THE COMBINATION OF WOOD AND METAL IN CONTEMPORARY JEWELRY AND RELATED OBJECTS

An abstract of a Creative Project
Robert Ray Wilkerson, Jr.
January 1975
Drake University
Advisor: Condon Kuhl

The problem. To investigate and create several wood and metal pieces, and show that these combinations are a personal statement of the artist.

Procedure. The procedural set-up for this project was to (1) Investigate the following metals--sterling silver, brass, steel, and woods--basswood, rosewood, walnut, and zebrawood. (2) Show aesthetic affiliation between the materials. (3) Create various jewelry, and related objects--belt buckle, match box, humidor, necklace, chess set and chess board, and (4) Evaluate aesthetically and technically.

Findings. In my findings I discovered the following qualities of metal and wood. Of the metals I used, I found silver to be the easiest to form and shape. Both brass and steel are very durable and show good strength, but brass showed signs of cracking during forging.

Each of the woods used were enjoyable with which to work. Basswood is a very soft wood and thus it was the easiest to work using hand tools. Walnut and zebrawood are also very workable as they do not split readily. For strength in the woods, walnut and rosewood would head that list. I feel both the metals and the woods have their own qualities of color variations, which I kept in mind throughout the projects.

One of my main concerns in working with each project was to find a way to fasten the metal and wood together. I found that for my purposes the bezel and supporting pins were the most satisfactory.
THE COMBINATION OF WOOD AND METAL IN CONTEMPORARY
JEWELRY AND RELATED OBJECTS

A Report of a Creative Project
Presented to
The School of Graduate Studies
Drake University

In Partial Fulfillment
of the Requirements for the Degree
Master of Fine Arts

by
Robert Ray Wilkerson, Jr.
January 1975
THE COMBINATION OF WOOD AND METAL IN CONTEMPORARY
JEWELRY AND RELATED OBJECTS

by

Robert Ray Wilkerson, Jr.

Approved by Committee:

Condon Kuhl
Chairman

Douglas Hendrickson

Dean of the School of Graduate Studies
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>LIST OF FIGURES</th>
<th>v</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter</td>
<td></td>
</tr>
<tr>
<td>1. The Problem</td>
<td>1</td>
</tr>
<tr>
<td>2. Investigation of Materials</td>
<td>2</td>
</tr>
<tr>
<td>Sterling Silver</td>
<td>2</td>
</tr>
<tr>
<td>Brass</td>
<td>3</td>
</tr>
<tr>
<td>Steel</td>
<td>3</td>
</tr>
<tr>
<td>Wood</td>
<td>4</td>
</tr>
<tr>
<td>Basswood</td>
<td>5</td>
</tr>
<tr>
<td>Rosewood</td>
<td>5</td>
</tr>
<tr>
<td>Walnut</td>
<td>6</td>
</tr>
<tr>
<td>Zebrwood</td>
<td>7</td>
</tr>
<tr>
<td>3. Survey of Projects</td>
<td>8</td>
</tr>
<tr>
<td>Belt Buckle</td>
<td>8</td>
</tr>
<tr>
<td>Match Box</td>
<td>11</td>
</tr>
<tr>
<td>Humidor</td>
<td>12</td>
</tr>
<tr>
<td>Necklace</td>
<td>17</td>
</tr>
<tr>
<td>Chess Set</td>
<td>19</td>
</tr>
<tr>
<td>The Chess Pieces</td>
<td>20</td>
</tr>
<tr>
<td>Castle</td>
<td>22</td>
</tr>
<tr>
<td>Knight</td>
<td>26</td>
</tr>
<tr>
<td>Bishop</td>
<td>27</td>
</tr>
<tr>
<td>Queen</td>
<td>27</td>
</tr>
<tr>
<td>Chapter</td>
<td>Page</td>
</tr>
<tr>
<td>--------------</td>
<td>------</td>
</tr>
<tr>
<td>King</td>
<td>28</td>
</tr>
<tr>
<td>4. Conclusion</td>
<td>29</td>
</tr>
<tr>
<td>Bibliography</td>
<td>31</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Belt Buckle, Constructed of Walnut Surrounded by Brass</td>
<td>9</td>
</tr>
<tr>
<td>2.</td>
<td>Smaller Motif of Main Buckle in Brass Used on Each Side of Belt</td>
<td>10</td>
</tr>
<tr>
<td>3.</td>
<td>Match Box, Sterling Silver with Chip Carved Basswood Inserts in Sides</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>Humidor, Constructed of Walnut for the Liner and Steel for the Frame</td>
<td>15</td>
</tr>
<tr>
<td>5.</td>
<td>Humidor with Liner Inserted</td>
<td>16</td>
</tr>
<tr>
<td>6.</td>
<td>Necklace Constructed of Steel, Sterling Silver and Rosewood</td>
<td>18</td>
</tr>
<tr>
<td>7.</td>
<td>Chess Board, Walnut, Rosewood, and Zebrawood</td>
<td>21</td>
</tr>
<tr>
<td>8.</td>
<td>Sterling Silver Chess Pieces with Rosewood</td>
<td>23</td>
</tr>
<tr>
<td>9.</td>
<td>Brass Chess Pieces with Zebrawood</td>
<td>24</td>
</tr>
</tbody>
</table>
CHAPTER 1

