1971

An Investigation of Certain Aspects of Embellishment with Wire

Elizabeth A. Rickmeyer
Eastern Illinois University

PAPER CERTIFICATE

TO: Graduate Degree Candidates who have written formal theses.

SUBJECT: Permission to reproduce theses.

The University Library is receiving a number of requests from other institutions asking permission to reproduce dissertations for inclusion in their library holdings. Although no copyright laws are involved, we feel that professional courtesy demands that permission be obtained from the author before we allow theses to be copied.

Please sign one of the following statements.

Booth Library of Eastern Illinois University has my permission to lend my thesis to a reputable college or university for the purpose of copying it for inclusion in that institution's library or research holdings.

July 26, 1971
Date

Author

I respectfully request Booth Library of Eastern Illinois University not allow my thesis be reproduced because _____

_____

_____

_____ _____

Date Author

AN INVESTIGATION OF CERTAIN ASPECTS

OF EMBELLISHMENT WITH WIRE

(TITLE)

BY

Elizabeth A. Rickmeyer

THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF

Master of Arts

IN THE GRADUATE SCHOOL, EASTERN ILLINOIS UNIVERSITY
CHARLESTON, ILLINOIS

1971
YEAR

I HEREBY RECOMMEND THIS THESIS BE ACCEPTED AS FULFILLING
THIS PART OF THE GRADUATE DEGREE CITED ABOVE

July 19, 1971
DATE

ADVISER

July 19/71
DATE

DEPARTMENT HEAD

ACKNOWLEDGMENT

I am deeply grateful to Mr. Garret De Ruiter for his continued help, encouragement, and personal interest throughout my work on this thesis.

I would like to extend my appreciation to the other members of my committee, Dr. Lynn Trank and Miss Susan Braun, for all the time and assistance they have given me.

A note of gratitude must be extended to Phillip Hahn for the photographs utilized within this thesis.

A special thank you to my fiance for all his patience.

PREFACE

Many different techniques of working with wire have developed through the ages. The application of filigree, the twisting and curling of small wires, has been traced back to Mesopotamia around 2500 B.C. Figure I illustrates the filigree.

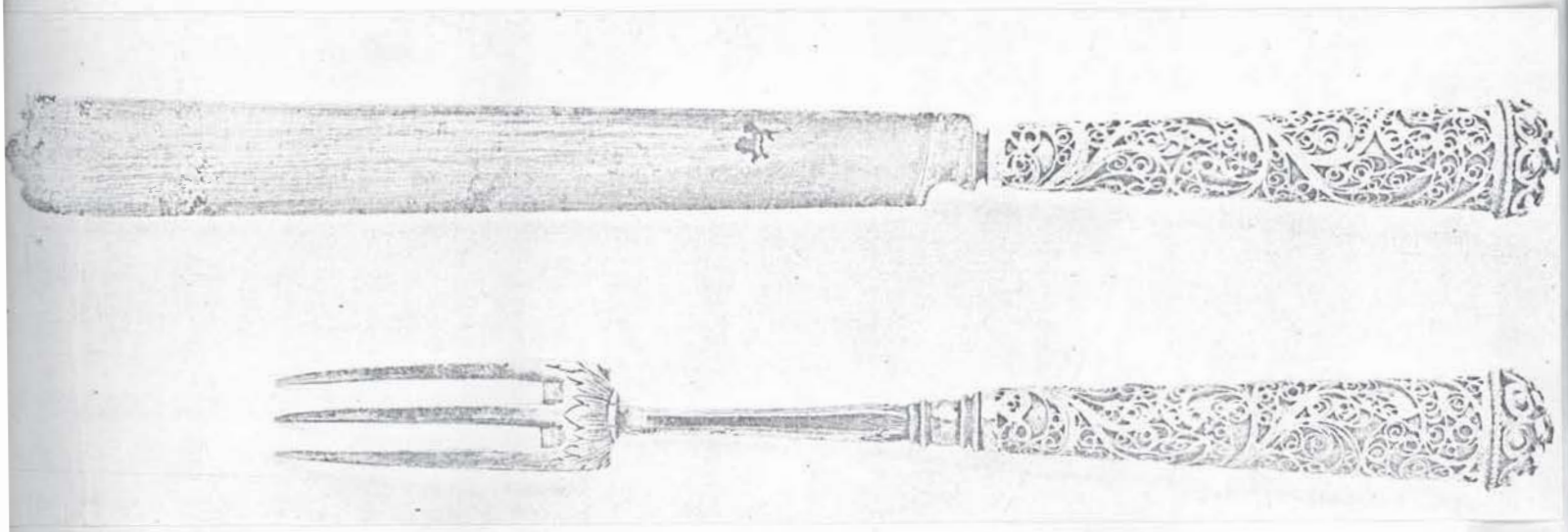

Fig. 1.--German silver-gilt knife and fork with filigree decorated handles, 1660-70. (Oppi Untracht, Metal Techniques for Craftsmen, p. 200.)

Intricate chain work was another development from wire which has been in use since around 2200 B.C. (Figure 2).

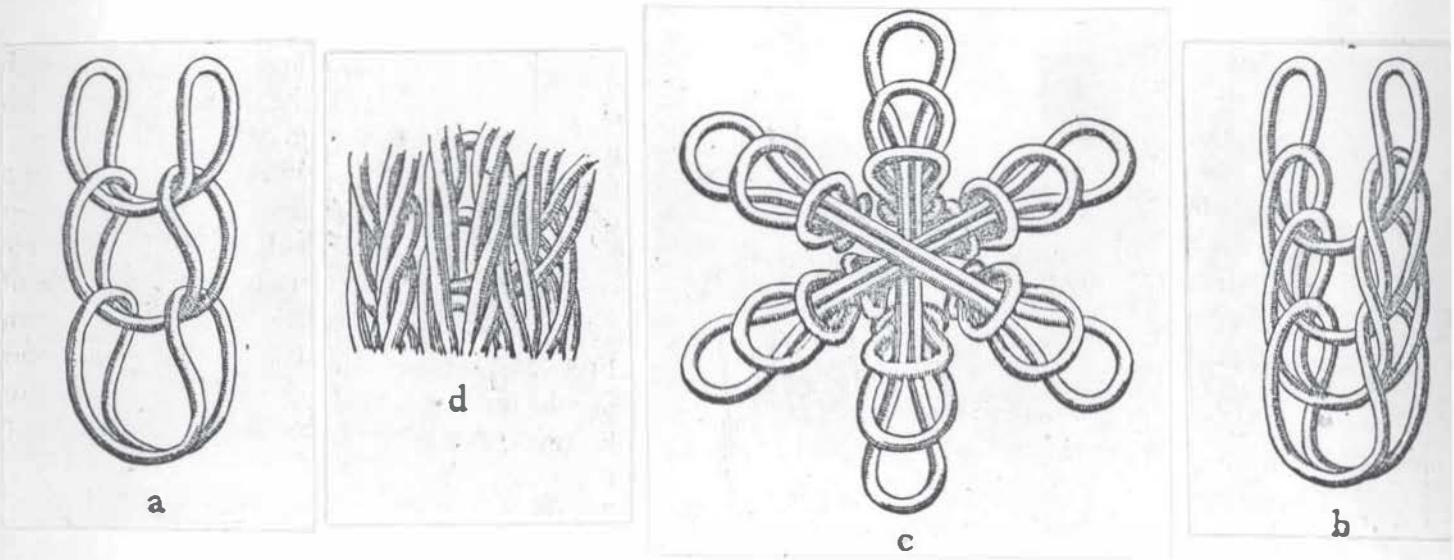

Fig. 2.--The development of the loop-in-loop chain. a, single. b, double. c, doubled, sextuple, end view. d, ditto, completed, side view. (R.A. Higgins, Greek and Roman Jewellery, p. 15.)

Wire was also used to surround and embellish jewels like those found on the crown in Figure 3.

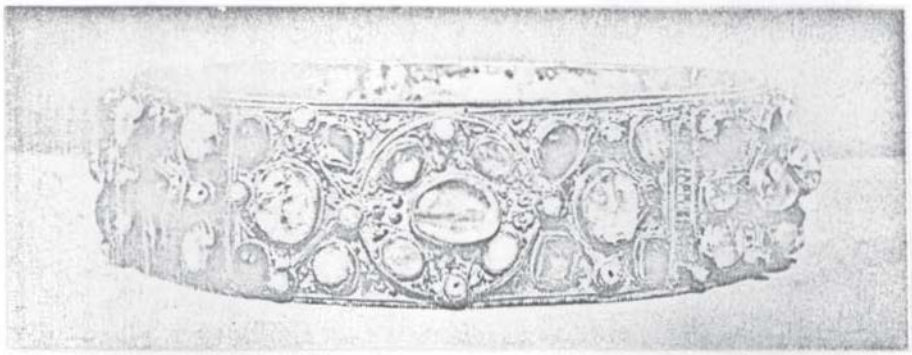

Fig. 3.--Crown for Queen Kunigunde. Lorraine, perhaps metz, c.1010. (Graham Hughes, Jewelry, p. 47.)

