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Treatise on Chasing and Repoussé

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DEDICATION

Dedicated to those learning craftsmen who have only just begun to know the true meaning of "Goldsmithing".

PREFACE

Although the process of chasing and repoussé has been covered in most techincal books, to date there is no major source which deals with the subject in depth. My goal in writing this thesis was to compile a reference manual for both the beginner and the advanced craftsman, based upon outside research as well as my own explorations of the process.

In conjunction with the written text I have included photographs whenever possible to give a clearer understanding of the working processes of chasing and repoussé. In the last section I have called upon several contemporary craftsmen to contribute statements about and photographs of their work. I would like to thank Eleanor Moty, Dickie LaDousa, Chris Sublett, Ginger Moore, and Elliot Pujol as well as those who participated in the show Metal+72 at State University of New York, College at Brockport, whose work I have photographed.

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PART I

INTRODUCTION

INTRODUCTION

As both decorative and forming processes the possibilities of chasing and repoussé are unlimited. Though there is a basic difference between the two, most work that uses repoussé often employs chasing as well. Repoussé is simply the forming of low or high relief by working the sheet metal from the reverse side. Chasing is a means of ornamenting, defining, or texturing the metal by indenting the front side with a hammer and tools. When speaking generally about these processes I refer to them as chasing.

Chasing can be used as a decorative surface embellishment to cover bare surfaces or hide imperfections. It provides depth on an otherwise flat surface. By losing and following outlines as they merge into the surrounding background, a soft and modeled effect is obtained. The most successful results of fine chasing leave the unmistakable impression of the hammer and hand in its execution. The thing to avoid with chased and all other relief work is the effect of ornament which has been made from a different piece of metal and stuck on a background. It should obviously be of one piece, but with surfaces tilted about to play with the light; an ornamentation of rather than a decoration applied to the metal.[1]

In all chased work the metal is plastic, and with care can be modeled, spread over surfaces, and led into forms like much hard wax. The student should be alert to the suggestions of decorative treatment which constantly arise from the process of working with the metal itself. The behavior of the metal is more instructive than any teacher.[2]

Chasing is by no means a new process. An important work, dating from the third century B.C., is a beautiful gold chased helmet in the form of a wig, found in one of the Royal Tombs at Ur in Mesopotamia. This masterpiece shows that the technique of relief was already highly developed. The piece was formed from thin gold sheet of constant thickness, beaten on a wooden or stone mold to make the rough shape, and then hammered in repoussé.[3]

The technique became quite popular in Medieval times. For reasons of cost it was rarely considered feasible to cast from precious metals, even in the most advanced cultures.[4] Theophilus Presbyter, a Benedictine monk, was a historical metal worker who flourished around A.D. 1000.[5] In his treatise, Diversarium Artium Schedula, he describes the detailed technology, the tools, materials, and practical processes, and gives a realistic picture of what was definitely known of metal working in the Middle Ages. Since the material-working crafts constituted the most advanced branch of technology at this time, Theophilus' discussion of them provides a valuable source for study.[6]

Theophilus states:

> Through the spirit of counsel you do not hide away the talent given you by God, but, working and teaching openly and with humility, you faithfully reveal to those who desire to learn. [7]

In The Treatises of Benvenuto Cellini on Goldsmithing and Sculpture, which was intended for the workshop of the sixth century, Cellini writes about the methods and practices of the goldsmith of the Renaissance, and devotes a chapter to chasing. He refers to the work done with a punch as "minuterie" work.

Cellini says:

> The greatest master in this art that I ever knew, lived in the times of the Popes Leo, Adrian, and Clement, and he was Caradosso. [8]

It was Caradosso's custom to make a little model in wax of the form he wished his work to be chased. After he finished the modeling he cast it in bronze; then he beat out gold leaf into a slightly curved form and laid this on to the bronze form. With punches of wood, birch or dogwood, he carefully followed the shape of the figure or whatever he was working on. He worked with wooden, then steel punches, alternating from back to front, being careful to keep the metal a uniform thickness throughout.[9]

Cellini tells of another method of working:

> I made a plate of gold, and began, bit by bit to work my figure up in relief with all the patience you can possibly imagine. I took a small rounded stake and on this I wrought little by little, working up from the gold from the ground with a small hammer, working right into arms and legs, and with the greatest difligence and patience I brought the work into completion. This we call 'lavorare in tondo', working in the round; that is without putting the figure on pitch, or such a stucco basis. It isn't till I worked it up to a certain point that I then took my punches and continued it on the stucco with very great finish.[10]

Other fine examples of work done in the round are found in Greek bronzes, and Medieval steel armours.[11]

PART II

THE WORKING PROCESS

THE SEQUENCE OF STEPS IN CHASING

I. PRELIMINARIES

Choose a Design to be Chased

Selecting the Metal

In order to achieve deep relief the metal must be stretched quite a bit. A substantial stock of 18 or 20 gauge, which will allow for stretching, is desirable. If fine or low chasing is to be the result, it is not necessary to use as heavy a stock of metal. Although 20 gauge is most often recommended, I have found the thinner gauges, 22-26 gauge, easier to manipulate. If the metal is too thin it is easy to puncture with a sharp tool. (See section on Metals)

Transferring the Design to the Metal (fig. 5)

The simplest method of transferring a design to sheet metal is to use carbon paper. Part of a knitting needle set into a wooden handle, as the lead in a pencil, makes a good stylus. The point of the needle should be ground quite smooth and round. When buying carbon paper be sure that the marks it makes on the metal do not rub out very easily. Paper which is prepared on one side only should be chosen. It is nearly impossible to transfer a

design in the manner just described to any domed-up piece of metal. It should be drawn freehand in pencil.

To make corrections in either the traced or free-hand drawing, first rub out the part that is wrong. This is best done with fine emery paper using a circular stroke and then redrawing with pencil or ink;[12] grease pencil works well.

After transferring the design to the metal, cut out the shape with a jeweler's saw. (fig.6) It is a good practice to file the edges after sawing to free them of snags which possibly could be worked into the metal and lead to cracking.

Annealing the Metal (fig.7)

When the metal is annealed, it is changed from a work-hardened, springy state, induced by working and stretching, to a soft, easily manipulated state. These qualities are of prime importance to the chasing process. Through working, metals undergo a crystalline or structural change. If this condition is not remedied at the proper time, further working will cause the metal to crack.[13] All cracks should be repaired. (See P.21)

Before annealing, the metal should be cleaned with an abrasive such as pumice powder, or a chemical pickle, and then placed on an asbestos pad or pan filled with rock pumice. A large soft reducing or non-oxidizing flame is usually best. An oxidizing flame is one with an excess of

fig.5

fig.6

fig.7

fig.8

fig.9

FIGURES

5- Transferring Design
6- Cutting Out Design
7- Annealing
8- Quenching and Pickling
9- Drying the Metal

oxygen and is bluish in color. A reducing flame is yellowish in color. The metal should be heated to a dull cherry red. Sterling silver may be safely heated to 1100°-1200°F, gold to 1200°F, and copper to 700° - 1200°F. Overheating the metal may result in destruction of its working quality, as well as increase the firecoat.

Pickling the Metal (fig. 9)

When red-hot non-ferrous metals are plunged in water or other cooling liquid, the sudden cooling or "quenching" makes it 25% softer than if it were allowed to cool down by air. With a pair of copper tongs remove the annealed metal from the pad and quench immediately in hot water or pickle. This removes the oxides and dirt.

The pickle bath is made up of sulphuric acid and water in proportions of one part acid to six or eight parts water. For best results the pickle bath should be heated until it begins to steam. Plate 4 illustrates the use of a heat resistent pickle pot.

After pickling, rinse with water and dry the metal. (fig. 9)

Placing on Hardground Surfaces

In order to raise a pattern on the surface of the work place the metal downward on some material which will yield sufficiently to the force of the blows given, but which at the same time supports the metal nearby and

prevents it from being disturbed. The supporting material should be in continuous contact with the face of the work.

Pitch is the most commonly used substance and is placed in a cast iron pitch bowl.(fig. 11) In order for the flat sheet metal to adhere properly, the surface of the pitch is heated (fig.10)until it melts and is level in the bowl. When beginning with a dapped form, it is desirable to push some of the warm pitch from the outside of the bowl toward the center, forming a slight mound. One of the easiest ways to push is with the fingers.(fig.12) Until one becomes accustomed to handling hot pitch, care must be taken not to burn the fingers. By wetting the fingers this may be avoided.

During the initial working stages the metal has a tendency to pry itself loose from the pitch. This may be prevented by initially placing the sheet metal on the bench or anvil with 3/32 inch projecting over the edge. Bend it down by tapping it gently with the mallet to an angle of about 30 degrees; do this to all four sides. This will not work on curved or round shapes, as there are no corners to bend.

It is a good idea to smear a tiny spot of oil on the metal side coming in contact with the pitch, as the metal is easier to remove later. I have found that it works best to warm the pitch several times by applying a soft flame before laying the metal on the pitch surface. If just the surface of the pitch is heated, as is often

fig.10

fig.11

fig.12

fig.13

fig.14

FIGURES

10- Warming the Pitch
11- Level Pitch Bowl
12- Mounding the Pitch
13- Warming the Metal
14- Adhering the Metal to Pitch

suggested, the metal has a tendency to break away from the pitch after it has hardened. To insure perfect adhesion, the metal and pitch should both be warmed (fig. 13) and then the metal, back side up, carefully placed on the pitch and then wriggled sidewards to remove air pockets underneath. (fig.14) Pressure should be applied to insure adhesion, but if the pitch surface is too hot or too much pressure has been applied, then the metal is sure to sink and the working surface will be covered with hot pitch. Excess pitch may be wiped off with a rag dipped in hot parafin, alcohol, benzol, gasoline or kerosene. If allowed to cool, it will become brittle and may be chipped away carefully with a small, dull chisel. The fingernail may be used to scrape away warm pitch.

In order for the pitch to serve as a resilient backing it must be allowed to cool before any work is attempted. It is best to allow it to cool slowly and evenly, but if one is in a hurry the bowl may be placed under cold water or in winter placed near a window or mounded with snow. The disadvantage of rapid cooling is that there is greater chance for the pitch to become hardened on the surface, causing it to become brittle and thus crack.

Lead, tin, and zinc may be used as supports. These materials give a clear, sharp impression, and have the advantage of being clean to work with. Not, however, being of an adhesive nature, they do not keep in close contact with the work. After a small amount of hammering, the metal will no longer be completely supported and thus become difficult to manipulate. Care must be taken to

remove any particles of lead, tin, or zinc which may have transferred themselves to the work, for they would cause serious damage if the piece had to be heated afterwards.[14] Tin, which is less yielding than lead, and gives a cleaner result, was used as a backing for much Etruscan work. Zinc can be roughly beaten up to shape as a preparation for chasing.[15] This was especially useful in antique work if the same decorative motif had to be repeated several times, for example in neckpieces, pectorals, or borders. In repoussé and chasing which was done in the Middle Ages, the work or plate was fixed on these materials as well as wood and pitch.[16]

Linoleum, wood, or microcrystal linewax (a dark brown, sculptor's wax, consisting partially of beeswax) are other possible backings. Woods with strong grain such as oak, pitch-pine, etc., are not usable for repoussé boards, as after some use the harder part of the grain is left standing in the ridges. Sycamore, which has interlocking grains, is suitable.[17] (For further information see section, Chasing on Wood) Microcrystalline wax works especially well for filling hollow forms which are to be chased. It is similar to pitch in that it is sticky when soft, resilient when cool, but a bit difficult to manipulate with the fingers. It has the advantage of being clean to work with.

Cellini used a stucco made from a mixture of Greek pitch resin, a little yellow beeswax, brick dust or ground terra cotta.[18] Many variations of stucco may be used and are mentioned in the section on materials.

II. REPOUSSÉ

This is a plastic process, and the design must be formed in the process. It is not a question of duplicating, accurately, a predesigned form. It is a question of bringing the form into precise existence in the metal through successive stages. This is the key to successful repoussé.[19]

-Philip Morton

SUMMARY OF THE WORKING PROCESS

There are three main divisions of the chaser's art. Flat chasing, worked on one side--the front-- mainly with tracers. Backgrounds may be textured. Embossing, the raising of forms from the back. Repoussé, normally worked in three stages--outlining with tracers--reversing the metal on pitch and giving texture; the metal is once more turned over, bringing the front uppermost. Very low relief may sometimes be got by sinking the background and modeling the parts left standing.

Here are a few hints which will help anyone who wishes to try his skill. In raising bosses of any height avoid straining the metal; do this by inclining the tool and working outwards, towards the edges of forms. Anneal as soon as the metal hardens. If cracks should develop solder then at once.[20]

FIRST COURSE

The function of the first course is to block out the masses by embossing or raising forms from the back. (fig. 16) In chasing work done from the back is referred to as repousse. Before any work is done, it is advisable to decide which areas will be raised and which will be depressed. Mark these sections after the design is drawn in reverse while the front surface is in contact with the pitch. (fig. 15)

TOOLS

It is usually difficult to reach the full depth of an area in the first course. The deeper the hollow is to be, the farther out from the center must one gather the metal. To push down a deep recess, a broad area is worked down to perhaps half the depth. In the second and third stages the final shape and depth is achieved.