THE PROBLEM

Before there is a problem, there must first of all be a need. Today, in a contemporary world, there are varieties and combinations of materials. Craftsmen need to recognize the creative potential of materials like wood, silver, bronze, brass, pewter, iron, stainless steel, plastic, leather, and common stones. These materials typify this age of technology in which we live. The contemporary designer-craftsmen are freer, and less easy to categorize. Since they are trying to express something that comes from within; a personal statement.

The purpose of this study then is to investigate and create several wood and metal pieces. The importance of this study is to attempt to show that the combinations of woods and metals are a means for expanding the personal statements of the artist.

The procedural set-up for this project is to: (1) investigate various metals and woods; (2) show aesthetic affiliation between the materials; (3) create in various metals and woods contemporary jewelry and related objects; and (4) evaluate the designs both aesthetically and technically.
CHAPTER 2

INVESTIGATION OF THE MATERIALS

STERLING SILVER

Sterling silver is a beautiful, shiny, precious, white metal. Silver has been known as a metal since very ancient times; it was also mentioned in the books of the Egyptian King Menes, about 3600 B.C. Two finishes can be developed on silver, a bright shine or a mat finish. Because pure silver is extremely soft, it is usually alloyed with other metals for strength and durability. The most common alloying metal is copper, which imparts hardness and strength without appreciably changing silver's desirable characteristics. This also lowers its melting point from 1760°F. for fine silver and 1641°F. for sterling.¹ Sterling silver which is 92.5 percent silver and 7.5 percent copper is perhaps the best known silver-copper alloy.²

This metal can be formed and shaped easily (very malleable); it is also suited to chasing, etching and other


surface decorations. In the projects, the silver is combined with the various woods showing the contrast of the bright, shiny qualities of this metal and the soft grain qualities of the wood.

BRASS

Brass is an alloy of copper and zinc. One of the most widely used brasses is yellow brass, with a nominal composition of 65 percent copper and 35 percent zinc.\(^1\) Brass has a color almost identical to gold, which gives it a rich appearance. As with many other metals, brass can be finished to a dull mat or bright shine. Because of its wide range of melting points, brass is very good for casting. Brass melting points range from 930\(^\circ\)F. to 2075\(^\circ\)F. with standard brass around 1800\(^\circ\)F.\(^2\) It is poor for forging, because of its hardness; it cracks during this process. However, it does have many assets such as highly ductile, strength, durability, and resistance to corrosion.

STEEL

Steel is an alloy of iron and carbon. It is a very strong metal that is easily bent and shaped, but retains its strength. Steel is either bluish-gray or


\(^2\)Neuman, loc. cit.
silver-gray in color. After a period of weathering, steel will take on a rustic appearance. Through a heat treatment, using a torch, steel would go through slight color changes corresponding to the movement of the torch, and the range of temperatures used in heating. It is easily worked but requires slightly higher temperatures for forging.