Another technique used a long length of wire that formed a coil or that alternated back and forth to form a pattern. (Figures 4, 5).

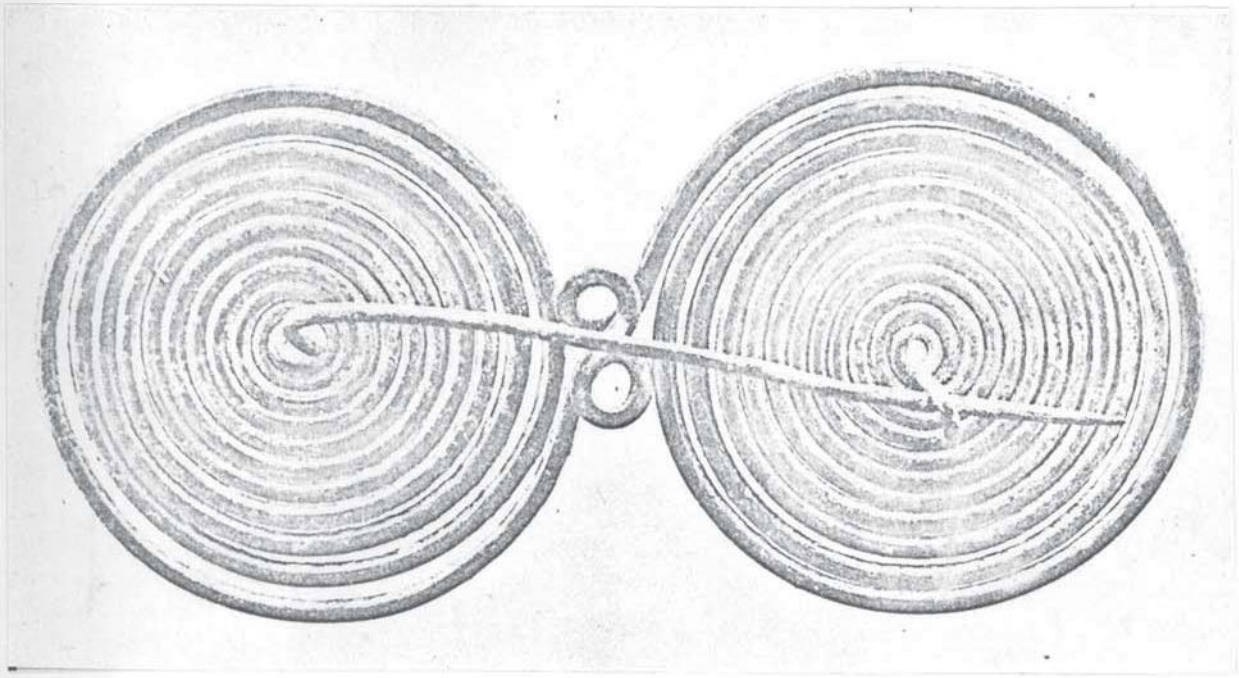

Fig. 4.--Greek bronze wire fibula, tenth-eighth century B.C. (Oppi Untracht, Metal Techniques for Craftsmen, p. 193.)

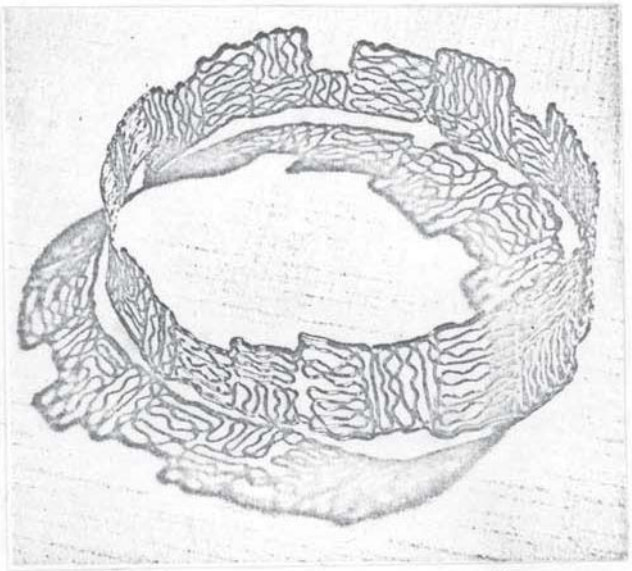

Fig. 5.--Gold wire necklet, by E.R. Nele, Munich, Germany. (Oppi Untracht, Metal Techniques for Craftsmen, p. 194.)

In the later nineteen hundreds more simplified displays of wire were seen in delicate forged pieces. (Figures 6, 7, 8).

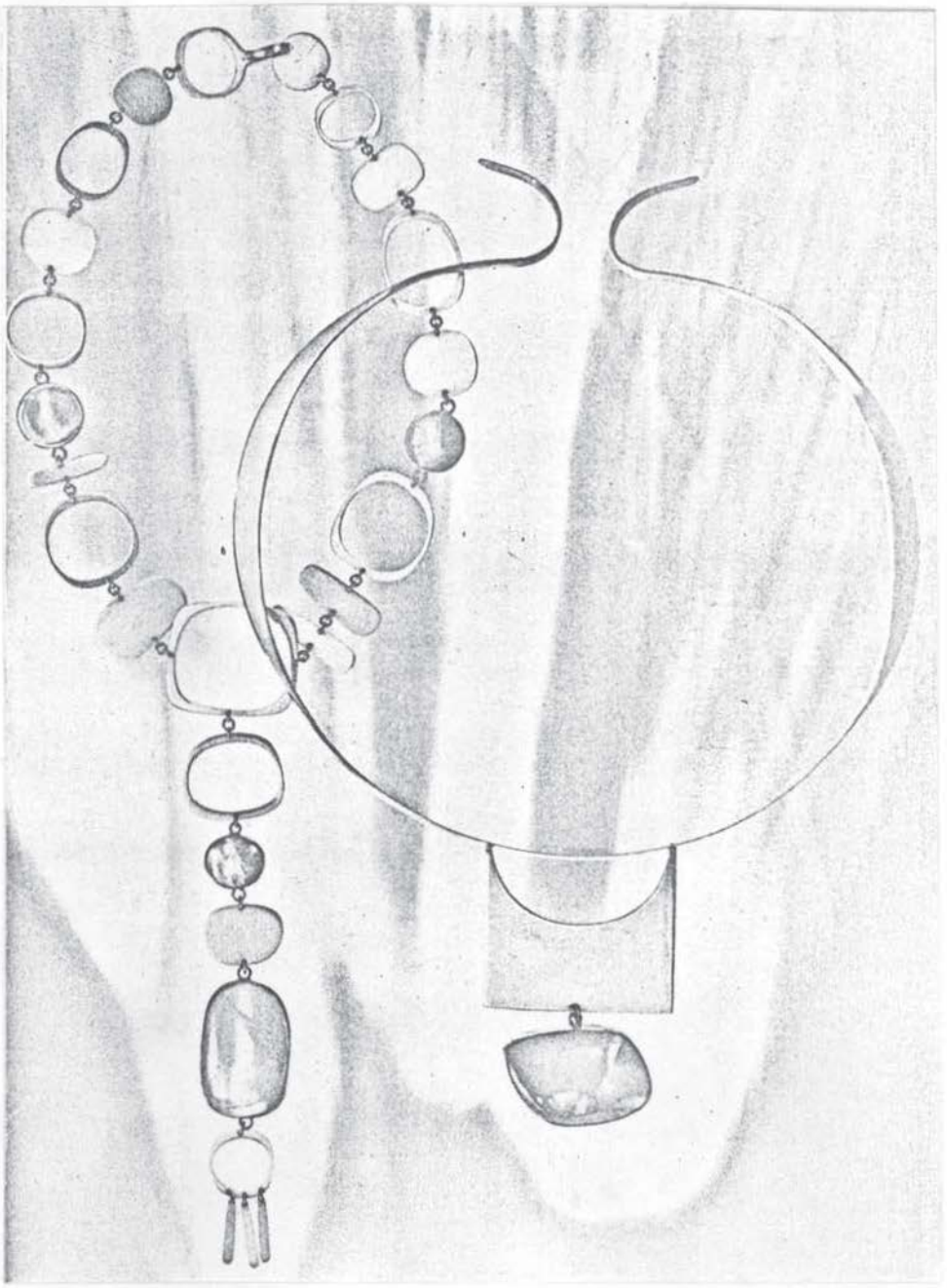

Fig. 6.--Gold neckpiece, by Gerda Flockinger, English, 1965. (Graham Hughes, Jewelry, p. 158.)