Smooth, larger, rounded punches referred to as repousse' tools are used in the beginning. (See section on tools)

fig.15

fig.16

fig.17

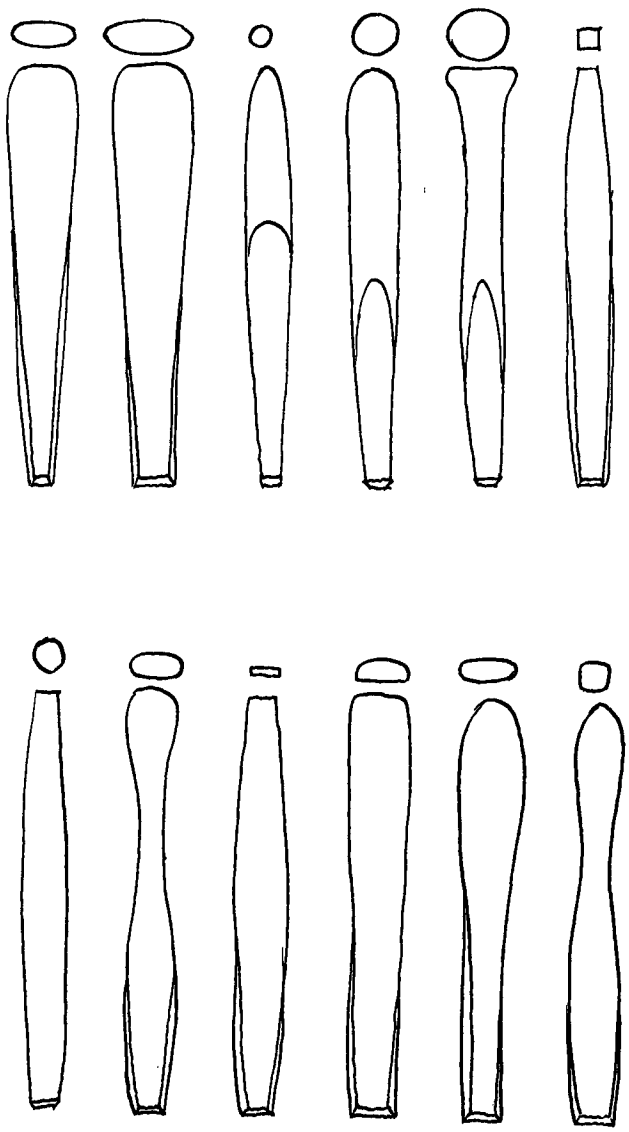
fig.18

fig.19

FIGURES

15- Drawing Design
16- First Course; Blocking Masses
17- Completion of First Course
18- Warming Pitch; Removing Metal
19- Draining off Excess Pitch

Fig. 1 Repoussé tools of various kinds and sizes with plan view of end shapes.[21]



A chasing hammer, preferably a heavy weight, or ball-peen hammer is used to strike the upper end of the tool steadily and continuously with light blows. An emery finish, is preferred to a high polish on the hammer face, as it avoids slippage. When striking with the hammer remember that the face of the hammer must always be held in normal relationship to the axis of the tool; otherwise each blow will deflect the tool out of line and the force of the blows will be lost.' When the hammer and the tool are held in the proper alignment, the force of the blows goes directly into the metal, and if the tool is adjusted correctly it will automatically move along the surface of the metal.[22]

Fig. 2 Chasing hammer head.

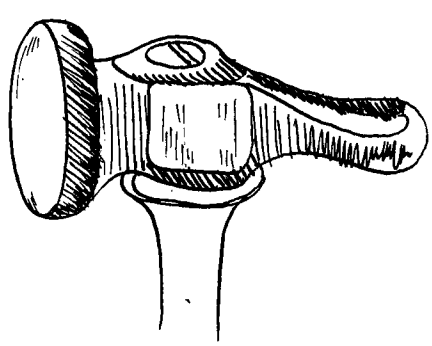
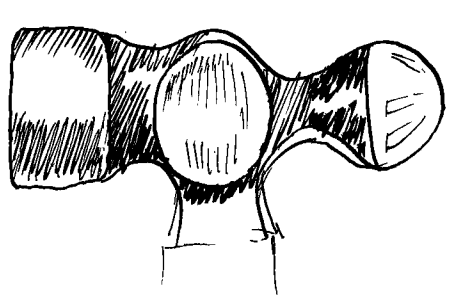


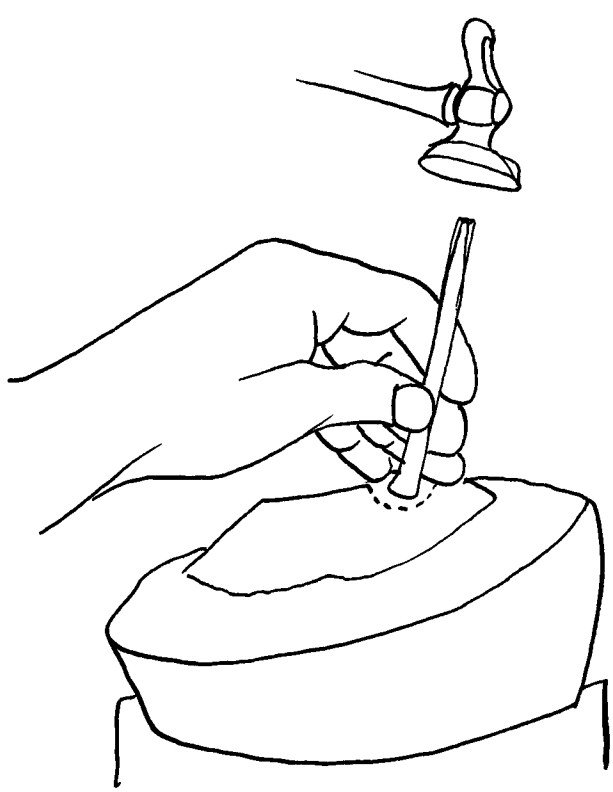
Fig. 3 Ball-Peen hammer head.



Form for repoussé

The repoussé punch is held firmly, but not tightly, in the left hand, In the figure below, notice that the little finger rests upon the surface of the sheet metal while the other three fingers are spread along the tool; one near the top, one near the middle, and one at the bottom of the tool. The hand remains in this position allowing the tool to recoil or spring up. The tool is tilted slightly back and away from the direction in which one wishes to move.

Fig. 4 Form



Patching Holes

It should be remembered that during the first course of repousse' the metal is becoming work-hardened. If the metal is pushed too far, the surface will become uneven, thinner in sections, and in this condition the metal is easily punctured with a tool. There will undoubtedly be an urge on the part of the metalworker to push the metal further than it can go before submitting the sometimes dreaded withdrawal process. Do not expect too much at first. If the metal is punctured it is best to repair the damage immediately. This prevents the hole or crack from becoming enlarged through further working. The more experienced one becomes, the fewer holes one makes, but I can almost guarantee a beginner that he will experience the art of "hole patching". This is how it is done:

> Drill or file out the hole slightly larger than it is. Insert a wedge or piece of wire of slightly smaller dimension, so that it fits snugly. The wire or rod should be of the same material as the parent body. Cut off the wire and leave it protruding on the outside. Clean and flux the crack and the pin. Flow hard solder under heat, around the pin, and through the joint. Capillary action will draw the solder into place. Clean the soldered piece in the pickle and file off the excess solder and the protruding pin.....
> The join will show slightly, but it is better than the crack.[23]

Removing the Metal from the Pitch

This may be done in several ways.

...The bottom of the pitch container may be given a sharp blow with a mallet, often dislodging small pieces of work which may already be loose.

...A chasing tool may be worked under the surface of the metal to pry it loose.

...The most common way is to warm the metal and lift it off the pitch with a pair of tweezers. (fig. 18) It is advisable to set aside several pair of inexpensive tweezers for this purpose. Hold the work between the tweezers and allow the excess pitch to drip back into the bowl. Pitch should not be burnt over the bowl, for in the process, hard clumps of pitch or ashes may fall into the bowl and leave undesirable lumps. Pitch should be of one consistency, free from lumps and dirt.

Burning off Pitch

This operation is rather messy; therefore, in order not to contaminate clean working areas or tools it is a good idea to isolate this operation by setting up a small, well-ventilated pitch working area. In addition to extra tweezers, have on hand an additional asbestos pad specifically for pitch removal.

Lay the metal on the pad with the pitch surface up. As the metal is heated with a soft reducing flame the pitch will begin to bubble and smoke. From time to time remove the torch from the metal. The pitch will begin to turn to a white ash. Anneal the metal as described previously, making sure not to overheat the metal. Be sure that all traces of pitch have been burned off during the annealing process. A partially burned area of pitch, if dropped in the pickle, will form a hard crust which is difficult to remove.

Quenching, Washing, Drying

As alloys containing copper are heated to annealing temperatures, "firescale," an oxide which clings tenaciously to the surface, is formed. The pitch ash and "firescale" can be removed by quenching the metal in hot pickle solution.(fig. 21)After washing the metal in order to get a better look at the surface, the metal may be scratch-brushed. Dry the metal.

At this point the surfaces should be studied and

fig.20

fig.21

fig.22

FIGURES

20- Annealing and Burning Off Pitch
21- Quenching and Pickling
22- Drying the Metal
23- Front, First Course
24- Back, First Course

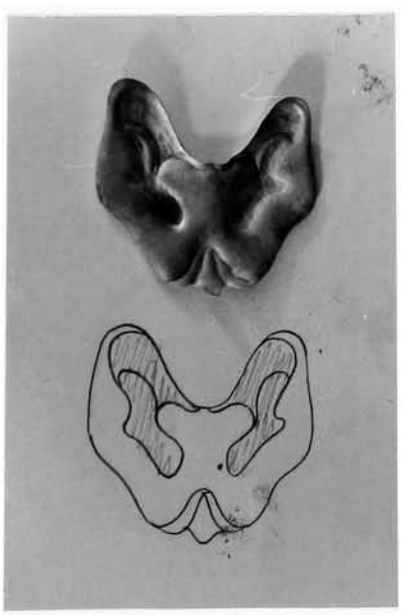


fig.23

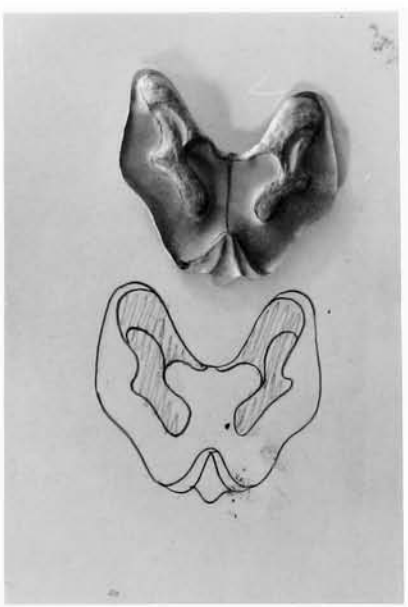


fig.24

perhaps the original drawing should be referred to. Although the recesses are probably not deep enough at this point it is a good idea to work alternately from back to front until the desired depth is achieved, providing that there is just as much work to be done from the front as the back. In some cases most of the work will be done from the back. If this is so, continue working on the back after the metal has been annealed. When working on one side only, certain areas act as the ground. Often these areas are not hammered as much as the relief areas. Thus, the relief areas will be thinner or stretched out. It is generally quite difficult to keep the metal the same thickness throughout. Alternating helps to keep the surface more even.

Completing the Repoussé Stage

Having observed the areas that need greater contour, they may now be worked to completion. After drying the metal replace it on the pitch as described before, making sure that it is evenly supported. When the desired relief has been achieved, anneal, pickle, and dry the metal. At this stage the design will be represented by an unevenly bossed-up piece of metal, a little larger in every direction than the shape desired.

fig.25

fig.26

fig.27

fig.28

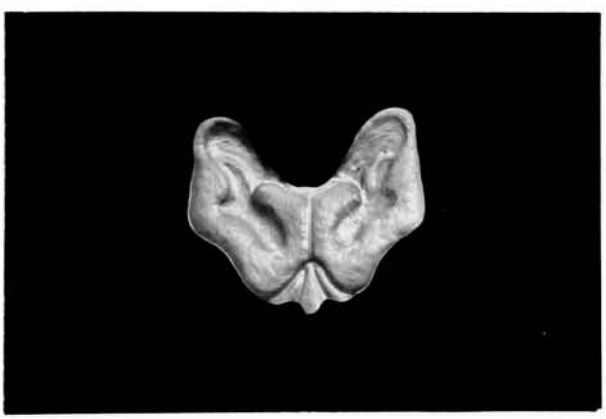


fig.29

FIGURES

25- Warming the Metal
26- Warming the Pitch
27- Pouring Pitch into Recesses
28- First Course, Chasing
29- First Course Completed

III. CHASING

First Stage (fig. 28)

Chasing is any relief work done from the front. During the first course of chasing the metal is worked in the same manner as in the first stages of repousse'. Begin working with smooth, rounded punches to push down areas which are to remain the lowest undercutting. You can begin defining some of the relief areas by pushing down and modeling the areas which are pushed out farther than the final results are to be. Do not expect to do too much refining the first time. After the lowest areas have become work-hardened, remove the metal, anneal it, pickle it, and dry it.