There are two kinds of steel: carbon steel and alloy steel. In my projects I have used a low-carbon steel. Steel is graded by its percentage of carbon. Low-carbon steel contains about 0.05 to 0.30 percent carbon.\(^1\) The melting point of steel is very high \(2500^\circ\text{F}\).\(^2\)

The technical problems with using steel as a jewelry metal are minor. The main problem being that it cannot be soldered in a delicate manner. If stronger joints are needed the artist should use brazing or welding techniques. Aesthetically, I feel that steel combines well with many different materials: it provides a stimulating contrast against the precious metals.

WOOD

No other natural material has proven itself so versatile, essential, and challenging as wood.

\(^1\)Oswald A. Ludwig and Willard J. McCarthy, Metalwork Technology and Practice (Bloomington, Ill.: McKnight and McKnight, 1969), p. 142.

\(^2\)Ibid., p. 161.
Basswood--(Linden or Lime)

"When the lime tree is grown in gardens it is often called the 'linden tree,' from its old German name of linde which has survived from Anglo-Saxon days. In forests and timberyards, however it is usually called 'bass-wood,' a name derived from its remarkably thick and very tough inner bark or bast."¹ The softest and lightest hardwood in commercial use, it is of fine, even texture with straight grain. Basswood is especially easy to work with using hand tools. It is highly resistant to shrinkage and warpage which makes it an excellent wood for sculptors and carvers. Being a pale yellowish-brown color, basswood takes stains well but it is not naturally durable and should not be used out-of-doors.

Rosewood--Brazilian

"This beautiful and costly wood, also called 'Rio Rosewood,' 'Bahia Rosewood,' and 'Palisander' is cut from a slender tree that grows in eastern Brazil."² It also comes from Ceylon, India, and Central America. The properties of this wood are many: exceptional weight, smoothness, strength and hardness, and captivating appearance. The color is a

²Ibid., p. 32.
reddish-brown with various shades of dark brown and conspicuous black streaks. Rosewood has a very pleasant odor. This is because of the fragrant oil that pervades with the delicate scent of the rose blossoms. It is unfortunate that scarcity and cost have limited the regular use of rosewood today.

**Walnut, Black American**

Black walnut is one of the best known, largest, and most valuable native hardwoods. "Black walnut is classified as a heavy wood, averaging 38 pounds per cubic foot. The wood is hard, with a specific gravity of 0.51, is strong and stiff, and has good shock resistance."¹

It has excellent physical properties, fine to coarse texture, open grain, great strength, toughness, and elasticity. The wood of black walnut is beautifully figured, with stripes and sometimes with wavy or curly grain. Its lustrous surface color is from dark brown to black. This rich color is enhanced by its ability to take a beautiful polish. It is easily worked with handtools since it does not split readily.

The early colonists who needed strength and stability in their furniture and gunstocks appreciated the abilities of the American walnut. Now in our contemporary society, wood is not a fashionable medium in which to work.

However, wood provides an infinite potential—constantly changing and maturing.

**Zebrawood**

This very exciting wood should be known at once by its bright yellow-gold bands alternating with narrow streaks of dark brown to blackish strips, thus giving the appearance of a zebra. "Zebrawood grows in Cameroun and neighboring states of West Africa, on and around the equator."¹ "There is variability in its density, but mostly hard, heavy, and strong; weight 47 to 63 lbs. per cu. ft., texture fine to rather coarse, grain straight to irregular; easy to work, finishing very smoothly."² Because of its luminous coloration, zebrawood presents a challenge for the artist, as it must be used in an innovative way.

¹Herbert, op. cit., p. 161.

CHAPTER 3

SURVEY OF PROJECTS

BELT BUCKLE

The materials for the belt buckle were brass and walnut; the motif—a eagle's head. (See Figure 1) Brass and American walnut complement each other, giving a definite dark-light variation. Since the design for the buckle is somewhat complex brass proved very satisfactory because of its strength.

In comparing brass and silver, brass proved more difficult to cut and also more resistant to forming.