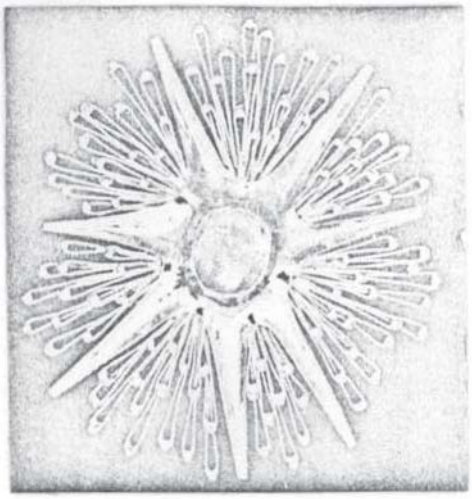

Fig. 7.--Gold brooche, by David Thomas, English, 1965/6. (Graham Hughes, Jewelry, p. 159.)

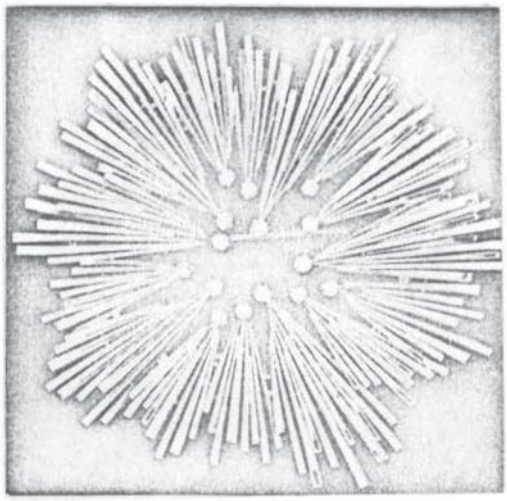

Fig. 8.--Gold brooche, by David Thomas, English, 1965/6. (Graham Hughes, Jewelry, p. 159.)

My purpose in the following investigation was to explore more ideas for wire patterns as embellishment. Some of the techniques were taken from various methods of weaving and macramé. I wanted to achieve in metal the same richness of texture that was exhibited in the fibers. The designs were to be the center of interest embellishing a pure and simple form.

What is Wire Embellishment

I have chosen to define wire embellishment as the decoration of a metal object with wire of either a heavy or light gauge.

To achieve this decoration I investigated four techniques of working wire. The first method was forging. This technique caused a change in the metal when massive hammer blows were applied. The second technique was wrapping and involved binding wire around one wire, many wires, or other objects in a controlled manner. The third technique was macramé. This was the knotting of wires in a decorative fashion. The fourth technique was weaving. This process called for an actual loom and a handmade loom constructed with boards and nails. These looms were dressed with wire warp and woven with wire weft.

After experimental investigation of these techniques, it was necessary to study ideas of application. Through observations of the wire experiments, I noted various opportunities that the wire provided, such as knotting, lacing, and balling the ends of the wire. With these techniques and the use of solder, I created the attachments that secured the embellishments to pieces of holloware, flatware, and jewelry.

With each piece in these three categories, there were certain intentions which I sought to achieve. One was to emphasize the functional character that all pieces require. Tiny gauge wire is very vulnerable

to damage and must be protected; also, wire embellishment must not obstruct the practical use of the piece; therefore, the mechanics of the attachment and the mechanics of the entire piece must work together as a functional unit.

Although the mechanics and the function of the object may have dictated the placement of the wire, there was still an aesthetic factor that had to be considered. A piece may work mechanically and functionally, but if the wire embellishment does not enhance the piece then it should not be applied. There must be an integration of the wire embellishment with the body of the piece. However, even if these three factors were considered, a unit could still be inferior if there were a low grade of craftsmanship. Thus, I sought to present function, mechanics, and embellishment united by good craftsmanship.

TABLE OF CONTENTS

INTRODUCTION

Background to Project

During my earlier years of study in jewelry and metalsmithing, I became involved with the technique of forging. I enjoyed forming the metal which was probably due to the direct personal contact with the metal itself, and I had a greater appreciation for the finished piece. This involvement with forging was my initial contact with wire.

I began by using square wire about eight to fourteen gauge. From the eight gauge wire I created a candle chandelier which gave me the greatest insight into forging. With this knowledge, I wanted to create a forged neckpiece and incorporate feathers in the decoration. The mechanics of attaching these feathers involved the use of wire and started my thinking of other possibilities of wire as a functional and decorative material.

While working on a series of mechanical wire problems, I went to a conference of the Society of North American Goldsmiths (SNAG). At this conference, I met and became familiar with the work of a woman named Mary Lee Hu. She has done extensive work in wire wrapping with light gauge fine silver wire. I was fascinated with her work and wanted to learn more about it. One month later I attended a workshop that she gave at the University of Wisconsin-Milwaukee. I gained much insight into the handling of wire, and I wanted to explore more ideas.

Since the wire was fine silver and thread-like in character, I decided to relate it to some methods of weaving and macramé. Thus, I came to compile my series of embellishments around forging, wrapping, macramé, and weaving.

SPECIFIC PROJECTS

Project 1

"Feathers," sterling silver neckpiece of 12 gauge square, and 24 gauge round sterling silver wire, and stiff biot feathers.

Objective:

Create a neckpiece that fits the contours of the body and incorporates feathers in the design.

Process:

The curves of the neckpiece were forged into a single piece of 12 gauge wire which gave it strength. The ends of the wire remained apart, positioned on the front of the body, and became the connections for the feathers. One hole was drilled into each end of the wire and a piece of 24 gauge wire was inserted and soldered to each. This wire was used to bind the feathers to the neckpiece, and the remaining tail was balled at the end and curved to flow into the feathers.

Observations:

1. The piece has strength and the binding works well to secure the feathers.
2. The remaining curved tail of binding wire has a subtle way of tying the orange feathers in with the silver.

PLATE I Feathers

Project 2

Series of mechanical catch systems.

Objective:

Learn the properties of different gauge wires and devise catch systems that would be an integral part of the design of a piece of jewelry. No applied devices or commercial findings of any sort could be used. However, other materials could be incorporated into the design.

Process and Observations:

Each observation is dealt with in the following individual problem.

Problem 1

"Iris Pin"--double pin, sterling silver 18 gauge wire.

Mechanics:

Top pin contains a swing joint that comes down and locks the bottom pin in place. It also contains the pin stem which is inserted into the material. The bottom pin contains the catch for the pin stem which is slipped up the remainder of the pin stem after insertion through the material. The swing joint, which is a big petal spiraled around two other petals, is pushed down over the top petal of the bottom pin. This locks the pins together as one unit.

Observations:

1. The silver wire was too heavy a gauge to carry through a well-controlled design when wrapped to construct the swing joint.
2. The mechanics of the pin work fine when inserted into the material; the bottom pin will not detach from the unit. However, the pin off the body by itself is unstable as a unit.

