the hook, while the other (right) holds the hook. The slip knot begins the foundation chain. This may be difficult to form with metal. Instead, twist a loop of wire around the hook, draw an additional loop through it, then pull firmly on both ends of the wire from underneath. Draw this through the existing loop, so that a new loop is on the hook. Occasionally check to be sure the number of each row (or round) equals the number of stitches given. Tension must be carefully controlled, and if larger loops are desired, a larger crochet hook must be used.

Colors and sizes of wire can be interchanged freely, and areas can be built over or out of any surface allowing the development of relief and dimensional forms.

PROJECT #2 - CROCHET

"Wall Flower," - red, copper, and brass craft wire, flower: 28 gauge wire.

Objectives:

To create a flower shape that is developed by combining separate elements into a whole.

Process:

The outside lacy portion of the flower was done in single, double, treble, double-treble and treble-treble crochet. The center was done with crocheting over and over a row till the desired shape was achieved. The bottom part of the flower was developed by changing color of wire with triple crocheting.

Observations:

1. The flower needed a stem to help develop the form at the top.
2. The colors worked well together.

Plate #2, Investigation #2
"Wall Flower"

PROJECT #3 - CROCHET

"Susie Homemaker," - cast silver spider, silver colored craft wire, wood base: 28 gauge wire.

Objectives:

1. To create a light airy piece with a little humor.
2. To produce a spider web made of wire.

Process:

The spider web was formed by crocheting a simple flat circular shape using single and double crochet stitches. The web was attached to the frame by a series of interlocking loops called a chain. A long chain of sixty stitches was attached from the web to the bottom of the frame with a nut and a screw, then chained to the top of the frame and to the web once more. This process was repeated three more times. The cast spider was then added by pressing the spider legs firmly into the wood base. The spider was made by the lost wax process.

Observations:

1. The base could have been of better quality.
2. The cast spider does not resemble a real spider.

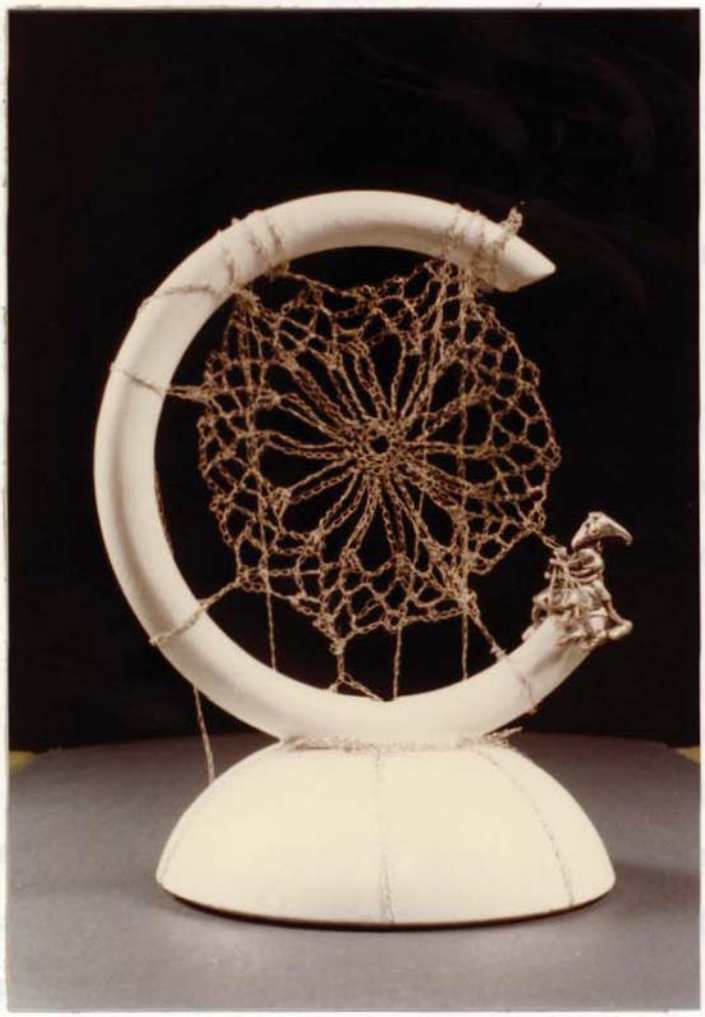

Plate #3, Investigation #2
"Susie Homemaker"

LOOM WEAVING

Weaving is the interlacing of two separate sets of elements to produce a fabric. The element called the warp is set down first. The element which interlocks with the warp is called the weft. This creates a stable planar structure from two sets of originally linear elements.

There are vast textural changes which can result from simple changes in warp and weft composition and in variation of weave construction. Together these produce a wide range of effects.