The saw-pierced design was soldered to a brass band which was textured with a center punch. The piece was oxidized, giving it a dark effect in each of the dotted valleys. This same process was also used in the background of the smaller motifs. (See Figure 2)

After sweat soldering an oval piece of brass to the smaller designs a problem was encountered on how to fasten these pieces to the leather belt. After experimentation, two copper rivets were soldered to the back of each piece which was in turn fastened to the belt after punching holes in the leather.
Figure 1

Belt Buckle, Constructed of Walnut
Surrounded by Brass
Smaller Motif of Main Buckle in Brass Used on Each Side of Belt
The main buckle was attached to the belt by forming a heavy brass rod into a long extended U-shape onto which the belt was fastened. Another rod, shaped into a C, was used to hook into the holes.

The walnut, which was inserted into the oval piece of brass, was finished by sanding and applying five coats of Deft, steel wooling between each coat.

The end result was satisfactory except that the buckle was too thick, extending too far from the body. A thinner walnut piece could have been used but then the buckle would be weakened.

MATCH BOX

Silver and basswood were used in the construction of the match box. (See Figure 3) The 20 ga. silver sides were soldered together along with an #8 sq. wire bezel around each side to hold the inserts of chip carved basswood. Silver was chosen in part because it is a bright white metal and will complement the ebony-stained wood. Since a complex pattern was cut from each panel, basswood was chosen because of its soft quality.

Originally my plan was to have a fine silver bezel around each panel but this lacked the correct effect for which I was striving. Therefore, each surface was epoxied into place.
The inside of the box was given a dull mat shine using steel wool to accomplish this. A small base was secured on the underneath of the box, again using #8 sq. wire. Since the inside of the base could not be polished, it was oxidized. Finally, a piece of black sandpaper was glued inside the base for striking matches. Rubber cement was used making replacement easier.

Chip carving is a type of incised carving, with the incisions grouped to form geometric patterns. The triangle is the base for most designs.

Chip carving was introduced to America by early settlers from northern Europe. Although no one person can be justly credited with the introduction of this form of carving to our country, Gustaf Larrson is responsible for much of its popularity between 1890-1910 when he revived this work through the Sloyd Schools which he introduced here.¹

Very sharp tools are needed for chip carving. The skew chisel being one of the most basic. The single edge razor blade proved to be an easier tool with which to effect the small intricate patterns which were cut before fitting into the sides of the box.

HUMIDOR

The main structure of the hexagonal humidor was made of steel with a walnut liner. Each steel side, after saw piercing was brazed together. (See Figure 4)

Figure 3

Match Box, Sterling Silver with Chip Carved Basswood Inserts in Sides
Steel is a very hard metal and was extremely difficult to cut with a jewelers saw even when heavier blades were used.

Each side of the liner needed to be cut at a 33 degree angle. First, nails were used to hold them together but the nail holes showed even after filling so that this liner was discarded. For the next liner, glue was used which produced a better result.

During the brazing of the steel the sides were held together with C clamps. The lid was made of ¼" steel strips acting as a base and then five triangular pieces of steel were brazed to the base rising up to a point. Keeping the pieces together during this process was a problem. Steel rod used underneath and masking tape in some spots worked quite well; the tape just burned away. The bottom has a ¼" base that was also brazed.

The walnut was finished with five coats of Deft with steel wooling between coats. The inside of the liner was left untouched so that the finishing product would not contaminate any tobacco stored in the humidor.

The aesthetic qualities of the piece were pleasing because the blackness of the steel complements the gold color of the brazing rod and the soft quality of the walnut. (See Figure 5)
Figure 4

Humidor, Constructed of Walnut for the Liner and Steel for the Frame
Figure 5
Humidor with Liner Inserted
NECKLACE

The idea for the necklace came after finishing two other projects: the humidor and the chess set. As for materials, I liked the black color of steel with its heavy appearance and silver with its brightness which offered a distinctive contrast. With this project it is evident that these two metals can be a dominant design feature. (See Figure 6)

Steel is seldom used as a jewelry material, mainly because it does not solder well. It is hard to manipulate and is difficult to anneal after work hardening. Since the early 1970's some contemporary artists have been using iron in various techniques such as forging and casting in order to expand their list of materials.