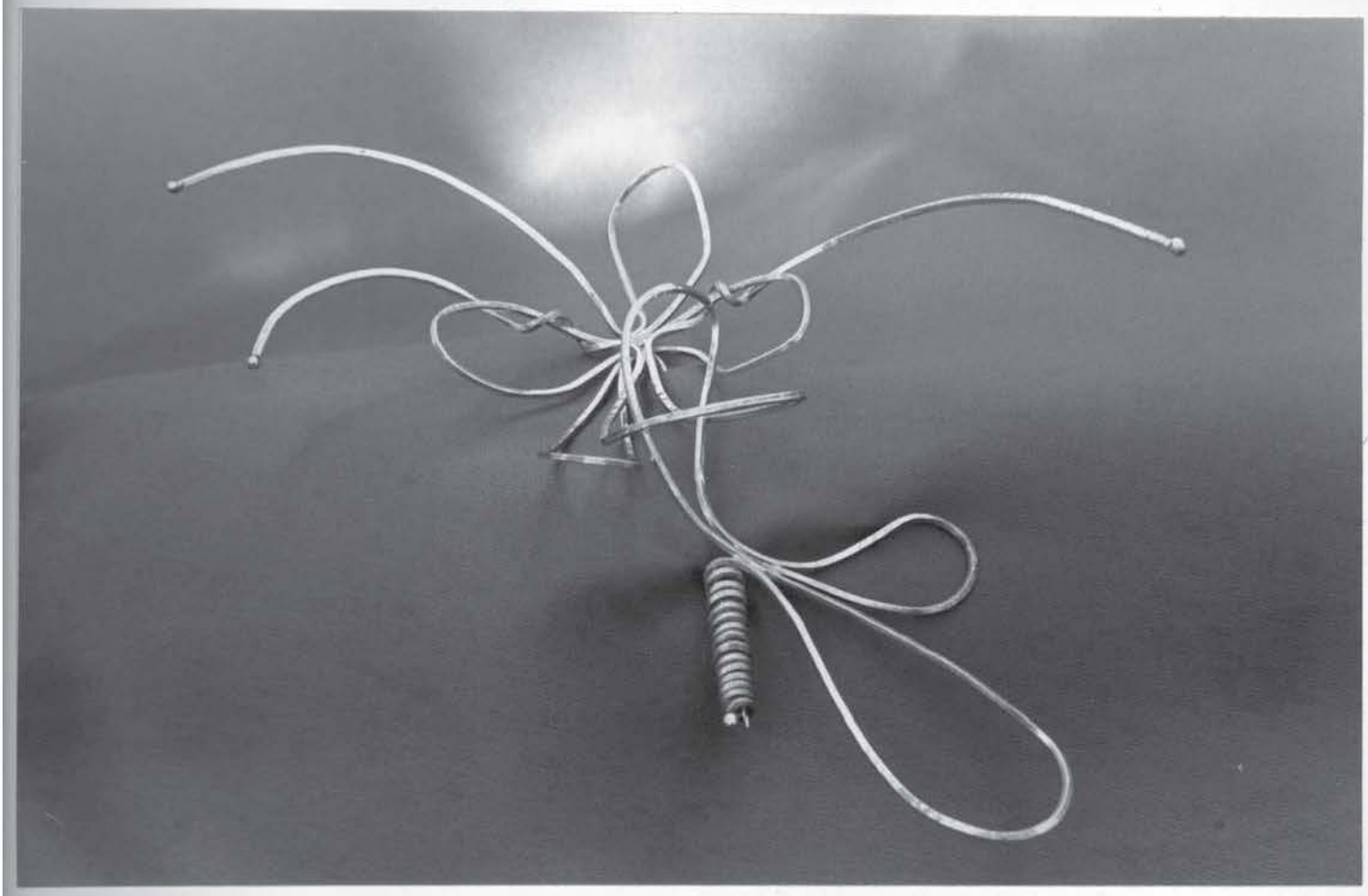

PLATE II Iris Pin

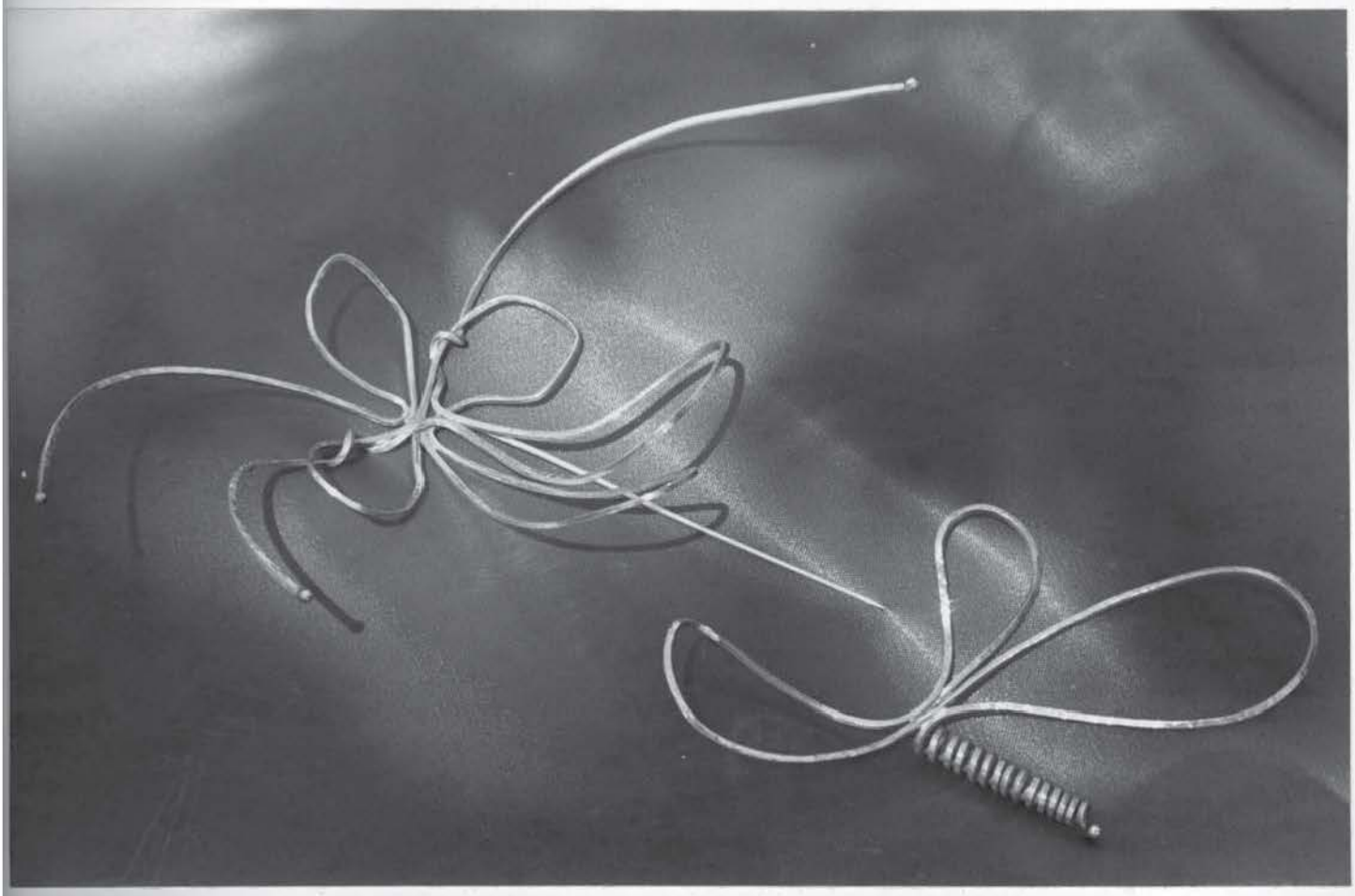

PLATE III Iris Pin (apart)

Problem 2

"Fantasy Flower"--nugold 21 gauge round wire, stiff biots.

Mechanics:

One loop petal has one end disconnected from the center where all other petals are bound together. This end becomes the forged pin stem with spring tension. This is inserted through the material and allowed to spring back into one of the spirals which is a simulated stamen of the flower. The spiral acts as the safety catch.

Observations:

1. The mechanical idea works, and the pin is a secure unit when it is worn as well as when it is not worn.
2. Control of the wire is lacking in the bound area.
3. As yet, not much has been done with the wire design except to use it to outline the form.

PLATE IV Fantasy Flower

PLATE V Fantasy Flower (pin stem)

Problem 3

"Dream Flight"--forged 12 gauge sterling silver wire, 23 gauge sterling silver wire, and hackle feathers.

Mechanics:

The top of the forged wire form contains the pin stem. This was achieved by reversing the plane of the wire at the top so that the depth of the wire was coming away from the body. This depth allowed the wire to be split up to a certain point. This made two wires. The first one was in front and was textured to flow in with the rest of the forged wire. The second one was in the back and was filed into a taper to become the pin stem.

The attachment of the feathers was done with 23 gauge wire. Holes were drilled in various places on the forged wire. The feathers were then bound at the ends with the 23 gauge wire. The ends of the feathers were too soft to bind and tended to follow the wrap wire. A small piece of silver wire was laid in with the ends of the feathers which gave them enough strength to be bound tightly. The wrap wires were cut long so that after the feathers were bound there was enough wire to be inserted into the holes of the forged wire and the remaining wire spiraled into a taper. On the top section along with the pin stem one of these spirals became the catch.

Observations:

1. The catch system works; however, the split was not long enough to support the pin in the originally planned position.
2. This pin was an attempt to show more depth in the forging in order to enhance the role of the wire in the design.