A wire gives a quite different surface quality to a woven structure. A wire warp with a weft of metal can produce many varied effects. Slight structural changes such as this will influence the way the piece moves and flexes as well as its appearance.

Frequently wire has been stretched across the fixed frames and hoops in the creation of screens and hangings and used as weft where rigidity of structure is desired. With the proper selection of wire type and size, wire warps, too, can be used as easily as yarn warps on inkle looms, back strap looms and even standard two-, four-, and eight-harness looms.

A few necessary precautions should be taken when preparing a metal warp for use on a loom. Arline M. Fisch, author of Textile Techniques in Metal, advises in winding the warp, "it is preferrable to do so around as long a length as possible in order to avoid crimping the wire by unnecessary bends. Before removing the warp from the tension of the pegs, place masking tape across the width at frequent intervals to eliminate unnecessary tangling. The warp should be kept taped until one end is fastened to the back beam of the loom, and spread to the approximate width of the loom."[3]

When winding the warp around the back beam, it is necessary to use paper and slats to separate the layers of warp as they wind around. After threading through the heedles and reed, the warp is attached to the cloth beam, not by tieing as with yarn but by twisting each piece around itself. The maintenance of tension is not a serious problem despite the lack of stretch quality in wire. As even tension must be established across the width of the warp, and as the warp will be subjected to extremes of movement, it should be loosened slightly first.

[3]Arliene M. Fisch, Textile Techniques in Metal for Jewelers, Sculptors, and Textile Artists (Van Nostrand Reinhold Co., New York, 1975.), pp. 75.

Weaving with wire proceeds in the same way as with yarn. The shed is changed and the weft is pushed down with the beater. The front beam of the loom may need padding to keep its edge from bending or damaging the woven metal structure as it is finished and wound up. It is also important to wind sturdy paper or fabric between these layers of finished weaving to prevent any damage to the surface of the metal. With wire the warp can be cut off the loom. Finishing can be by coiling, twisting, or weaving ends back into the structure. It is not necessary for weaving to be done only in variations of the rectangular format. When working with a loom it is possible to weave to any shape by controlling the edges of both warp and weft. Both flat and silhouetted forms can be shaped through structural manipulation and placement of a wire warp in a shaped outline. For basic instruction on weaving itself see Bibliography.

PROJECT #4 - LOOM WEAVING

"Test Weave," - natural, red, blue, green, electrical magnet wire, brass and copper wire. Warp-28 gauge copper, electrical magnet wire; weft-28 gauge red, blue, green, and natural magnet wire, 22 gauge brass; four harness-loom.

Objectives:

To create several patterns and textures in weaving with wire.

Process:

The following weaves were used: plain weave or tabby (one over, one under); basket weave (two over, two under), plate #4; twill weave (one over, three under in a diagonal rotation); spanish lace (weaving a small group of threads in plain weave going back and forth as often as desired); leno (warp threads are twisted around each other and secured by the weft thread); danish medallion (weave a few rows in a plain weave, open the next shed, lay in a heavy gauge wire, then weave several rows of the plain weave, open the next shed and bring a loop of the heavy wire over the plain weave and under the heavy weft wire and draw tightly the knot that has been formed); brooks bouquet (grouping and tying warp ends). Some of the weave examples are on plate #4.

Observations:

1. Experimentation should always be used before starting a new project.
2. A padded front beam must be used to keep from distorting the weaves.
3. Any weave that has been done in fiber can be done in wire.