Chasing Tools (fig. 36)

The chasing process calls for many of the previously mentioned tools. Blunt relief forms may be sharpened and defined with flat modeling tools. Lines may be chased with straight and curved liners and surfaces may be embellished with liners, pointed tools or matting tools. (see section on tools)

Form for Chasing

The thumb, index and middle fingers hold the tool while the ring finger and pinky are braced on the working surface (fig. 4). The tool should be positioned carefully before the hammer is struck. Each mark counts and is visible. To create an even line it is best to use the corner of the tracer or liner rather than the whole tool. The corners should be slightly rounded to prevent cutting of the surface. Use continuous, rapid blows of the chasing hammer. If short jagged depressions are desired the total edge of the tool should be used. Here is the opportunity to become acquainted with your tools. Each tool leaves a different mark and can be used to make textures of all sorts. Some of the effects possible are subtle modeling, cross-hatching, dot patterns, ribbing, or feathery variations.

Planishing

Method I: If you examine the surface of the metal you will probably see areas on both sides which can be refined by planishing (figs. 32 and 33). With the use of a planishing tool (refer to the section on tools), ridges, lumps, or undesirable marks left by the repoussé tools may be hammered out smooth. One method is to fill the hollows on the reverse side with broken pieces of pitch, and melt them in, taking care to leave no bubbles,

or the surface of the pitch bowl may be heated and the pitch poured into the concavities (fig. 27). It will probably be necessary to use your fingers to push the warm pitch away from the edges of your metal. After the pitch is cool, smooth out the metal with the planishing tools.

Method II: This method is a great time saver. It eliminates several trips in the pitch bowl because the metal may be worked from both sides at the same time. A dapping tool (fig. 31), smaller than the area to be planished, may be held in a vise to function as a miniature planishing stake. The metal is placed over the tool and hammered in a planishing fashion with a planishing hammer (fig. 34). The metal should be rotated constantly over the stake to create a uniform surface. If the areas to be planished are tiny it will probably be necessary to use a smaller planishing hammer. I have found that the flat end of a medium weight rivet hammer works well if the face is emeried smooth. Figures 32, 33 and 35 illustrate the metal before and after it has been planished in this fashion.

Many times in chasing a piece of metal mistakes will be made: areas will be pushed in the wrong direction, lines will not be straight, or forms will be unpleasing to the eye. Method II is a simple way to correct these faults. It should be remembered that the metal must be annealed when planishing, unless this is the final step

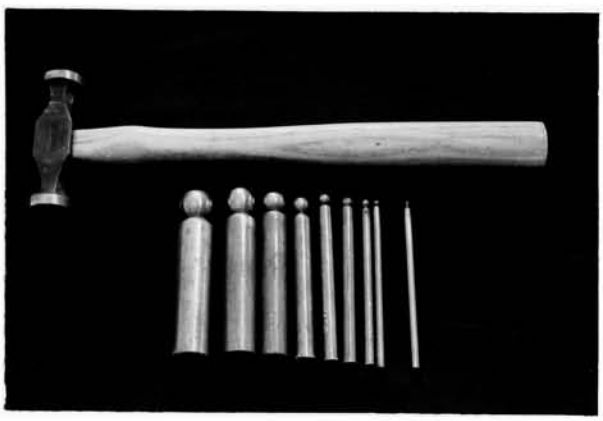


fig.30

fig.31

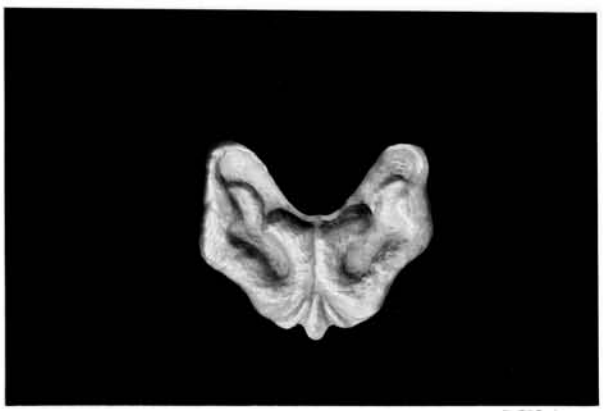


fig.32

fig.34

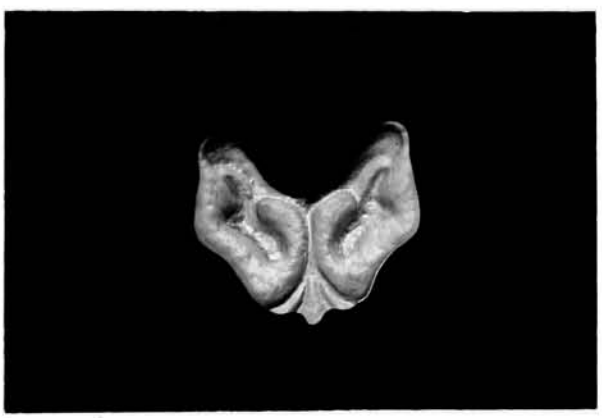


fig.33

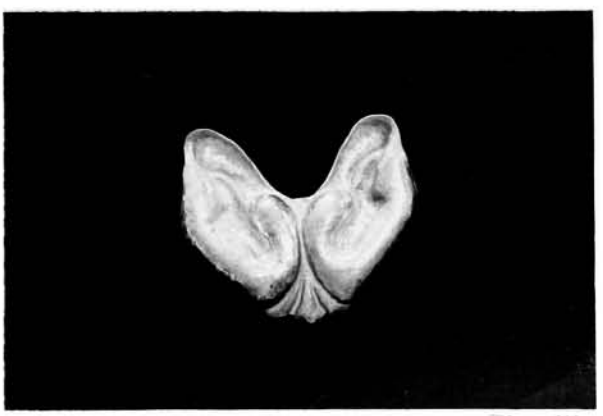


fig.35

FIGURES

30- Dapping Tools and Planishing Hammer
31- Dapping tool in Vise
32- Back before Planishing
33- Front before Planishing
34- Planishing over Tool
35- Metal after Planishing

and a work-hardened surface is desired.

Second Stage

Most chased work in this stage is begun with liners rather than forming tools. Unless a visible outline is desired around a specific shape it is not a good practice to use the curved or straight liners to outline forms. A parallel may be drawn between chasing and drawing. In drawing, forms are modeled in chiaroscuro, or light and dark shading. Heavy outlines, or anu outlines for that matter, are the indelible marks of the novice craftsman. When modeling metal, liners may be used to shade around a shape. This may be done by placing fine lines parallel to one another or by cross-hatching.

Texturing

When areas must be covered closely with tool marks, a slightly different method than that described above is useful. Hold the tool in the same manner as previously described, but keep the little finger on the surface of the metal while the tool is held slightly above the surface of the metal and is lifted out each time the hammer rises. This method increases the rapidity with which an area may be textured, since it eliminates the additional motions of placing the tool in a new position and of removing the tool afterwards. This method also allows flexible movement

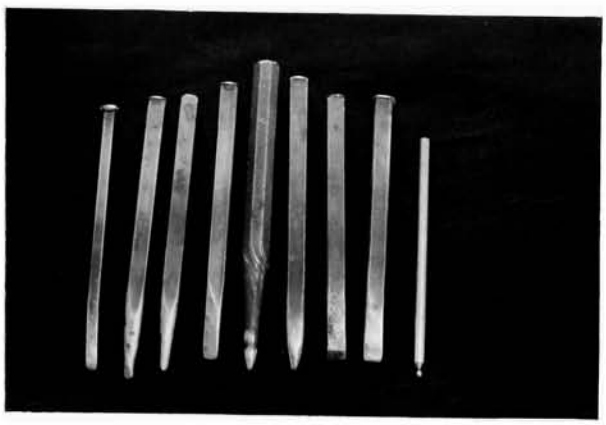


fig.36

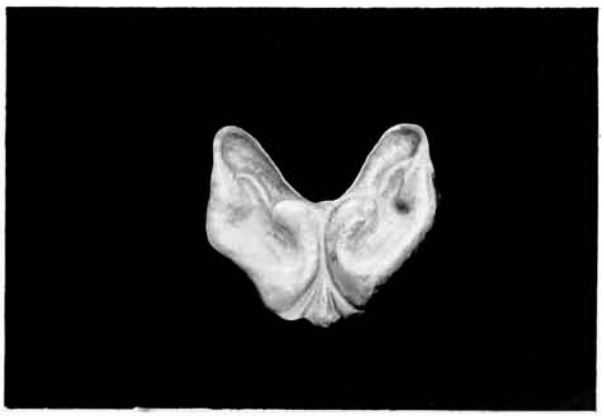


fig.37

fig.38

fig.39

FIGURES

36- Chasing Tools
37- Front Before Texturing
38- Texturing and Defining
39- Completion of Second Course

of the tool over the surface and permits the tool to be rotated between the fingers in order to create varying effects.[24]

Matting

Although any tool may be used to texture an area with lines or dots, matting tools are made specifically with textures on the faces. By using these tools a broader surface may be textured in a shorter amount of time. Other interesting textures may be created with the use of letter and number stamps as well as burrs made for the flexible shaft. If burrs are to be used, a special holding device must be designed, as there is no tool shaft or tip to hammer on. Perhaps a hole, smaller than the diameter of the small shaft on the burr, could be drilled into a steel rod shaped like a chasing tool with a flat head. The burr could be pushed in with epoxy and have a pressure fit. One should experiment with burrs on a scrap piece of metal as they are sharp and could damage the surface if too much pressure is applied. Matting tools have a tendency to make a surface look cheap and "rinky-dink" when used haphazardly or without control. Once these tools are applied to the surface it is impossible to erase the marks.

Chasing on Wood

Not all chased work requires repousse'. If shallow surface treatment and texturing is desired merely to create a surface embellishment, it is not necessary to work from the back of the metal. Pure or fine chasing is usually done from the front side alone and may be done on a backing of wood rather than pitch.

A block of wood at least one inch thick, is needed and larger than the piece of metal to be chased. The wood should be heavy enough so it doesn't move with each hammer blow. Sycamore works well as the hard ridges are not left standing after it has been indented; this quality is attributed to its interlocking grain.

The metal is annealed, pickled, dried, and lightly flattened with a mallet. I suggest using 24 gauge or 26 gauge metal. It is not necessary to use heavy gauge metal if forming is not to be done, unless the chased metal is to be used as an element, such as a lid for a container, where weight is desired.

The work may be pegged down on the wood by careful placement of headless nails. Space the nails evenly around; this prevents the metal from buckling up after pressure is applied with a tool. The nails should be placed around the metal rather than directly into the piece. The force of the hammering moves both the chasing tool and the metal and the pegs act as stops. The metal

may be held in position with screws. Holes are drilled into the wood at specific intervals, and the screws screwed in around the metal. Washers may be used for more holding support. The advantage of using screws is that the work may be removed and replaced easily.

IV. FINISHING PROCESSES

Pumicing

After the metal is taken to completion on wood or pitch, a finish is usually applied to the surface to accentuate the forms. Much traditional and trade jewelry is finished with a high polish, but the standard flashy, shiny surface is not often suited to rich, textural relief work. One is unable to see the subtleties of form due to the distracting high reflections of light which interfere with the tilted surfaces.

Pumice powder can be used to control placement of reflective and nonreflective areas. It comes in various grades of consistency and may be rubbed over the surface to dull the shine for a more subtle effect. This procedure is done after the final pickling of the work. If the metal, in its finished state, is to be work-hardened, then the metal should be planished, pickled and pumiced. One method is to dip the thumb in water and then in the pumice powder and rub the surface of the piece, or a toothbrush may be dipped in the pumice and gently worked over the surface. Pumicing is repeated until the desired finish is achieved.[25]

Coloring the Metal

Coloring of metals should follow buffing or pumicing, as it is the last step in finishing the piece. The colors and effects vary, depending on the existing surface before the patina is applied. If the metal is buffed, emeried, burnished, or polished before an oxide is applied, the surface and color will be different from that of a piece of metal which is pumiced, oxidized, and then burnished, or polished. When the oxidized surface is rubbed with an abrasive the high sections will not be colored with a patina.

Prior to applying a patina the piece should be annealed and pickled several times. This builds up the "fire-scale" and leaves pure metal on the surface of the alloyed metal. After sterling silver, an alloy of silver and copper, is annealed and pickled several times, it will have a thin layer of pure silver on the surface. Oxidation seems to have a greater reaction on the pure metal than on an alloy.

Cleaning the Metal

The metal should be free from grease, oil, and finger prints. This may be accomplished by boiling the work in a solution of non-poluting detergent, ammonia, and water, or with a fine abrasive such as pumice powder, or it may be cleaned ultrasonically. If the surface is

not absolutely clean the chemical (liver of sulfur) will not adhere properly.

Oxidizing with Liver of Sulfur

There are many different methods of coloring or patinizing the metal, but the easiest, most successful, and commonly used process for chased work of silver, copper, and bronze is to oxidize the metal with a mixture of sulfur compounds commonly known as liver of sulfur (potassium sulfide). Another similar patina may be prepared by dissolving sulfide in water. Both solutions are prepared by adding a small piece of chemical, about ¼ inch, to a quart of water. The solution is kept in a tightly covered jar, since the oxygen in the air causes it to deteriorate. Although the solution is not poisonous, it should be washed from the hands, if not, it will stain them.