PLATE VI Dream Flight

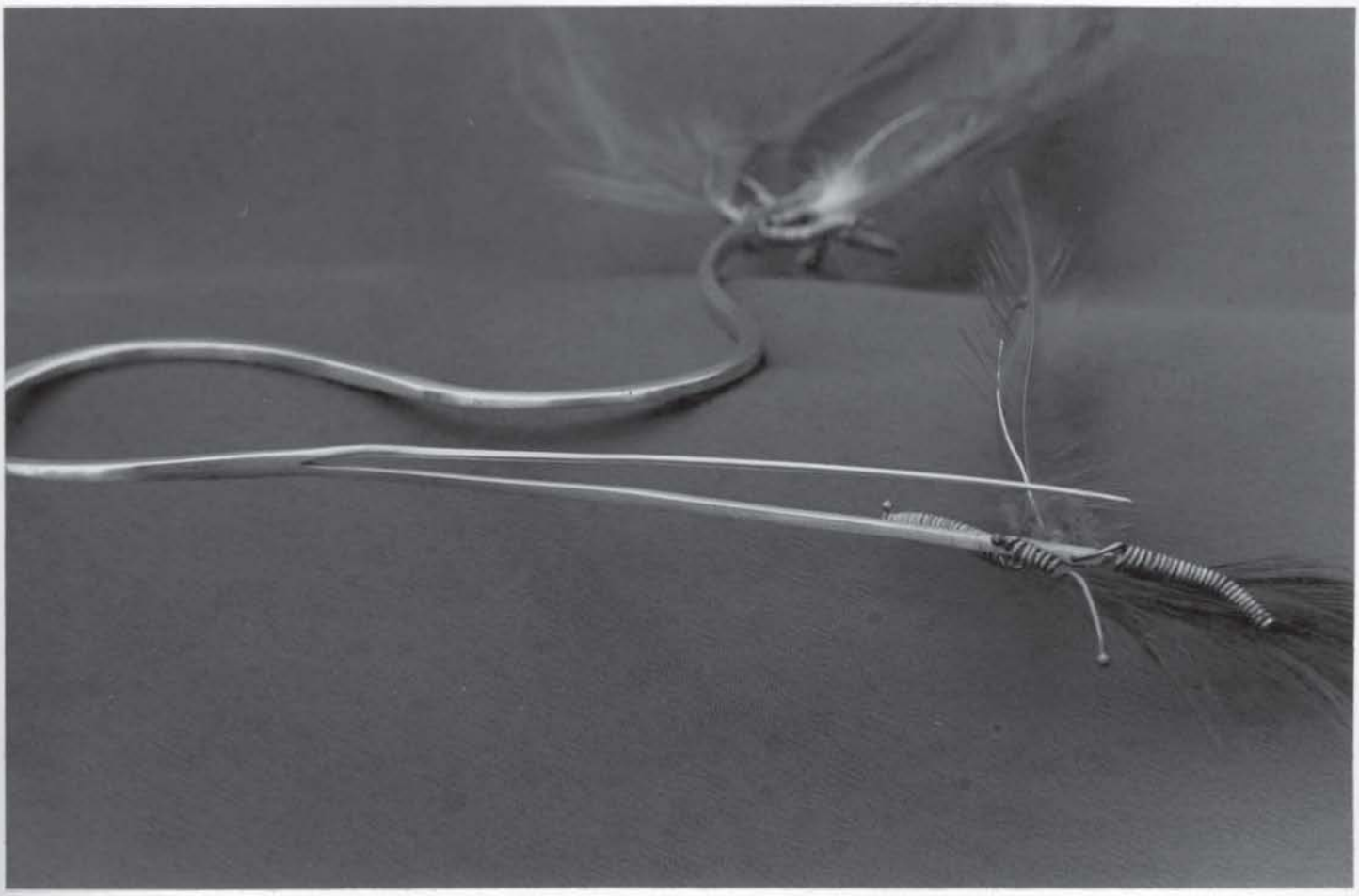

PLATE VII Dream Flight (pin stem)

Problem 4

"Variation"--double pin, forged 15 gauge sterling silver wire, 23 gauge wire, beads.

Mechanics:

The background section of the pin contains the pin stem and the catch. This section consists of a spiral with a tail of straight wire which was bent down behind the spiral to run parallel with it. Two opposing forged curves were brought together at one point. At this point the spiral was placed vertically on top allowing the pin stem to run down the back.

The foreground piece consists of a forged triangular piece with the ends of the top angle extended straight up, but forged so that they do not touch. The base line of the triangle supports three strands of beads interspersed with spirals. They are connected with wire which was threaded through holes in the base line and worked into a spiral on the opposite side.

The background piece is first secured to the material. Then, the two straight extensions of the triangle are squeezed together and pushed up through the central spiral of the background piece and pulled through. The central spiral of the beads on the foreground then houses the end of the pin stem. The tension and fit of the forged extension wires secure the piece into one unit.

Observations:

1. Mechanically and aesthetically this piece overcomes most of the major faults previously encountered:
    a. It is a sturdy design and maintains this design on the body as well as off the body.

b. The wire plays a dominant role in the design because it reveals a fuller potential for forging.

c. The catch system is very well concealed in the over-all design, yet, is a center of interest in the pin.

2. The mechanics of this pin worked so well that it inspired me to carry it further in Problem 5.

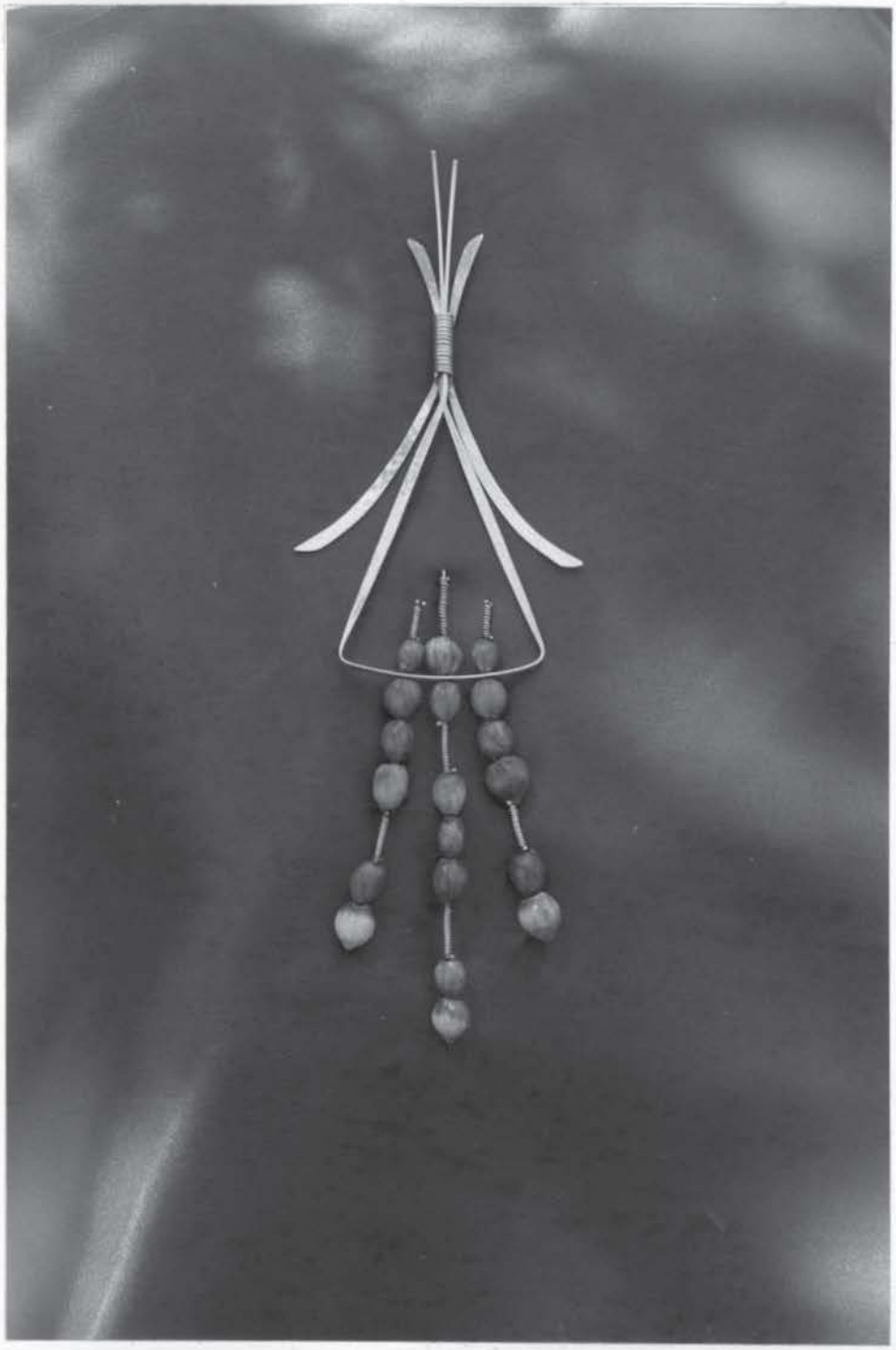

PLATE VIII Variation

PLATE IX Varaiation (apart)

Problem 5

"Salt and Pepper Pour"--19 and 16 gauge square sterling silver wire, 23 and 24 gauge round silver wire, beads.