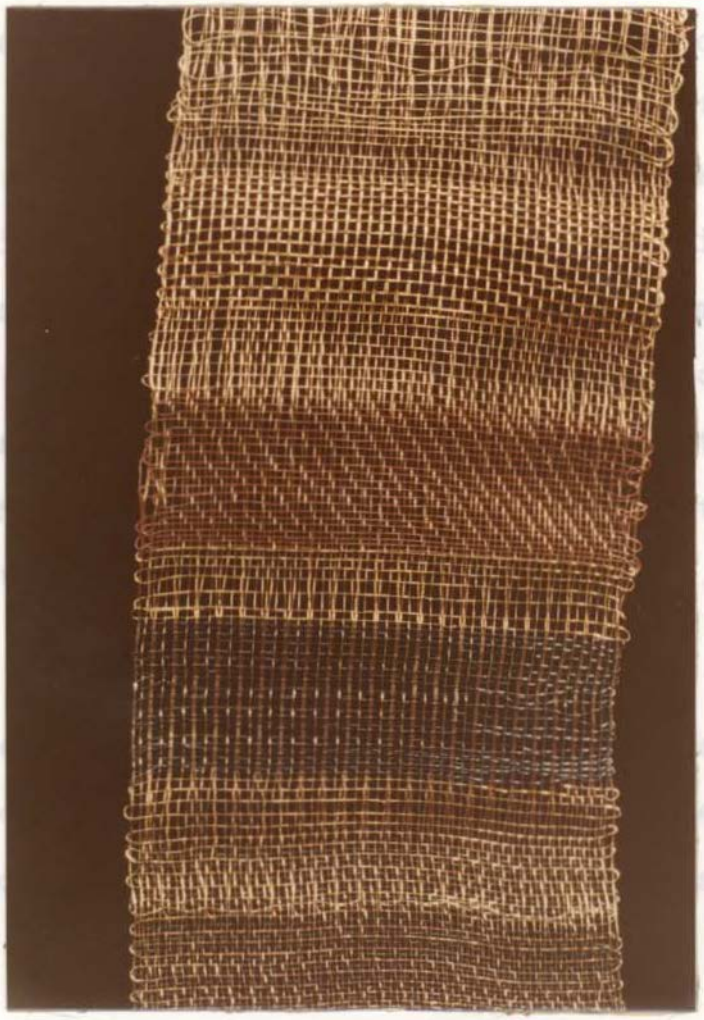

Plate #4, Investigation #3
"Test Weave"

KNITTING

Knitting is a continuous single-element technique in which a series of loops are interlocked vertically through the repetition of knitting stitches placed on some kind of tool. The new stitches are constantly interlooped into the already existing structure to expand, extend, or compress it. The fabric can be produced as a single flat plane, or as a round form, such as a tube. The interlooping structure remains basically the same throughout all knitting but the type and scale of the tool will change the form produced, either flat or tubular.

All of the methods are quite simple once the basic movements are understood, but it is a good idea to experiment with each before deciding on a particular approach since similar forms can be produced in a variety of ways.

To begin, a certain number of loops must be cast on a single needle. In wire, this is accomplished by the simple method of twisting the wire around the index finger to form a loop which is then slipped onto the needle. Gloves can be worn to relieve tension on the fingers.

When the second row is to be started, switch the needles to the opposite hands, so that the second needle is again

empty, and begin another row. With metal, the casting off must be done as loosely as casting on in order to maintain the proper width of the piece. Knitted lace patterns are especially beautiful when done in wire. The light reflective quality of wire lends brilliance to the entire structure.

PROJECT #5 - KNITTING

"Purse," - red, 28 gauge electric magnet wire knitted in a rectangular shape with a cast decorative accent.

Objectives:

To create an experimental piece, simple but decorative, with the wire itself.

Process:

To begin, a certain number of loops must be cast on a single needle. (Stitches are constantly interlooped into an already existing structure to extend, or compress it.) When the second row is started, the needles are switched to the opposite hands, so that the second needle is again empty. With metal, the casting off must be done as loosely as casting on in order to maintain the proper width of the piece.

Observations:

1. The piece is very simple in subject matter.
2. The light reflective quality of the wire lends brilliance to the entire structure.
3. The cast piece does not incorporate itself in the purse structure.

Plate #5. Investigation #4
"Purse"

CONCLUSION

When working with an open pattern such as some of the weaving, crochet, knitting and coiling designs throughout the processes of fiber versus wire, the most consuming factor is the repetition of doing the stitch over and over again.

First, there is the need to figure the length of the wire and the gauge needed in order to fill the space allotted. This may require a drawing of the finished design to see that the idea fits the area. A pattern may also be necessary to determine the exact size in weaving. Once everything is ready, the work is just repetitious. This along with the surface enrichment that it bestows gives a refreshing new quality.

GLOSSARY

BASKET WEAVE--A weave in which two shots travel over and under sets of two warp elements.

COILING--A process worked continuously over a wrapped core to make a form.

CROCHET--A kind of needle work consisting of loops.

END--An individual warp element.

GAUGE--A standard of measure which refers to metal thickness.

HARNESS LOOM--A machine for weaving fabric by interlacing the weft element through the warp element.

HEDDLE--In the loom, one of a set of cords, wires or strips of metal suspended from a harness with heddle eyes through which warp ends are threaded.

KNITTING--To form fabric by the interlooping of elements by means of needles.

LENO--Open weave made by twisting warp elements around each other.

MALLEABLE--Refers to the ability of which metal can be manipulated and how long it can be manipulated before breaking.

REED--Removable part of the beater which spreads the warp.

SHED--Opening in warp through which shuttle passes.

TABBY--Plain weave. A basic weave created by consistently interlacing one warp element with one weft element.

WARP--Elements stretched length-wise on the loom.

WARP BEAM--Roller in back of loom on which the warp is wound.

WEFT--Elements crossing the width of the fabric.

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