The solution may be applied in various ways. The metal is placed in a jar for a period of time until the proper color is reached (figs. 40-42). The time may vary from five minutes to an hour. The solution should be agitated, as often there is a sediment from the chemical which settles to the bottom of the jar. By agitating, the chemical is the same strength throughout and a more uniform patina is achieved. If the metal is to be oxidized in a hurry more chemical may be added,

fig.40

fig.41

fig.42

fig.43

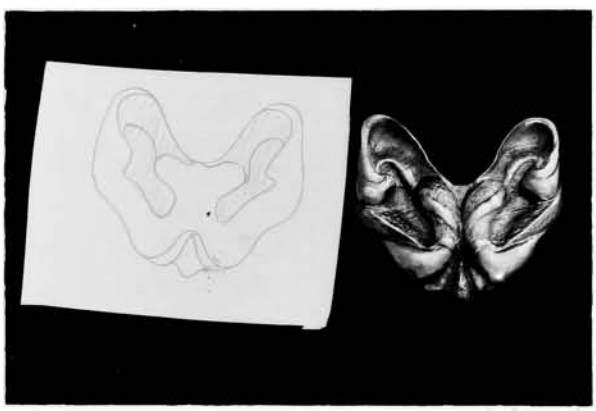


fig.44

FIGURES

40- Placing Metal in Liver of Sulfur
41- Oxidizing Metal
42- Oxidized Metal
43- Scratch-Brushing the Metal
44- Original Drawing; Finished Piece

buffing, or burnishing, or a combination of all. Scratch-brushing (fig. 43) leaves a fairly shiny surface compared to the duller pumiced surface. Pumicing, though, will remove the oxide on the high spots. Burnishing leaves a higher luster than scratch-brushing and is usually applied to specific areas rather than to the entire surface. Burnishing may be employed as to contrast dull sections, and it works well in small or tight areas which cannot be isolated while scratch-brushing. Polishing compounds may be applied but they tend to wear down the surface and obliterate clean, fine lines, crisp textures, and other rich chased effects. Buffing, therefore, is not recommended.

In order to achieve a rich surface, which I feel is an inherent characteristic of chasing, there should be dark blacks, greys, and natural metal color, as well as dull areas contrasted with burnished areas. To do this successfully it would be necessary to experiment with different solutions, and repumice and oxidize several times.

PART III

TOOLS, MATERIALS, EQUIPMENT

fig.45

TOOLS AND EQUIPMENT

> It is interesting that creative man had, at an early time, designed the tools of his arts so well that many have not changed in shape and function to this day. Of course modern technology has improved the quality of the tool and mass production has made a tremendous variety available to the craftsman who had to make his own in past ages, but the functional aspect has changed very little.[26]

The craftsmen of the middle ages used tools for chasing and repousse' which are similar to ours today. Theophilus describes the tools which were made for pushing up figures, birds, animals, or flowers as being,

> A span long, broad, and headed on top, while below they are slender, round, flat, three cornered, or curved back as required for the diversity of forms in the work.[27]

Although most of the tools used for chasing and repousse' may be purchased from tool suppliers, the serious student will probably want to make his own tools. Tools purchased from suppliers usually are quite expensive, poorly crafted, and cannot be purchased individually. After becoming acquainted with the process you will come to know which tools are most comfortable for you, as well as which you have little or no use for.

H. Wilson, in his book. Silverwork and Enamelling, states that:

> There are few things necessary in the workshop which the student cannot make for himself. The curse of the modern workshop is the dependence of the workman on machine-made things... The effect on the work is deplorable. The chief beauty --the quality given by human handiwork-- is absent, and nothing can make up for the loss.[28]

Tool-making is an art in itself. Although I believe that the best tools for chasing and repousse' are the ones that you make for yourself, I will not cover toolmaking in this thesis. If you are interested in making tools you can refer to any number of the workshop manuals listed in the bibliography which discuss tool-making.

LIST I: GENERAL TOOLS USED IN THE PROCESS

For Sawing and Cutting

1. Jeweler's saw frame, 5", adjustable
2. Jeweler's saw blades
3. Beeswax
4. Metal shears
5. Bench pin
6. Metal gauge

For Annealing and Pitch Burning

1. Annealing pads, 2
2. Torch
3. Tweezers, several pair
4. Pickle Pot, copper or glass

For Chasing

1. Pitch
2. Pitch Bowl
3. Leather or rubber ring as support for Pitch Bowl
4. Chasing and Repousse' Tools
5. Dapping Tools
6. Chasing Hammer
7. Ball-peen Hammer
8. Wood Board for Chasing
9. Nails

LIST I: Cont'd.

Miscellaneous Tools

1. Anvil
2. Vise
3. Binding Wire
4. Wood and Metal stakes
5. Pliars

LIST II: DESCRIPTION OF SPECIFIC TOOLS USED IN THE PROCESS

Punching tools are made of rod steel or brass, shaped according to their function, and are known by the name of the function they perform. They may be divided into the following categories:

REPOUSSE' TOOLS

1. Embossing or Doming Tools (fig. 1)

These tools are used for raising metal, generally from the back or reverse side. Most are about 5" long and are square, rectangular, or round in cross section. They may be tapered at both ends to give a firmer gripping area in the middle. The face should be emeried and all sharp edges removed to avoid cutting the metal.

2. Dapping Punches (fig. 30)

A dapping punch is a steel shaft with an almost complete ball at one end. These punches can be bought in graduated sets ranging from very tiny to large. They can be used as repousse' tools to block out masses from the reverse side as well as small stakes which may be placed in a vise on which to planish small areas. Smaller punches may be used as chasing tools for texturing.

CHASING TOOLS (fig. 36)

1. Tracers or Liners

As the name indicates, these tools are used for forming lines, straight or curved. They are probably the most useful of all chasing tools. They are shaped basically like blunted chisels but are neither round nor a chisel, rather, they are formed of two intersecting arcs with the tip rounded off. They may have very thin or broad edges, depending on the quality of the line they should form. Although the tools may be used to outline a shape which is to be raised from the back, this is not a very sophisticated approach. One should get in the habit of shading the metal with tool without the use of outlines.

> Now for the actual tracing. Hold the tool on the line, with the utmost firmness, strain the fingers and hand as if to draw the tool along the line, but press the tip of the third finger on the metal firmly so that it acts as a brake. Now strike the end of the tool with steady, even blows, at the rate of about 140 a minute, and it will move slowly forward towards one. The tool will move a little way without any movement of the tip of the third finger; but we shall soon find that we have to move the whole hand. When this happens the pressure is, of course, momentarily relaxed.[29]

2. Planishing or Smoothing Tools

These tools are used to planish, smooth or work-harden a surface too small for a planishing hammer. The faces of these tools are flat or convex-tipped and the edges are slightly rounded. They may be used to punch

or flatten down an area after it has been raised from the back.

3. Matting or Graining Tools

Matting tools are classified as chasing tools because they are used specifically to texture or create an all-over pattern on the front side. They can be used to give a fine dotted or cross lined effect on the background metal. There are an infinite number of faces, each giving a specific texture indentation.

All-over patterns do not have to be done with matting tools. Liners and dotting tools work well.

4. Point or Dotting Tool

The tool is actually like a center punch, but perhaps a bit longer. A textured surface can be created by covering a space with tiny point marks close together (fig. 48). How the point tool is used:

> The tool should be held in the usual way with its tip about 1/16 inch above the surface of the metal. Then we shall find that when we strike it with a hammer it will be forced down on to the metal and immediately will spring back again to its former position. The fingers actually function as a spring. Our aim should be to move it about over the space while the hammer falls quickly, lightly, and regularly, thus producing an even texture ...On old work we will find patterns, sometimes elaborate, done with a fine point in this manner...This work is often called "pricking" or "pouncing".[30]

HAMMERS

Ideally at least two types of hammers are needed: a heavy one weighing about 16 ounces and having a flat, broad face to be used with larger repousse' tools, and a chasing hammer.

Chasing Hammers

> Chasing hammers are made with polished faces up to 1¼" across, and have thinly tapered wood handles about 10 inches long, ending with oval, pistol, or round grip. The face is hardened so that when properly used with the tools, being hit lightly and squarely at the tool end, it should not become dented. The tapered wood handle is designed to give the tool spring, and its weight and form allow the tool to be applied rapidly. The broad face of the hammer is designed to provide relatively large striking areas so that this part of the work need not be watched. Vision is concentration on the action of the tool on the metal.[31]

Chasing hammers come in different weights, between 2 and 8 ounces. The hammer head should be properly secure on the handle; if not, the head can fly off while in the act of chasing. The head can be secured by coating the tip of the handle with Chair-Loc[32] and then inserting this tip into the hole in the hammer head. When secure and tightly fitted, insert a wood wedge and then hammer in a metal wedge. Apply more Chair-Loc on top. Let dry. This substance causes the wood to swell, and acts as a glue as well. The chances of the hammer head flying off are greatly reduced.

III. PITCH

Pitch is a black or dark viscous substance obtained as a residue in the distillation of tars and other organic materials. When combined with other materials such as plaster and tallow, it serves as an excellent hard-ground base for chasing. Although I have mentioned other materials such as wood, wax, lead, and zinc, which can be used, pitch is probably the most favored. Pitch, being of an adhesive nature holds the metal securely in position even after pressure has been applied.

Chasers' pitch may be bought commercially, but I have found the most efficient pitch is prepared by the craftsman according to his needs. Some work calls for harder pitch some softer, and pitch used in winter will differ from that used in summer. A stiffer pitch is used in summer.

Herbert Maryon, in his book Metalwork and Enamelling, gives a good account of how to prepare pitch.

> Take 7 lbs. of "Brown Swedish Pitch" - the quality may be determined by a) colour: there should be a faint shade of brown in the lumps and when broken, the dust is very distinctly of that colour; b)fracture: this should be clearly "Conchoidal," i.e., the forms are shell-like; c)tenacity: when a tiny fragment is held in the fingers until it becomes warm and soft it would pull out in

> thin strings several inches long; here again we should test by colour for good pitch pulled out until very thin and shows a clear translucent brown when held to the light; d) smell: pure vegetable pitch has an agreeable odour; but pitch adulterated with rosin and bitumen gives off acrid, choking fumes when melted. Break the pitch up into pieces of 2 or 3 inches, then put them in a pot and melt on a gas ring. With the pitch put about 6 oz of the best tallow. Have in readiness 10 lbs. of coarse "Plaster of Paris" or powdered pumice, or "Bath Brick" dust. This powder must be dry and free from lumps.
>
> When the pitch and tallow are completely melted, add three or four handfuls of the powder and stir evenly until it disappears; then add a similar quantity; go on doing this until the mixture becomes difficult to stir. If too much powder is added the mixture will become dull in surface and short in consistency. If this over-stiffening happens it can be remedied by adding more pitch and tallow.
>
> When we think we have reached the right degree of stiffening, or hardening, we test the pitch by dipping a bit of wood or scrap metal into the pot, and cooling it in running water. When quite cold, well mixed pitch should be so hard that one can, by using considerable force, just make one's thumb nail indent it. We must not forget that in winter, more tallow, and in summer more powder, will be needed.
>
> Caution: On no account must pitch be overheated. Not only is there the danger of the pot boiling over and taking fire, but any undue heating will destroy the elasticity and stickiness so necessary if one's chasing is to be done happily.[33]

Pitch Bowl (fig. 11)

After the pitch has been prepared it is carefully poured into a pitch bowl, a hollow hemisphere of cast iron which weighs about 20 pounds when filled. The weight is important because it prevents the bowl from moving when

hammering the metal adhering to the pitch. Pitch bowls come in several sizes; six to ten inches in diameter. Pitch is easiest to control when in one of these bowls. The proper angle necessary for tool control can easily be altered by resting the bowl on a ring of leather or rubber, or a sand bag, and tilting the bowl to the desired angle. If a bowl is not available, the pitch may be placed in a pan or mounded on a wood block; however the latter is much harder to control. If wood is used, cover it by pouring, spreading, and allowing it to cool, until the needed thickness is reached; at least one inch.

Helpful Hints

- Do not overheat the pitch.
- When burning old pitch, keep away from good pitch.
- Fingers may be used to manipulate pitch, but caution is advised. Hot pitch burns.
- Pitch is removed with such solvents as kerosene, gasoline, alcohol, hot wax applied to a rag, or by carefully chipping with a blunt chisel, or by burning to white ash.

Pitch may be prepared in any number of combinations. Cellini used a stucco, (P.); here are some variations:

1.	asphaltum	2 parts
	yellow beeswax	2 parts
	burgundy pitch	1 part
2.	asphaltum	1 part
	yellow beeswax	1 part
	powdered white rosin	1/2 part[34]

3.	pitch	10 lb.
	brick dust	20 lb.
	resin	4 lb.
	tallow	2 lb.
4.	pitch	6 parts
	brick dust	8 parts
	resin	1 part
	linseed oil	1 part
5.	pitch	14 lb.
	resin	14 lb.
	plaster of paris	7 lb.
	tallow	8 oz.[35]
6.	black pitch	2 parts
	rosin	4 parts
	tallow	3 parts
	fine bolus	2 parts
	linseed oil	10-12 drops
7.	black pitch	5 lb.
	whiting	5 lb.
	1/2 ordinary tallow candle[36]	
8.	pitch	4 parts
	rosin	4 parts
	plaster of paris	2 parts[37]
9.	burgundy pitch	7 parts
	plaster of paris or powdered pumice	10 parts
	tallow or linseed oil	1 part[38]

LIST IV: METALS AND THEIR CHARACTERISTICS

> Metals have three outstanding properties that distinguish them from other substances. They are malleable, fusible, and ductile. Metals are crystalline in structure. When subjected to strain as in cold working, the crystals are distorted, the metal hardens and becomes difficult to work. To restore its softness it is annealed, i.e., heated to about 600 degrees centigrade, a dull red, when the strain is relieved and the crystals revert to their original shapes.[39]

Of the three outstanding characteristics, the one that we are most concerned with in the process of chasing is malleability. Here is a list of several metals which can be used for chasing.