Mechanics:

The central catch system is the front design of the piece. It consists of a forged curved triangular shape. The top ends of the triangle curve down into the inside of the shape and are left straight, but they are forged so that they do not touch. Each end of the strand of beads has a curved forged wire with a spiral at each end. The straight ends of the central piece are squeezed together and pushed through the left spiral and then through the right spiral which is positioned lower on the wire. The spring tension of the forged wires against the spirals, together with the added weight of the three strands of the beads attached to the central design, hold the neckpiece closed. This weight in the front is counter-balanced by three longer strands of beads that hang down the back.

Observations:

1. The catch system was again successful.
2. The forged wires extending from the beads have quite a bit of spring to them. Possibly a heavier gauge wire could have been used; however, the beads produced some limitations when it came to balling the end of the wire.

PLATE X Salt and Pepper Pour

Project 3

"Ball Your Own Baby"--sterling silver birth control pill holder of 20 gauge sheet metal; and 26 gauge and 22 gauge round fine silver.

Objectives:

Create a container of sheet metal with wire decoration and mechanical devices.

Process:

The container was made by raising two off-centered shapes that formed a clam shape when put together. The top form contained the rim used for opening and closing. The rim consisted of a soldered circle of 22 gauge wire which became the core wire, and 28 pieces of 26 gauge wire that were bound together by a 26 gauge wrap wire. Starting from the center of the wires, the wrap wire went around six times and then one sub-wire was pulled out of the mass. This was done respectively until all wires were pulled out. The sub-wires were then inserted into holes drilled into the top of the clam form and the ends were cut and balled. Two wires on either side were not inserted but cut and balled. These served to position the lid when it was closed.

The hinge was formed by the wrapping technique also. The wrap wires were bound around the core wire and through the lid, forming the two sections of the hinge. The bottom section positioned between these two was formed the same way. The ends of the wrap wires of the two top sections were used to form a design of decorative loop wrapping which is found on the inside when the lid is opened.

The base for the piece has a supporting rim which was constructed and attached in the same fashion as the rim.

Observations:

1. The rim and wire connections are secure and durable.
2. The hinge should be five sections instead of just three.
3. The base could use more forming.
4. The piece as a unit aesthetically blends together.

PLATE XI Ball Your Own Baby

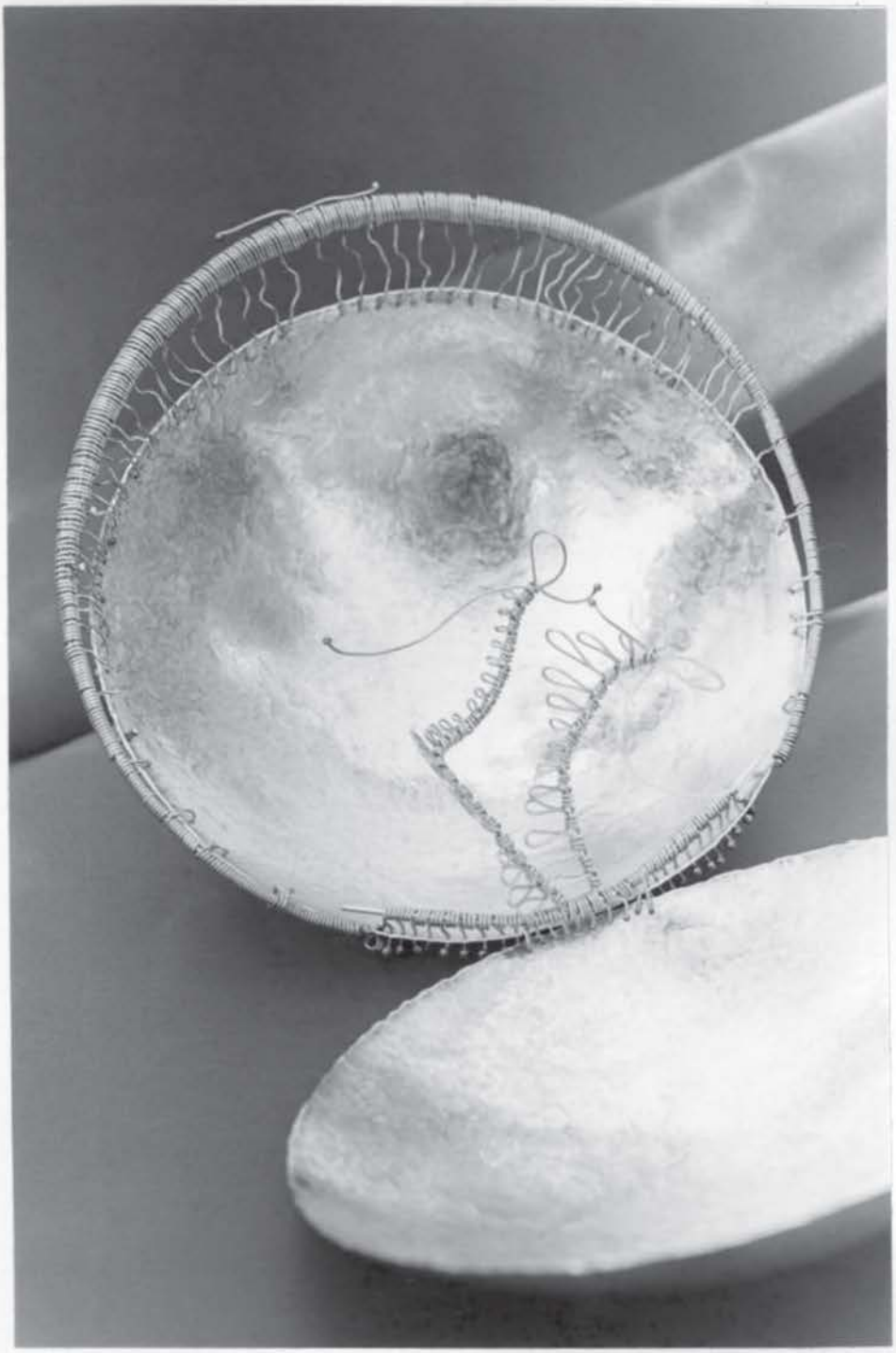

PLATE XII Ball Your Own Baby
(inside view)