The basic motif of the necklace was simply the combination of four C shapes soldered together twice at the curved part of the C. After soldering, there was the effect of opened C's pointing in four directions. Each shape was made from a ¼" x 2" piece of steel formed around a rod. Soldering proved to be no problem, because silver solder and silver brazing flux were used.

In order to stress variety in the necklace, small circular motifs, some being bands, rosewood and silver discs, were soldered inside the steel C's.
Figure 6

Necklace Constructed of Steel, Sterling Silver, and Rosewood
There were a total of seven motifs fastened together with jump rings. The grouping of these was as follows: three at the top, then two, then one and one. This effect worked well in conforming to the chest of the wearer. One problem encountered with the necklace was that the top three motifs continued to fall together rather than stay separated. The solution was to drill holes in the top C of each motif design, and for additional separation silver tubing was added on the wire. The silver wire was then formed into a choker.

Aesthetically the necklace was a complete success, owing to the blackness of the steel, the brightness of the silver, and the rosewood as a neutral accent.

CHESS SET

What an undertaking! In designing the set I had to think about designing each chess piece separately as well as the chess board.

The chess board is somewhat unusual in design, being made from walnut, rosewood, and zebrawood. The base of the board was made from ½" walnut. To get the correct size needed for the board (13" x 23"), two pieces were laminated together. The playing surface was raised from the base board with valleys between the playing squares, much like flat topped pyramids. (See Figure 7)
The playing surfaces were made from \( \frac{3}{8} \)" rosewood, \( \frac{3}{8} \)" zebrawood with a 3/4" walnut base underneath. First, rosewood and zebrawood were laminated on top of the walnut, then each board piece was cut out on a table saw. After the sixty-four pieces were hand sanded, they were finally glued to the base board. In gluing these pieces the direction of the grain was alternated, so that the rosewood grain would be going in the same direction and the zebrawood in another.

The tops of the playing surface measured about 1\( \frac{1}{4} \)" sq. The playing surface pieces were centered on the base board leaving an extra area of about 5" on each end of the board. This area was used for storing the chess pieces. Since the basic shape of each chess piece is tubular, 7/16" walnut dowel rods \( \frac{3}{4} \)" long were turned on a lathe. These, then, were spaced evenly in two rows of eight. They were sanded and glued into a pre-drilled hole in the base board.

The finishing of the board was done with three coats of Deft with steel wooling between each coat.

**THE CHESS PIECES**

For contrast, one set was made in sterling silver and rosewood, (see Figure 8) with the other in brass and zebrawood (see Figure 9). Each piece turned out to be a design problem in itself (see Figure 10). The basic shape
Figure 7

Chess Board, Walnut, Rosewood, and Zebrwood
is the cylindrical or tubular, with each piece growing, forming, expanding from this shape. The problems encountered with each piece will be explained on the following pages. Since so many sheets of metal would be formed into tubing some type of form was needed to work around; therefore a 7/16\" steel rod was turned on a lathe to serve this purpose.

The pawn measured 3/4\" - 7/16\" across: one set each in silver and in brass. In the silver set, each pawn had three rosewood pieces that were pinned to the tubing with two pins on each piece. The wooden pieces were a basic circular shape with the outward side of the piece cut in a concave pattern. The pawns had three wooden pieces evenly spaced around the tubing, by using two silver pins for each wooden piece. Hand sanding, a single coat of Deft, and buffing finished the pawn.

The brass pawn was basically the same with only a few changes. The zebrawood pieces were left in a circular shape leaving the outside convex. They were also attached with pins (brass), and were given a coat of Deft and buffed. Making the pawns had to be the most boring part of the whole process because of the repetition involved.

Castle

The castle measured 1\" high - 7/16\" across. In silver, each castle had three rosewood pieces attached to the top of the silver tubing. These pieces were only 1/4\"
Figure 8

Sterling Silver Chess Pieces with Rosewood
Figure 9

Brass Chess Pieces with Zebrwood
Figure 10

high, and of the same concave pattern as used on the pawn. Silver pins were used to secure each rosewood piece, being spaced evenly around the tubing. Directly underneath these rosewood pieces was soldered a 6mm. piece of sterling silver tubing.