1. Gold

Pure gold is characterized by its yellow color and extreme malleability, but is normally considered too soft for practical use in jewelry. However, most antique chased work was made from pure gold beaten out into very thin sheets. Cellini says:

> Your gold must be good, gold of at least twenty-two-and-a-half karats, but not quite 23 karat gold, for you'd find that a bit too soft to work in; and if it were less than twenty-two-and-a-half it would be too hard.[40]

To increase its hardness and alter its color, gold is alloyed with other metals. The most common alloy is 14 karat gold. By alloying, the cost is lowered and the working properties are improved for use in most processes, with the exception of chasing and repousse'. I would suggest chasing 14 karat gold from 22-26 gauge sheet depending on the amount of stretching to be done. The more stretching, the heavier the gauge should be.

Gold is annealed at 1200°F.

2. Silver

This metal is characterized by its high refractory index and extreme whiteness. Pure or fine silver is very malleable and suited to the chasing process. Sterling silver, which is most commonly used, is an alloy of pure silver and copper composed of 925 parts of silver and 75 parts copper in 1000 parts alloy. Although 20 gauge is suggested most often for chasing, and works well, I have found that the same deep relief may be obtained from thinner gauge stock.

Silver is annealed between 1000° and 1200° F.

3. Copper

Copper is one of the base metals which is used in alloying metal. In its pure state it is extremely malleable and lends itself well to the process, almost better than gold or silver. It works well in forming large tubular forms to be chased. If used for forming,

I would suggest 22 gauge. Copper has the advantage of being malleable, cheap, and a good metal to experiment with.

Copper is annealed between 700° and 1200° F.

4. Brass

Brass, an alloy consisting of zinc and copper, has none of the positive qualities that copper, gold, and silver have. Its brittleness and strength, qualities which are adaptable to machinery, make it very difficult to chase. Malleability is not one of its characteristics and therefore brass doesn't respond to the technique favorably. Although I have used it, I would not attempt it again.

PART IV

APPLICATION OF THE PROCESS

I. MY APPLICATION OF CHASING

As the warm spring afternoon lingers on, the birds are chirping away, the grass is being cut and a yellow buttercup catches my eye. The earth is blooming, and everything in this moment seems so pure, so real, and so enchantingly romantic, In nature, forms resolve themselves perfectly and combine harmoniously with textures and when I live with pure things around me, I become inspired and want to draw. Designs seem to flow into my mind and the next thing I know I'm chasing.

At one time I tried to express my feelings in wax. Wax, being a plastic substance, can easily be modeled with the hands and is quite adaptable to organic forms and textural surfaces. The wax models which I made were cast in metal and the results were only as favorable as the original design. It was a cinch to make jewelry, if this could be considered jewelry. I almost felt as though I was cheating. Having to rely on a casting machine, I was not in total control of the process, and this bothered me. The castings were always heavier than I wanted them to be, and the forms were not rich or spontaneous as I strived to make them.

I found that chasing was a spontaneous, plastic, and flexible means of working, and I could adapt my volumetric forms to the metal more directly through this process.

Every medium has its drawbacks. Cast designs tend to be heavy, and chased forms, which can be made as organic as any wax form, require a lot of time and patience. Wax can only be bent so far before it will break or split, but metal can go farther and, if annealed properly, will never break or crack. Although chasing is a slow process, and patience is a necessity if fine results are to be achieved, I feel the results are well worth the effort. Unfortunately, many other craftsmen do not feel the way I do, and chasing is one process that is often neglected.

My first venture was to use chasing as a surface embellishment. In The Chased Silver Belt Buckle, the chased element (fig. 46) illustrates a simple, traditional approach to surface treatment. Most of the work was done from the back, in repousse'; then the front was textured and chased with chasing tools. Liners and pointed tools were mainly used. The Gold Chased Fibula (fig. 47) is a more involved approach to surface embellishment, and the design was developed and altered from a rectangular shape rather than a predetermined, amorphic shape. Both the forms and textures were the direct results of the tools and the process. The forms were developed from the front and back equally and the relief is quite deep. Both of these pieces were chased in 20 gauge metal.

Chased Silver on Wood (fig. 48) shows a later attempt at surface embellishment and the piece is chased in the pure sense of the word; the metal was worked only from

fig. 46

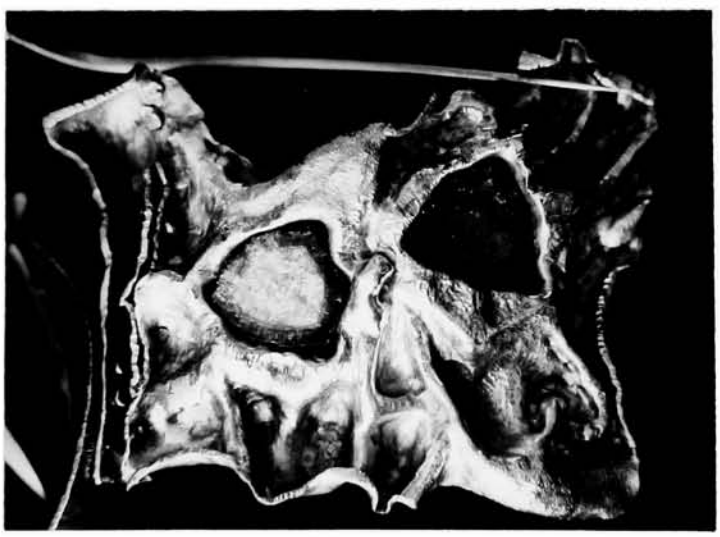


fig. 47

the front and I decided to see how involved I could become with textures. The design is almost flat as there is no deep relief. The design was linear and the forms evolved through modeling and texturing with small liners. I was concerned with creating the illusion of volume by shading the metal rather than actual forming. The piece was chased on wood rather than pitch, and was taken from finish to end in one course. I found this to be a great release from my normal working procedure. I feel that this piece sensitized me to the possibilities of applying textures in a more controlled and subtle way. I found that I could use 26 gauge metal instead of the standard 20 gauge.

In these earlier attempts I was mainly concerned with the malleability of a metal; now I am concerned with the use of thinner gauge metal as well. I see no need to use a heavier stock, 20 gauge, where a thinner sheet may be worked sufficiently in its place. Books often suggest that a standard 20 gauge should be used for over-all chased work. The metal, when worked, stressed, and pushed far is too often punctured. This is true, but once one becomes acquainted with the process, the metal, and the tools, and all their limitations, thinner gauge stock may be worked into deep relief. Had I chased The Gold Chased Fibula (fig.74) in 22 or 23 gauge metal, the gold would have been much easier to manipulate and less expensive.

Unlike gold, copper is not only malleable but

fig.49

fig.48

fig.49a

extremely flexible; it may be bent easily with the hands, and gains tensil strength after it has been planished. One of my earlier attempts with copper was The Copper and Silver Chased Fibula (fig.75). This piece really turned me on to the use of liners. In figs. 50 and51 , which illustrate a detail of the front and back, the thin ribs or lines were begun by pushing the metal out from the back further than needed and then, these areas were refined from the front by leaving the highest point and working the metal down slowly on either side of the ridge. The piece had to be annealed very often as I could only push a little amount each course. I responded well to the visual effect these lines created, and continued to develop this idea. The Butterfly Pin (fig.76) makes use of this technique.

Copper also responds well to volumetric forms. I am sure that Cellini had no problem creating figures in the round out of gold, but he had the advantage of being able to use 23 karat gold, which is soft, malleable, but outrageously expensive today, as it is almost a pure gold (24 karat is pure). The Locket (fig.78) is a combination of organic chased copper forms with a real, natural form, a buttercup, set behind a lense for protection. As I mentioned earlier, I respond well to flowers and butterflies and thought it might be a challenge to include these objects in the actual jewelry. The problem lies in the fact that the natural forms are usually strong enough to exist by themselves without the use of metal to enhance them. The

fig.50

fig.51

Chased Floral Neckpiece (fig.54), and The Butterfly Pin (fig.76), also incorporate natural objects.

The chased sections in The Locket (fig.78) were begun from irregular shapes of 20 gauge copper and then chased. I had a difficult time fitting the entire shape in the pitch bowl and I found that the copper, being malleable, allowed me to bend certain sections upward and could be left unexposed to the pitch surface. Previously I had worked on a flat surface which acted as a background for the relief sections: there was total contact with the pitch. In The Locket (fig.78) the chased elements were conceived as volumetric forms. My original intentions were to bend back the areas to their original position, but it dawned on me that I could let them remain as they were, remove the piece from the pitch, anneal, pickle, and then return these sections to the pitch and leave the finished areas outside the bowl. It was necessary to work on one section at a time as it is nearly impossible to have perfect contact between the metal and the pitch without having the metal sink in the pitch; whereas with flat sheet the metal is on one plane. Working in this manner allowed for the development of form in an additional dimension.

The pin stem holders on The Locket (fig. 53), and on The Butterfly Pin (fig. 76) are examples of forming the copper and the silver partially in the round while

fig.52

fig.53

fig.54

these sections remained in the pitch. When cutting out my original shapes from the metal I allowed for this forming and made tiny patterns for these specific volumetric shapes: tubes and cones. I found that these shapes could be combined with the larger chased masses provided that the transition was natural between the smaller and larger masses. By doing this I was able to avoid soldering two or more elements together, which seemed not to be as pure a way of working.

I have found the combination of forming and chasing to be limitless. I soon began to experiment with 22 gauge copper on larger volumetric forms and the results were quite favorable. The Chased Floral Neckpiece (fig.77) was formed by working the larger floral ends (fig.54) in pitch until completion, while the majority of the piece remained outside the pitch bowl. The tubular forms (fig. 55) were made like standard tubing over an anvil. One open end and seam were taped closed, and the piece was filled with hot wax. Wax was used instead of pitch as it is more liquid when hot than pitch and easier to pour into a small opening. After the tube was filled the metal was chased in the round by positioning the work on a large pitch covered board (fig. 56) which was clamped to the bench.

fig.55

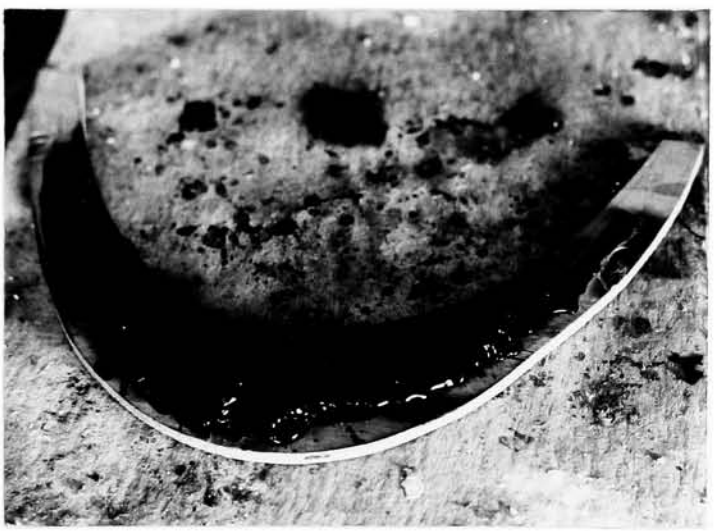


fig.56

fig.57

I feel The Chased Floral Neckpiece (fig.77) and The Chased Necklace (fig.79) are good examples of a combination of things which may be achieved through chasing. They combine traditional chased forms with volumetric and tubular forms in a unique and structural application. In The Chased Floral Neckpiece (fig.77)the smaller flower forms (fig.55) were chased, formed over wooden stakes, and then bent with pliers to serve as a linkage system between a third, partially round, chased form (fig.57). This section was roughed out, annealed, filled with pitch and then formed over wood stakes to conform to the curvature of the neck. The pitch was allowed to remain fairly warm, which made it easier to work the metal. If the pitch had been cooled, it probably would have cracked after the metal was compressed.

In both The Chased Floral Neckpiece (fig.77) and The Chased Necklace (fig.79) many chased elements were combined and perhaps the pieces appear heavier than they are. They are surprisingly lightweight and this can be attributed to the use of 22 gauge metal. The forms are volumetric and I feel the chasing gives a rich hearty appearance rather than a fragile or delicate one. For this reason the pieces look as though they should weigh a few pounds. These plastic forms could never have been worn on the neck had they been cast, for they would have been far to weighty. Chasing therefore allows me the freedom to work comfortably with forms and textures which I can best interpret in metal.