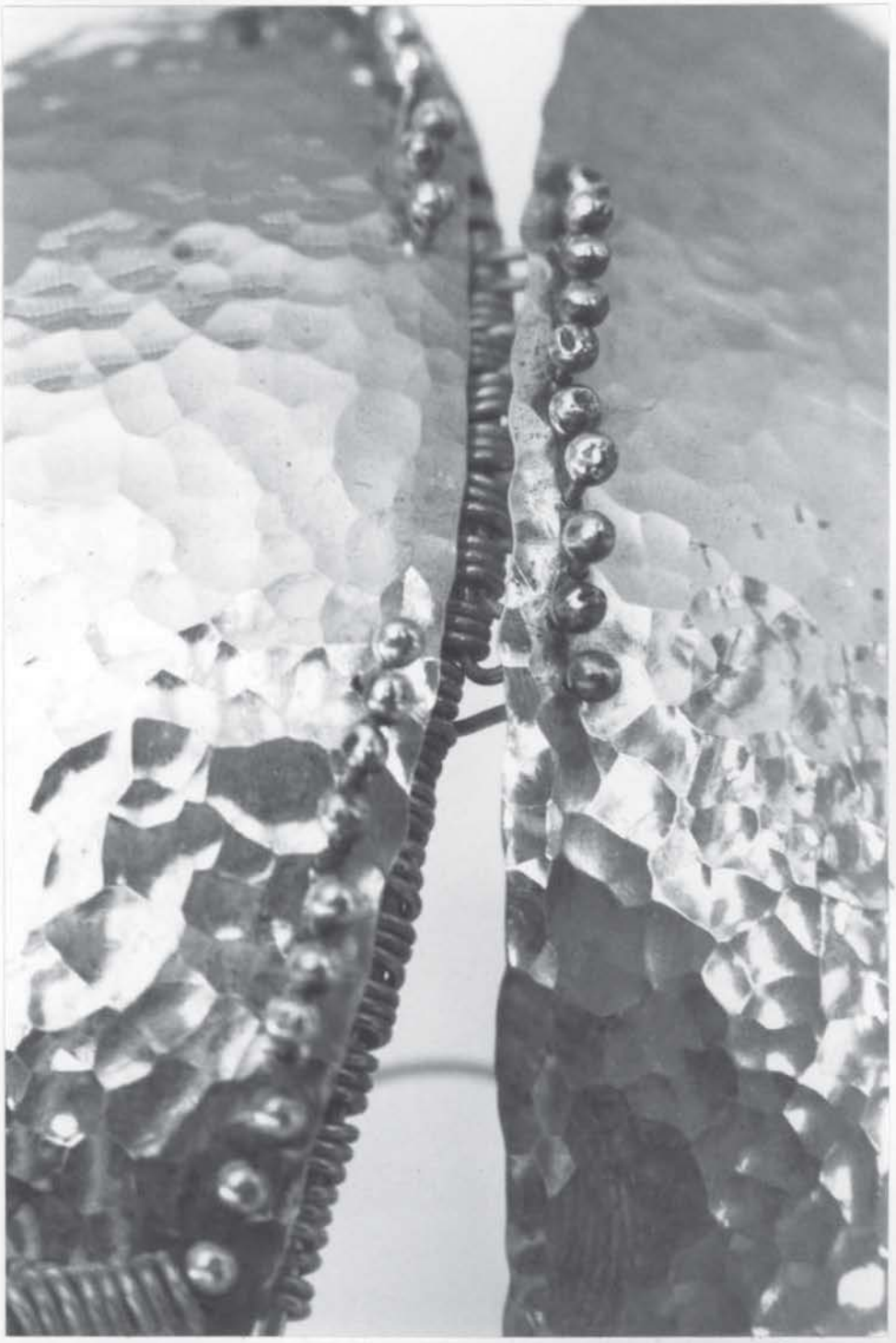

PLATE XIII Ball Your Own Baby (hinge)

Project 4

"Flare"--neckpiece, 14 gauge sterling silver square wire, 26 gauge fine silver wire, 3" tapered steel shaft, and beads.

Objectives:

Combine wire looping with beads as a decorative and connecting element when applied to forged pieces.

Process:

The wire and beads were looped and threaded up to half of their design. The remaining wire was inserted into holes which were at the ends of two overlapping forged pieces. The wire and bead pattern were continued and finished with the wire ends knotted and balled. This linking system continued around the neckpiece. The catch device holding the two ends together consisted of a wire and bead pattern that incorporated the pin stem and catch. One long steel shaft was curved and shaped to form the stem and catch and was wrapped into the back side of the design.

Observations:

1. Due to the problems I had in finishing the linking designs, I found it necessary to seek information on decorative knots for two reasons: 1) I wanted something to keep the beads in place, and 2) I needed some way to join the ends far enough from the beads so I could use a torch to ball the ends and not have the heat pop the beads. Macramé, the process of decorative knotting, seemed to offer the greatest possibilities for use with wire embellishment.

PLATE XIV Flare

Project 5

"Ode to a Square Knot"--breast piece of 26 gauge fine silver round wire and beads.

Objectives:

Devise a piece constructed with macramé. The beads are inserted for color and the wrapping is used for contrast.

Process:

The piece is constructed of variations of square knots and beads. The bottom design area was constructed separately from the neckpiece and the two were brought together to form the breast area. In this area wrapping and macramé are used, and some strands are ended with knots and balls. The remaining ends continue around in a belt-like fashion and secure the piece in the back of the body.

Observations:

1. With the light gauge wire used to tie the knots the piece is too flimsy to be very practical. It needs support.
2. The belt extension needs to be wider.

PLATE XV Ode to a Square Knot

Project 6

"Cleopatra"--macramé neckpiece of 14 gauge sterling silver square wire, 26 gauge fine silver round wire, and beads.

Objectives:

Create a piece using macramé and a forged frame for strength.

Process:

One piece of 14 gauge wire was used to form the neckpiece that follows the contour of the body by scooping low in the back, coming over the shoulders, and together at the breasts. At this point it was soldered and then spread apart again continuing under each breast. A second wire was formed which came closer to the neck and both ends stopped just over the breasts. At these points, the ends were soldered to the first wire. Afterwards it was textured and holes were drilled on the top side of the neck wire. Each hole held two wires balled together. These wires formed the macramé and bead pattern and were knotted around the bottom wire and finished with a knot and ball. The front design in the breast area followed the same principle. The starting wires were knotted over the forged wires, and the macramé was done between the wires.

Observations:

1. The forged wires made it a more practical piece.
2. Each loop of the macramé was work hardened with small hammer blows in order for them to keep their shape.

PLATE XVI Cleopatra

Project 7

"Contrast"--vase of 20 gauge sterling silver sheet, and 26 gauge fine silver round wire.

Objectives:

Make a cylinder with a woven wire embellishment.

Process:

A large table loom was used to weave the wire. Twenty-six gauge wire was used for the warp and weft. For the best weaving the wire should be kept as straight and taut as possible during all processes of warping and dressing the loom. With the tension that occurred during warping, it was necessary to cut each wire individually and thread it through its heddle and its space in the reed, and secure it to the opposite side before the next wire was cut. For this project the threading pattern was set up to form a traditional rose path variation with tabby. Tabby was woven for the borders, and the rose path was in the center.

In order to attach the weaving to the cylinder, two strips of silver were sawed from a sheet of silver. Into each strip twenty-two notches were sawed corresponding to the number of warp ends. Under each notch a hole was drilled. The smooth edge of each of the strips was then soldered vertically directly opposite of each other on the cylinder. The warp wires were then pulled through the holes and sectioned off into eleven pairs. The right wire of one pair then crossed up and slipped down into the notch of its corresponding left wire. This same wire then went down into the hole with the left wire. The left wire then crossed up and slipped into the notch over the right wire. It also went down and was pulled through the hole of the right wire. Each pair was laced in the

same fashion all the way down the strip. Then, the two wires were brought together and balled at the ends.

Observations:

1. I feel it is easier to do a piece of wire weaving on a loom that is large enough to allow the piece to be completed before it bends around the breast beam. This bend puts a crease in the woven area that is hard to get out without possible distortion of the piece. Another possibility is to devise a loom that has a breast beam with a smooth curve.
2. Using a regular loom was practical in order to achieve a pattern weave.
3. The lacing attachment holds the weaving securely.
4. The strips of silver serve to protect the weaving by acting as handles for the vase. Aesthetically, however, the bars look rather cold, and do not seem to flow in with the rest of the piece.

PLATE XVII Contrast

PLATE XVIII Contrast (attachment)

Project 8

"Delilah"--slave bracelet of 26 gauge fine silver round wire, 34 gauge copper wire, 20 gauge silver sheet, 12 gauge square sterling silver wire, and beads.

Objectives:

Set up a handmade loom that is faster and easier for just a tabby weave than dressing a larger loom. Attach the weavings to two silver bracelets.

Process:

A board was used as a base. Nails were hammered into the board in a straight line with the appropriate spacing. The number of nails depended on the width of the finished piece. An identical row was hammered in farther down the board. The space between the two rows was determined by the necessary length of the warp including the length of the finished piece plus the length needed for the attachment to the bracelet. The silver wire was run back and forth between the nails until the warp was formed. A tabby weave was then woven with silver, and copper wire, and beads.

The bracelets were formed, and textured 12 gauge wires were spaced and soldered around the two bracelets holding them apart. The weavings were placed in the areas between the wires, and the warp ends were pulled through holes drilled in the bracelet and the ends of each were balled for the attachment.

Observations:

1. The beads and copper wire were used for color and contrast.
2. In Project 7, "Contrast," the attachments did not flow in with the rest of the design. With the slave bracelet I minimized

this problem by distributing the attachment and protective devices to other areas of the piece and integrating them with the design rather than making the attachment and protective elements all in one device. The weavings are attached to the outer rims of the bracelet, and the textured bars were used to hold the rims apart and protect the weavings.

PLATE XIX Delilah

Project 9

"Congratulations"--serving bowl of 18 and 20 gauge sterling silver sheet, 12 gauge sterling silver wire, 26 gauge fine silver wire, and beads.

Objectives:

Create a serving bowl with a detachable base embellished with macramé and beads.

Process:

For protection of the wire embellishment the bowl was made detachable from the base so that it could be washed and cleaned without abuse to the wires.

Twelve gauge wires were forged, formed, and soldered. Holes were drilled into them and the wires for the macramé were inserted. After the macramé was completed, each unit was riveted to the base.

Observations:

1. Because of the contour of the bowl, the wires had to be formed at such an angle that the macramé could not be seen to the best advantage. The possibility of making more wire units and placing every other one in the opposite direction may alleviate this problem.