The brass castle is basically the same with only a few minor changes. Zebrwood pieces were also \( \frac{3}{4} \)" high and convex in shape and were attached to the main tube with brass pins. Below the zebrwood pieces a \( \frac{3}{8} \)" brass rod was soldered to the main tube instead of tubing. Since small brass tubing is difficult to purchase and almost impossible to make, the contrast between rod and tube would be very good from one set to another. All wooden pieces on both sets were finished with a coat of Deft.

**Knight**

The main tubing size for the knight measured \( \frac{7}{16} \)" across and \( \frac{3}{4} \)" high. Soldered and spaced out evenly to this main tubing were three 6mm. sterling silver tubing pieces. Attached to the inside of the main tubing and extending up was a rosewood dowel rod (all of the dowel rods used through the chess set had to be turned on a lathe). Protruding outward from the side of this dowel were six sterling silver pins made from \( \frac{4}{14} \) wire. They were spaced evenly on the rosewood and were in line with the three 6mm. tubes. The only difference in the brass knight
was that brass rods were used instead of the tubing, and zebrawood dowel rods instead of rosewood.

**Bishop**

The main tubing size for the bishop was 7/16" across, 3/4" high. As with the knight, attached to the main body, soldered and spaced out evenly were three pieces of tubing. Extending from the top of the main tubing is a dowel rod (rosewood) rising up 1/4". A hole was drilled in the middle of the dowel rod and a silver pin with a silver band soldered to the pin was inserted in the hole. The brass bishop was the same except that a brass rod was used instead of 6mm. tubing and zebrawood replaced the rosewood.

**Queen**

The main silver tubing measured 1" high and 7/16" across. This piece also had three 6mm. tubing which were soldered to the sides of the main tube. Extending out of the top of the main tube was a rosewood dowel rod. From this extends a silver pin which was soldered to a silver band: the same size used on the bishop. On top of this band was soldered five pieces of tubing, three different sizes of tubing being used. The only difference in the brass queen is the brass rods again were used instead of tubing on the main body. And, instead of using tubing on the top opened band, five pieces of brass rod were used. Also, zebrawood replaced the rosewood.
King

The main body measured 7/16" across and 1-1/8" high. Three tubing pieces were soldered to the main body. Around the top of the main body and extending outward from it, tubing pieces were spaced evenly and soldered. Extending up from the main body, again was a rosewood dowel rod. From that rod a silver pin extends which was soldered to a band. Outward from the top of the band are five silver pins with small jump rings soldered to them. The differences between the silver king and brass king are the following: instead of having six tubular pieces around the top of the main tube, brass pins were used. Zebrawood again replaces rosewood and a 1/16" thick piece of brass rod was soldered to the top pins instead of jump rings.
Chapter 4

CONCLUSION

The major consideration in combining wood and metal is technical problems in design. Such problems are: (1) What are the aesthetic qualities of wood and metal, (2) What are the functional qualities, (3) Discovering the peculiarities of materials, (4) Discovering the right way of employing tools, (5) How will it be put together or attached, (6) How will it balance, and (7) What should be used for a finish?

Wood and metal can successfully be combined if the physical characteristics of these materials are taken into consideration. Each kind of wood and metal imposes its own successful working. Since these conditions often vary from one piece of work to another, it was then important for me to find all I could about form, materials, and techniques before I began.

A great deal of thought had to be given to the joining of wood and metal with each piece designed and executed with this fact in mind. I found for my purposes that the bezel and supporting pins were the most satisfactory and impressive methods of combining these products. On all
of the wooded parts of the necklace and chess pieces I used supporting pins. The bezel process was applied in a simple manner on the match box and belt buckle but, in my opinion, less successfully. While not all of the projects were satisfying to me, I felt that the means of joining my materials deserved much thought and planning.

Throughout the paper and the projects I feel that I have developed some capacity for aesthetic creation and also individual growth. Thus this knowledge as well as being able to challenge my own work has made this creative project a complete success.
BIBLIOGRAPHY