The one guiding principle of all true craftsmanship is this: the true forms used in design should express naturally and simply the properties of the particular material employed.[41]

H. Wilson

II. CONTEMPORARY APPLICATIONS OF THE PROCESS

Perhaps the unpopularity or lack of commitment towards the chasing process, among contemporary metal-workers, can be attributed to the era in which we are living. It is an age of plastics, machines and mass production. Spend a little and get a lot, especially when it comes to spending time. Chasing, being a slow moving technique, requires a certain involvement and many hours of patience.

In order to better understand the process I have included the work of several contemporary craftsmen working with metal. Although they are dealing with the same process, each one's approach and technique is different.

Eleanor Moty, a Philadelphia, Pa. craftsman, makes this statement about her work:

> Most often I am inclined to use chasing graphically rather than for dimensional forming. At times, however, I raise a volume, and then sharpen or define areas by chasing. In conjunction with my photo imagery on metal, I have used chasing to define forms or figures of an image and have applied the image to this area to achieve a related dimensional effect. This technique is evident in The "Commerative" Box (fig. 58).

fig.58

fig.59

Ginger Moore, a graduate of Tyler School of Art, Philadelphia, Pa. says that chasing comes more naturally to her than any other metal working technique.

> I like the surface texture of the convex side because it seems very organic, so I rarely planish. I nearly always apply a texture around the border of my pieces, roll the edges up, and put a chased texture on the edge to thicken it up so that the piece doesn't look so tinny. (figs. 60 and 61)

Dickie La Dousa teaching at Louisianna State University, Baton Rouge, La., states this:

> I work with a sheet of metal and shape it with basically repousse' type tools. I feel as though the metal is as liquid as a sheet of wax, without direct limitations in possibilities of form. The tools are like fingers being pressed into clay leaving a particular form which is rarely altered in the finished piece. A combination of mimicking various basic forms of the human body and textures from natural and artificial objects is employed for richness of form and surface. I must bring that surface to an equality with the actual textural surfaces that I use. Repetitive forms, causing rich textural surfaces are often from non-valuable material such as ribbon or fabric. The metal itself contains a mental or photographic visual image which I work into, very often past, obliterating that original image. Being that the form is my primary concern, and even the fine textures are merely series of forms, there is very little working back into or high polishing of the pieces. They are to constrict or hold parts of the body. This retains the freshness in hollow, bulging, and squeezing forms. (figs. 62 and 63)

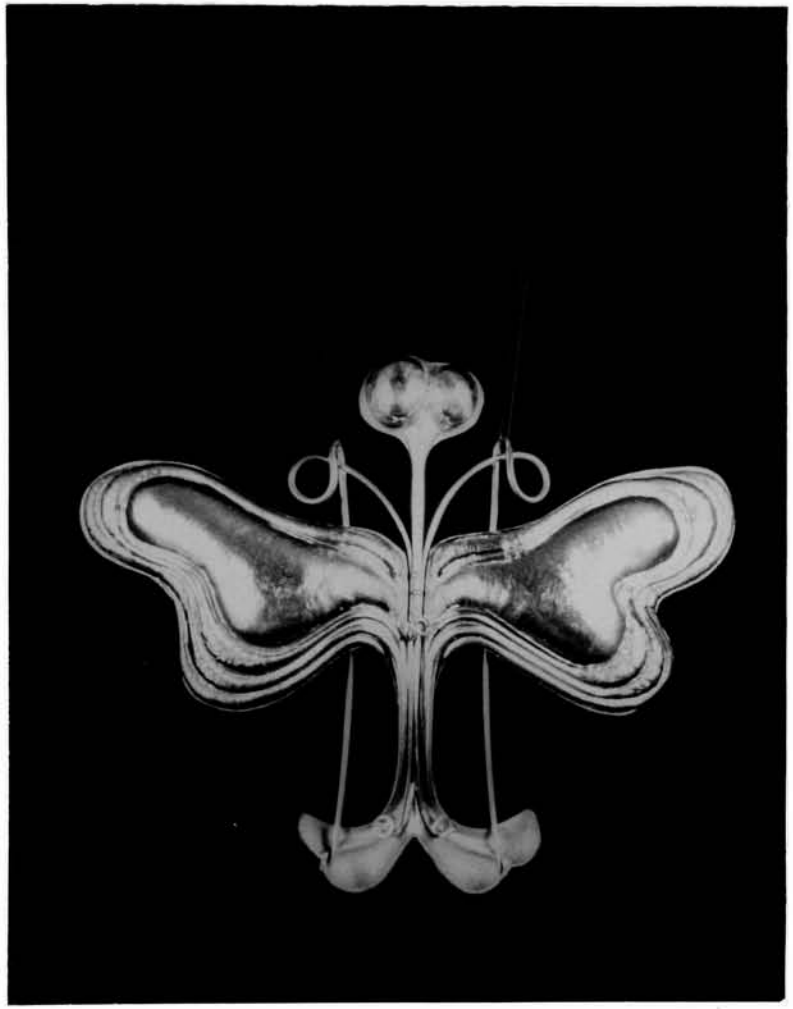


fig.60

fig.61

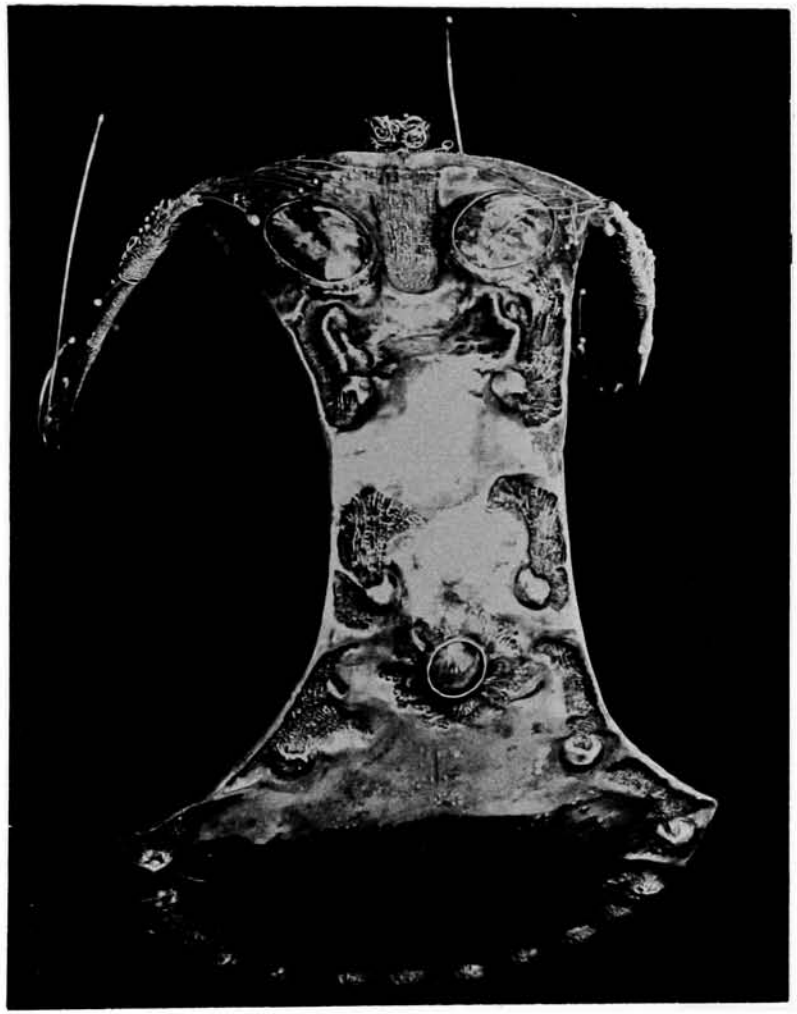


fig.63

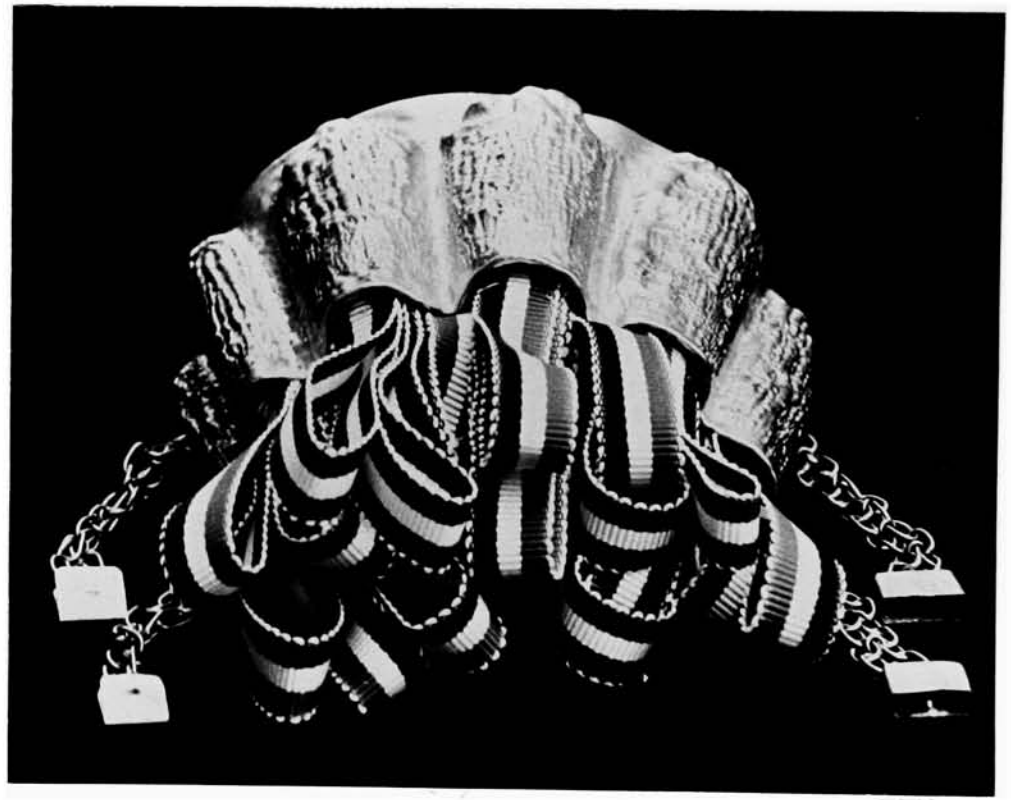
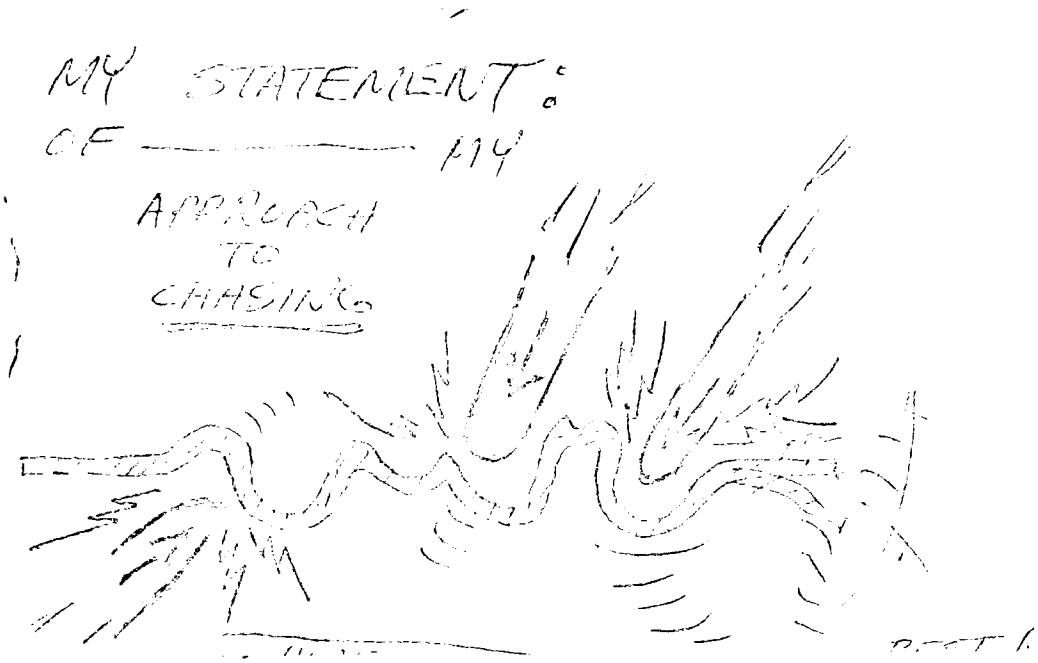


fig.62

Chris Sublett makes this statement about chasing:



Chris Sublett's bronze Devil Head (figs. 64 and 65) is quite dimensional as well as figurative. Figures 68, 69, and 70 illustrate three other figurative approaches.

Elliot Pujol, presently teaching at the Tyler School of Art, chased some interesting brass rings while attending graduate school. The hollow brass rings (figs. 66 and 67) were constructed out of soft brass tubing-1" in diameter. The tubing was necked in on a small stake and then collapsed onto itself. The tubing was then filled with pitch and chased.