PLATE XX Congratulations

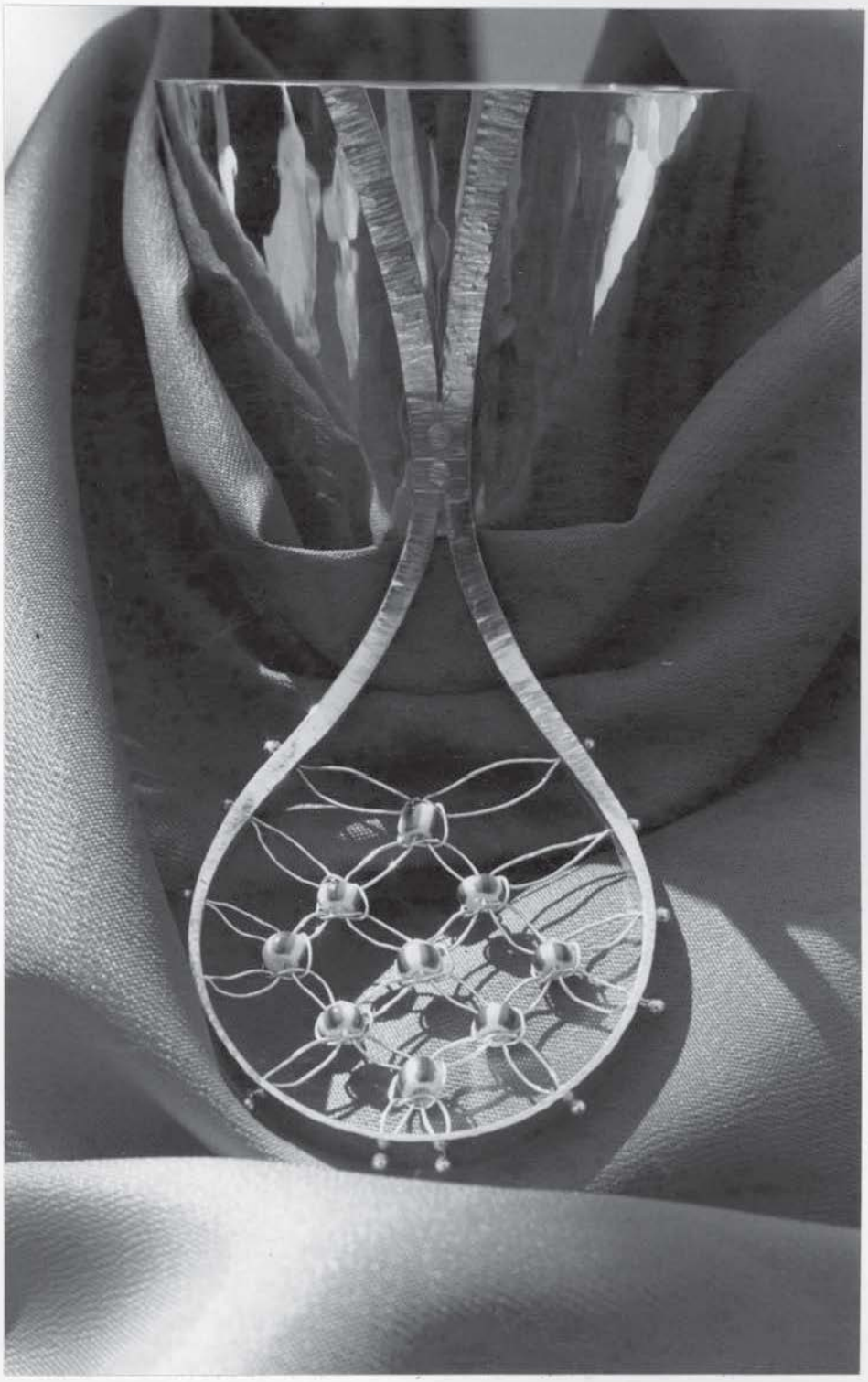

PLATE XXI Congratulations
(wire embellishment)

Project 10

"Health and Happiness"--wine goblets of 20 gauge sterling sheet, 1/4" and 1/2" sterling tubing, 16 gauge sterling circles and 26 gauge fine silver wire.

Objectives:

Create a pair of wine goblets with macramé and circles of sheet silver.

Process:

The wine goblets were raised and a section of 1/2" tubing was soldered to the bottom of each. Four circles were then cut, their edges were thickened, and tiny holes were drilled around their outside edges. One circle was then centered and soldered to the tubing. Three inches of 1/4" tubing were cut for both goblets. The remaining two circles had 1/4" holes drilled in the center which allowed them to slip about 3/4" down the tube and also allowed them to be soldered in place. This upper part of the tubing was then soldered to the circle on the goblets. Two more circles of the same size were cut and their edges thickened. These were soldered to the bottom of the 1/4" tube. The bases of the goblets were slightly domed circles with a section of 1/2" tubing soldered to the center of each one. These were then soldered to the bottom circles of the stem.

Six strips of macramé were then done for each of the goblets. In order to give the wires a different appearance, all six units were put through the rolling mill. The macramé was inserted into the holes of the two top circles and filled the space between the circles.

Observations:

1. The use of a tighter knot plus the use of the rolling mill strengthened the macramé.

2. When wire macramé is put through the rolling mill, the possibility of excessive squeezing of the knotted wires could cause some of the wires to be pinched off.

PLATE XXII Health and Happiness

PLATE XXIII Health and Happiness
(wire embellishment)

Project 11

"Don't Spill"--serving spoon, 4 gauge sterling silver square wire, 26 gauge fine silver wire, and 20 gauge sterling silver sheet.

Objectives:

Create a piece of flatware with macramé embellishment.

Process:

Four wires of 26 gauge fine silver were used for the macramé which extends the length of the handle. Wrapping was used between the macramé and to finish up the ends. The macramé was then put through the rolling mill to flatten and strengthen the wire. The whole macramé unit was sweat soldered onto the handle of the spoon. It was polished and treated with liver of sulfur in order to highlight the wires.

Observations:

1. Flattening of the wires along with the tighter knot produced a relatively smooth surface that when soldered at all points created a durable piece without protective devices.

PLATE XXIV Don't Spill

PLATE XXV Don't Spill
(wire embellishment)

CONCLUSION

When working with an open pattern such as some of the macramé and weaving designs, there is a need for protective devices in order to give strength and practicality to a piece. With a tighter design and a stronger attachment there is less need for protection. Strengthening the wires can be achieved through work hardening with burnishing, with the tapping of a hammer, or the pressing of a rolling mill. For the greatest asethetic value all protective and attachment devices must be integrated with the body of the piece.

Since the major form of attachment was balling the ends of the wires, I sought to find better methods for this technique. The greatest help was the use of fine silver wire. Without the copper alloy there was no tarnishing when the wires were balled. Then, if at all possible, the wires were held upside-down so that the balls climbed up the wires. If the wires were held upright, the balls had a tendency to fall to one side of the wires. An additional help was the use of a mini torch or a small oxygen and natural gas torch. The flames of these torches are very intense, and enabled me to get into small places and ball the wires with little if any discoloration of the surrounding metals. What little discoloration that did occur could be wiped off with a rouge cloth. Fine silver wire is softer than sterling silver, and can also be purchased pre-annealed. Twenty-six gauge wire with the above characteristics lends itself readily to weaving and macramé.

Throughout the processes of wire embellishment the most time consuming factor is preparation. First, there is the need to figure the lengths of the wires and the number 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 where the holes need to be drilled. Then, there is the cutting and balling of one end of the wires and the drilling of the holes that must be done before the wire embellishment can be started. Once everything is ready, the working is rather immediate. This, along with the previously mentioned work qualities, cut the time factor, and with the surface enrichment that it bestows, make wire embellishment very desirable.

LIST OF ILLUSTRATIONS

Figures

PLATES

GLOSSARY

Balling -- Melting wire to form a bead at the end.

Core wire -- A wire around which a finer wire is wrapped.

Sub-wires -- Any wires laid in with the core wire that will later be pulled out for decorative or mechanical purposes.

BIBLIOGRAPHY

Boucher, Francois, 20,000 Years of Fashion. New York: Harry N. Abrams, Inc., 1967.

Davidson, Peter Wylie, Applied Design in the Precious Metals. New York: Longmans, Green and Co., 1929.

Higgins, R. A., Greek and Roman Jewellery. London: Methuen and Co. Ltd., 1961.

Hughes, Graham, Jewelry. New York: Dutton and Co., Inc., 1966.

Hughes, Graham, Modern Jewelry. New York: Crown Publishers, Inc., 1963.

Hughes, Graham, Modern Silver Throughout the World 1880-1967. New York: Crown Publishers, Inc., 1967.

Morton, Philip, Contemporary Jewelry. New York: Holt, Rinehart, Winston, Inc., 1969.

Untracht, Oppi, Metal Techniques for the Craftsmen. New York: Doubleday and Co., Inc., 1968.