Several other examples illustrate the use of simple geometric shapes on which to apply subtle, minimal chasing (fig. 72) or the deep relief treated in a hard-edge manner (fig. 73). Some of the examples mentioned

fig.65

fig.64

fig.66

fig.67

fig.69

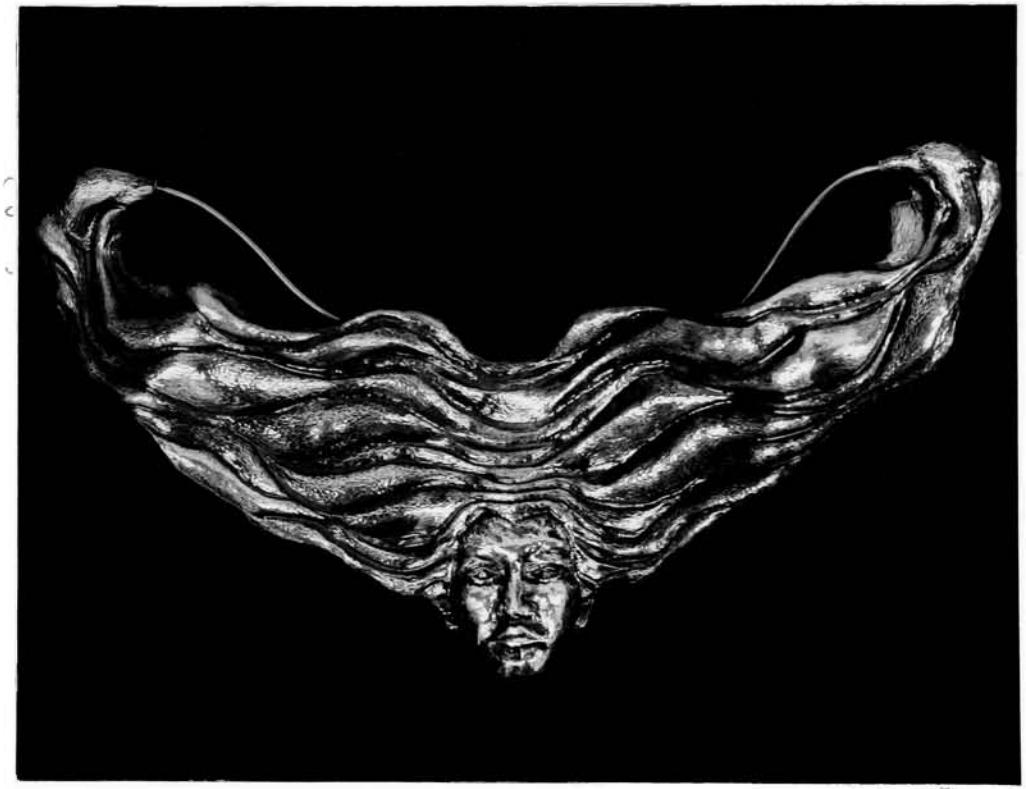


fig.68

fig.70

fig.71

fig.72

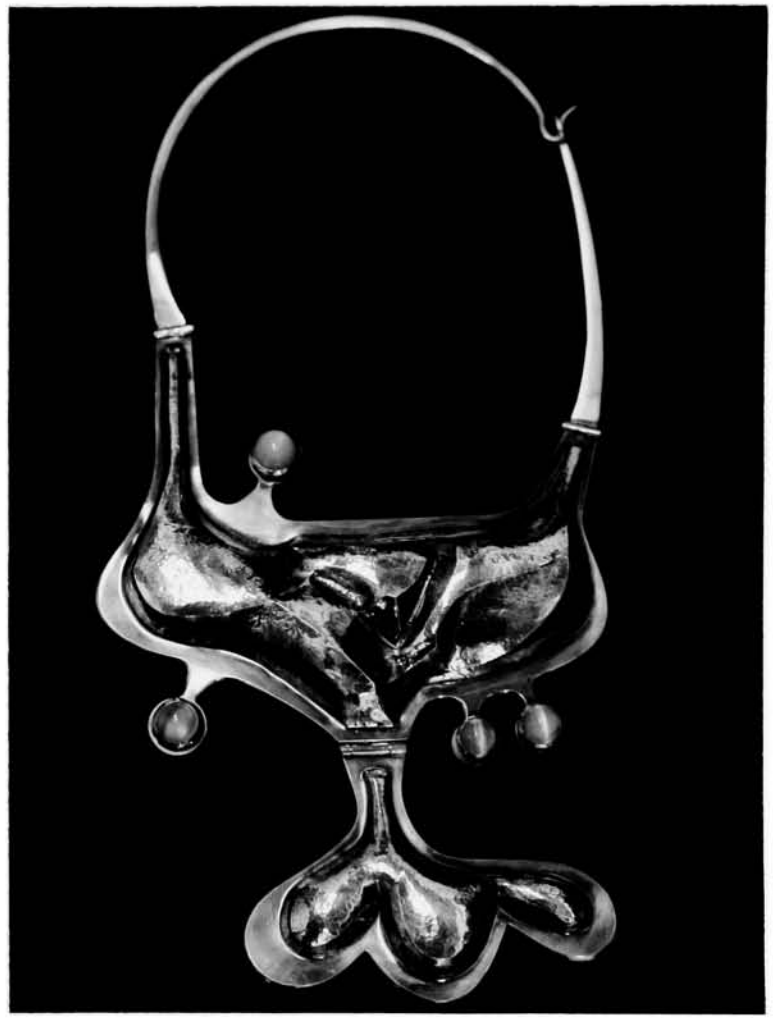


fig.73

were found in a recent exhibition, Metal + 72, held at State University of New York, College at Brockport. I was happy to see many fine examples of chasing. One thing I noticed was that most of the work was worked from 20 gauge silver. I personally feel that the same effects could have been successfully achieved by using thinner gauge metal. In every example the process was used to embellish an otherwise plain surface, rather than as a forming process.

In conclusion, I feel that the possibilities are numerous, the limitations are few, for those who wish to work with metal in a spontaneous, immediate and plastic manner.

> Therefore, most gentle son, who God has wholly blessed in that there are freely offered to you things which may obtain only after intolerable effort, plowing the waves of the sea at the greatest danger to their lives, constrained by the necessities of hunger and cold, or wearied by long servitude to the professors, and yet remain unflagging in their desire for learning-gaze covetously and avidly upon this treatise on diverse arts, read it through with tenacious memory, and embrace it with an ardent love....When you have read this again and again and entrusted it to your tenacious memory, you will repay your instructor for his pains if every time you have made good use of my work.[42]
>
> THEOPHILUS

GLOSSARY

Abrasive - A material used to wear away the surface of oxide to leave a smooth, even finish, Emery paper and polishing compunds are abrasives.

Alloy - A metal composed of a combination of two or more metals.

Annealing - Restoring the metal to its maximum malleability or softness by heating it and letting it cool.

Blocking - The beginning stages of forming metal by hammering sheet into a depression creating another dimension.

Brittleness - The tendency of metal to break without much deformation.

Burnishing - A polishing process applied to metals by the use of a smooth tool known as a burnisher, made of steel, agate, or bloodstone. The process is used to highlight dull areas after the surface has been pumiced or oxidized.

Chasing - A decorative metal process involving surface modelling of metal from the front with the aid of various shaped punches and hammer.

Compress - To force or condense into a small area.

Fire Scale - An oxide that forms below the surface of metal containing copper when heated.

Forming - Bending or shaping metal over stakes rather than stretching to shape.

Karat - The unit of measure indicating the content of gold in an alloy.

Liver of Sulfur - Mixed potassium sulfide used in a water solution to create a patina, or color, or to oxidize metal surfaces.

Malleability - The quality of metal which allows it to be formed by hammering or rolling.

Matting - Imparting a pebbled or grained texture to the surface of metal for textural effect in contrast to a polished surface.

Oxidize - To darken the surface of silver, copper, or gold with a solution of liver of sulfur.

Pickle - An acid solution composed of six to eight parts water to one part sulfuric acid, used to clean non-ferrous metals.

Planishing - A smoothing process for finishing raised shapes by the use of special slightly domed-faced hammers and stakes.

Plastic - Capable of being molded or modeled.

Polish - To impart a high luster to metals by rubbing with fine abrasives to remove scratches and blemishes from the surface.

Quench- To cool rapidly by plunging hot metal into water or pickle.

Repousse' - The decorative process of beating out the shape of metal from the back with punches and hammer.

Rosin - A translucent amber colored, almost black, brittle, friable resin that is obtained from dead wood or pine trees.

Stake - A kind of anvil which comes in various shapes and forms. Metals are hammered against it for shaping.

Stamping - A process by which patterns are made on the smooth metal surfice with a punch.

Stretching - A method of forming metal shapes that consists of shaping a thick piece of metal by hammering it on a metal surface. By stretching, the metal becomes larger and thinner.

FOOTNOTES

[1]Herbert Maryon, Metalwork and Enamelling (New York: Dover Publications Inc., 1955), p. 113.

[2]W. R. Lethaby, The Artistic Craft Series of Technical Handbooks, No. II Silverwork and Jewelry (New York: D. Appelton and Co., 1903), p. 50.

[3]Guido Gregorietti, Jewelry Through the Ages (New York: American Heritage, 1969), p. 25.

[4]Ibid.

[5]Theophilus Presbyter, On Diverse Arts (Chicago: The University of Chicago Press, 1963), p. XV.

[6]Ibid., p. XXVII.

[7]Ibid., p. 78.

[8]Benvenuto Cellini, Treatises on Goldsmithing and Sculpture (New York: Dover Publications, 1967), p. 45.

[9]Ibid.

[10]Ibid. pp. 47-49.

[11]Maryon, Ibid., p. 125.

[12]Ibid., p. 125.

[13]Richard Thomas, Metalsmithing (Philadelphia: Chilton Company, 1960), p. 11.

[14]Maryon, Ibid., p. 114.

[15]H. Wilson, Silverwork and Jewelry (London: Sir Isaac Pitman & Sons Ltd., 1962), p. 31.

[16]Isa Belli Barsali, Medieval Goldsmith's Work (London: The Hamlyn Publishing Group, 1966), p. 14.

[17]Maryon, Ibid,, p. 117.

[18]Cellini, Ibid., p. 46.

[19]Philip Morton, Contemporary Jewelry (New York: Holt, Rinehart and Winston, Inc., 1970), p. 191.

[20]Bernard Cuzner, A Silversmith's Manual (London: N.A.G. Press Ltd., 1953), p. 171.

[21]Morton, Ibid., p. 251.

[22]Ibid., p. 191.

[23]Thomas, Ibid., pp. 37-38.

[24]Morton, Ibid., p. 191.

[25]Ibid., p. 229.

[26]Robert von Neumann, The Design and Creation of Jewelry (Philadelphia: Chilton Books, 1961), p. 10.

[27]Theophilus, Ibid., p. 92.

[28]Wilson, Ibid., p. 47.

[29]Cuzner, Ibid., p. 160.

[30]Ibid., p. 163.

[31]Oppi Untracht, Metal Techniques for Craftsmen (New York: Doubleday & Company, 1968), p. 97.

[32]Chair-Loc Company, Lakehurst, New Jersey 08733.

[33]Maryon, Ibid., pp. 153-154.

[34]Untracht, Ibid., p. 130.

[35]Maryon, Ibid., p. 119.

[36]C. Schwahn, Workshop Methods for Gold and Silversmiths (New York: Chemical Publishing Company, 1960), p. 84.

[37]Wilson, Ibid., p. 37.

[38]von Neumann, Ibid., p. 66.

[39]Cuzner, Ibid., p. 21.

[40]Cellini, Ibid., p. 45.

[41]Wilson, Ibid., p. 29.

[42]Theophilus, Ibid., p. 13.

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PORTFOLIO

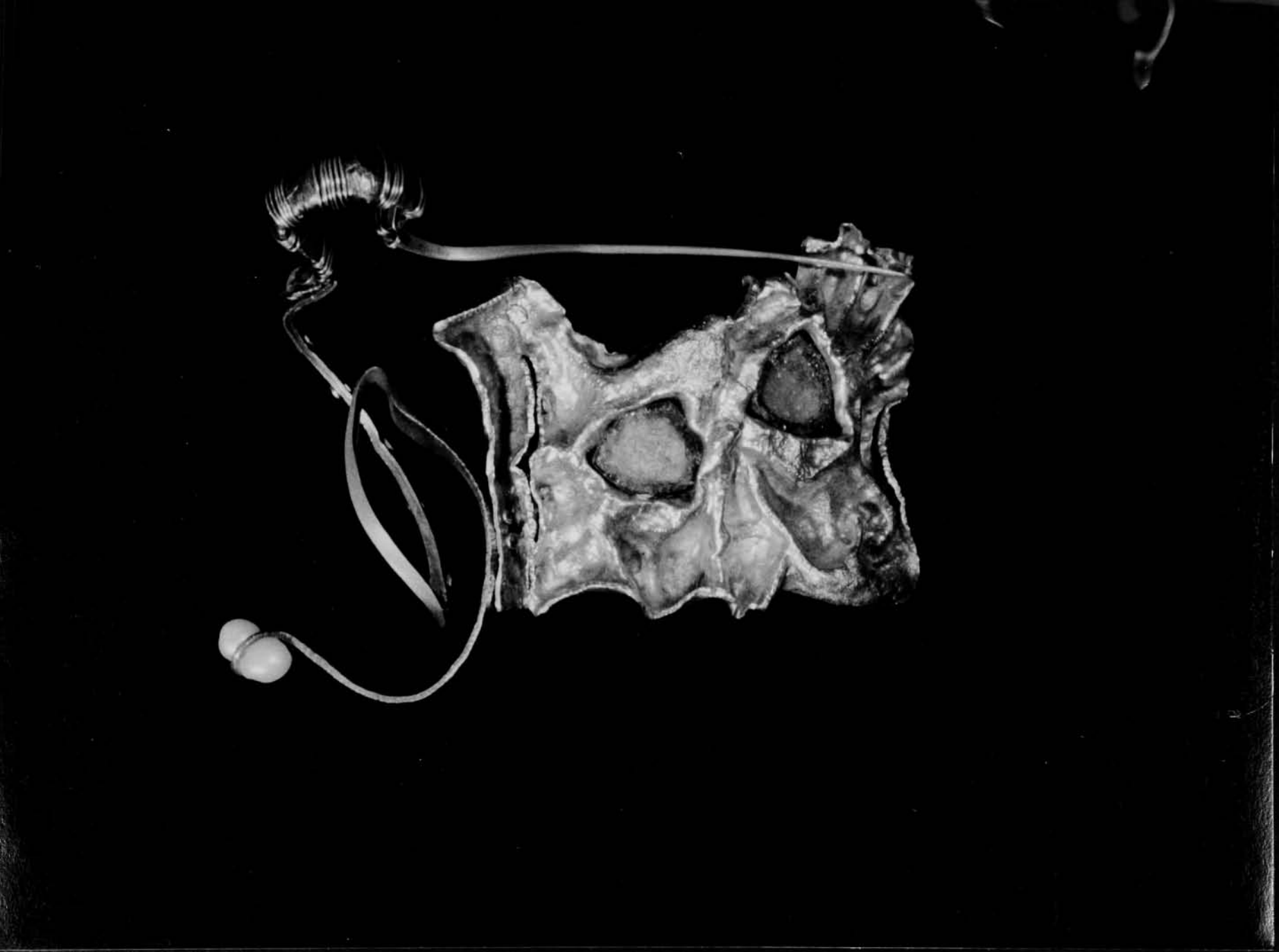

fig. 74

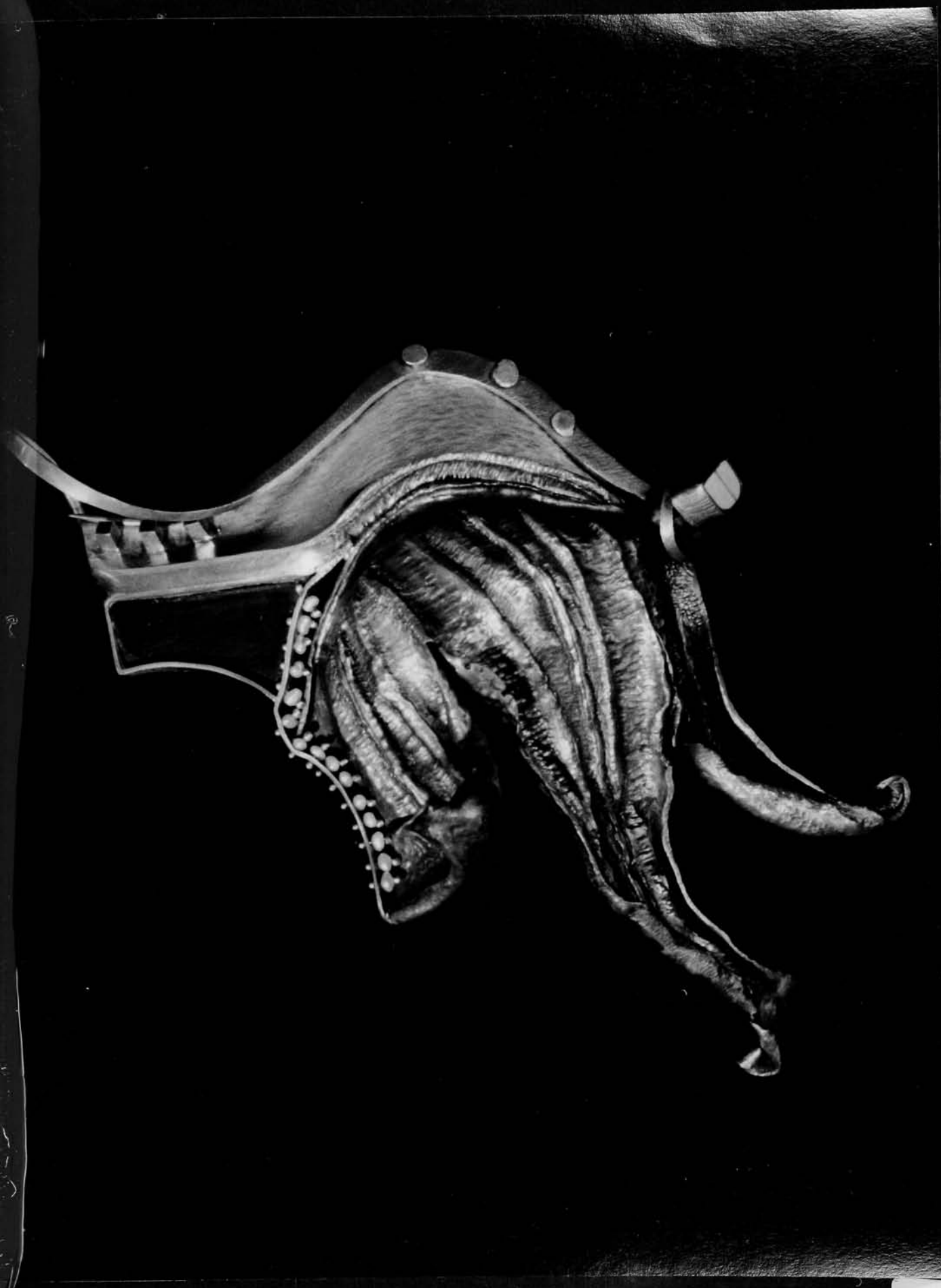

fig.75

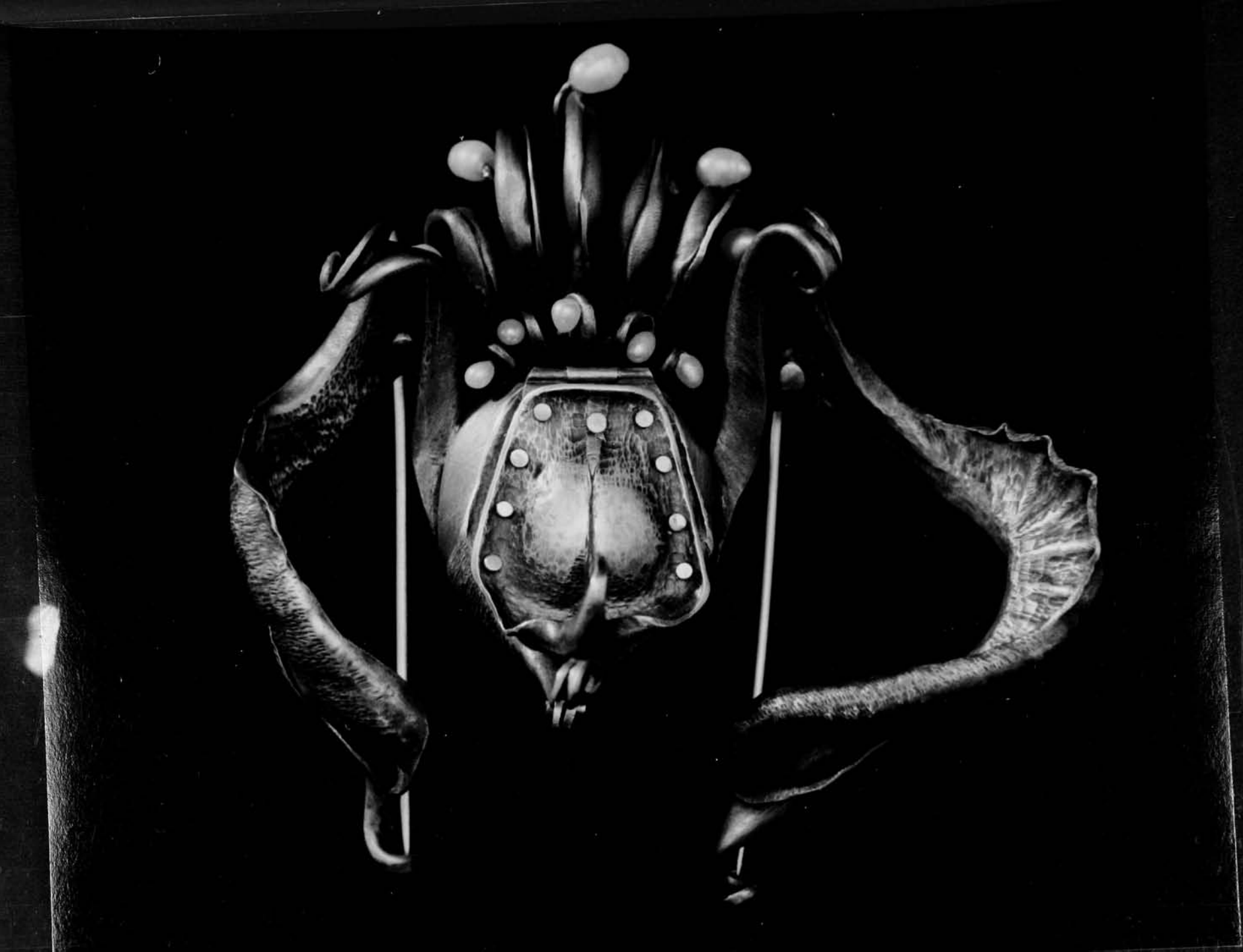

fig. 78

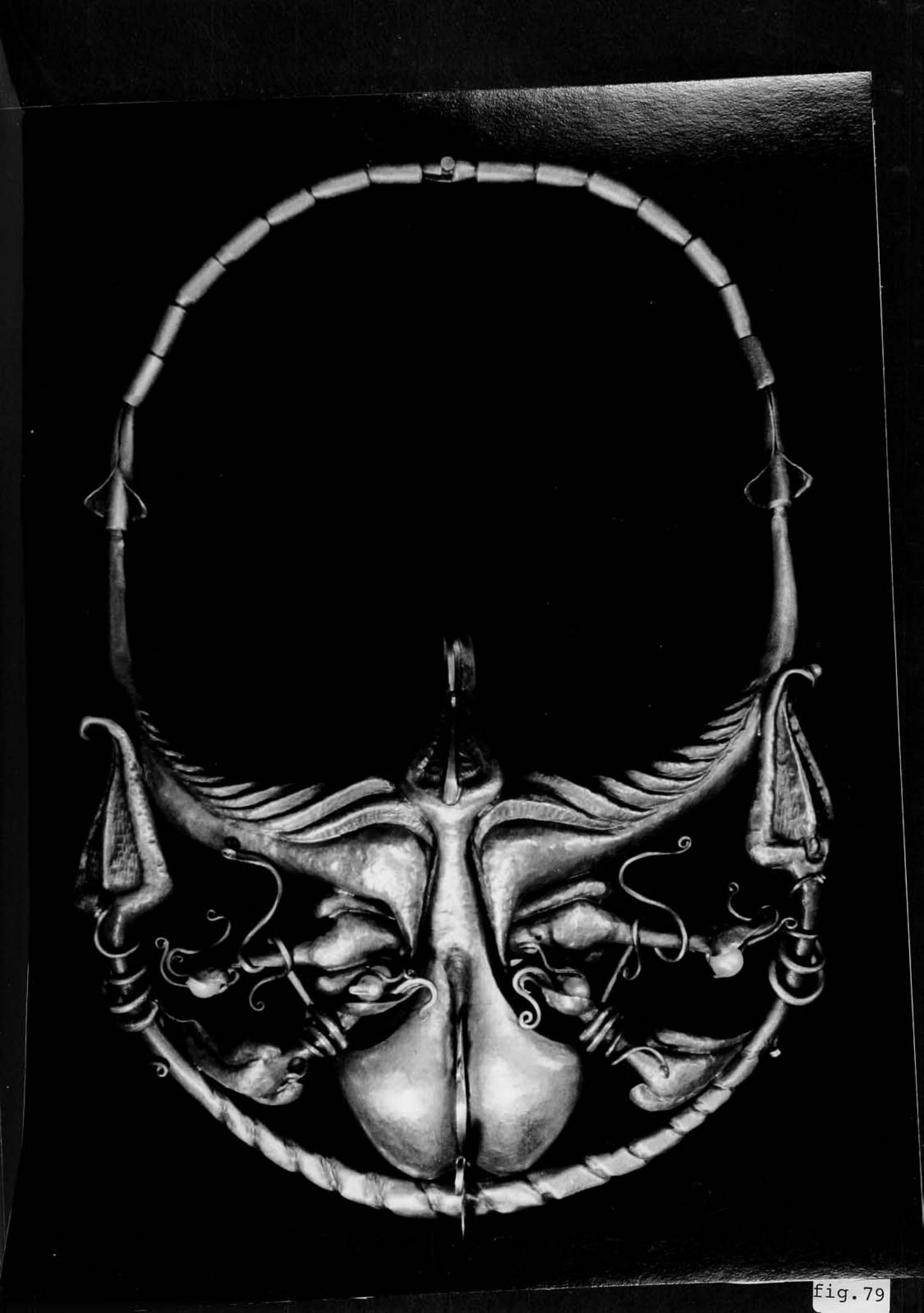

fig.79

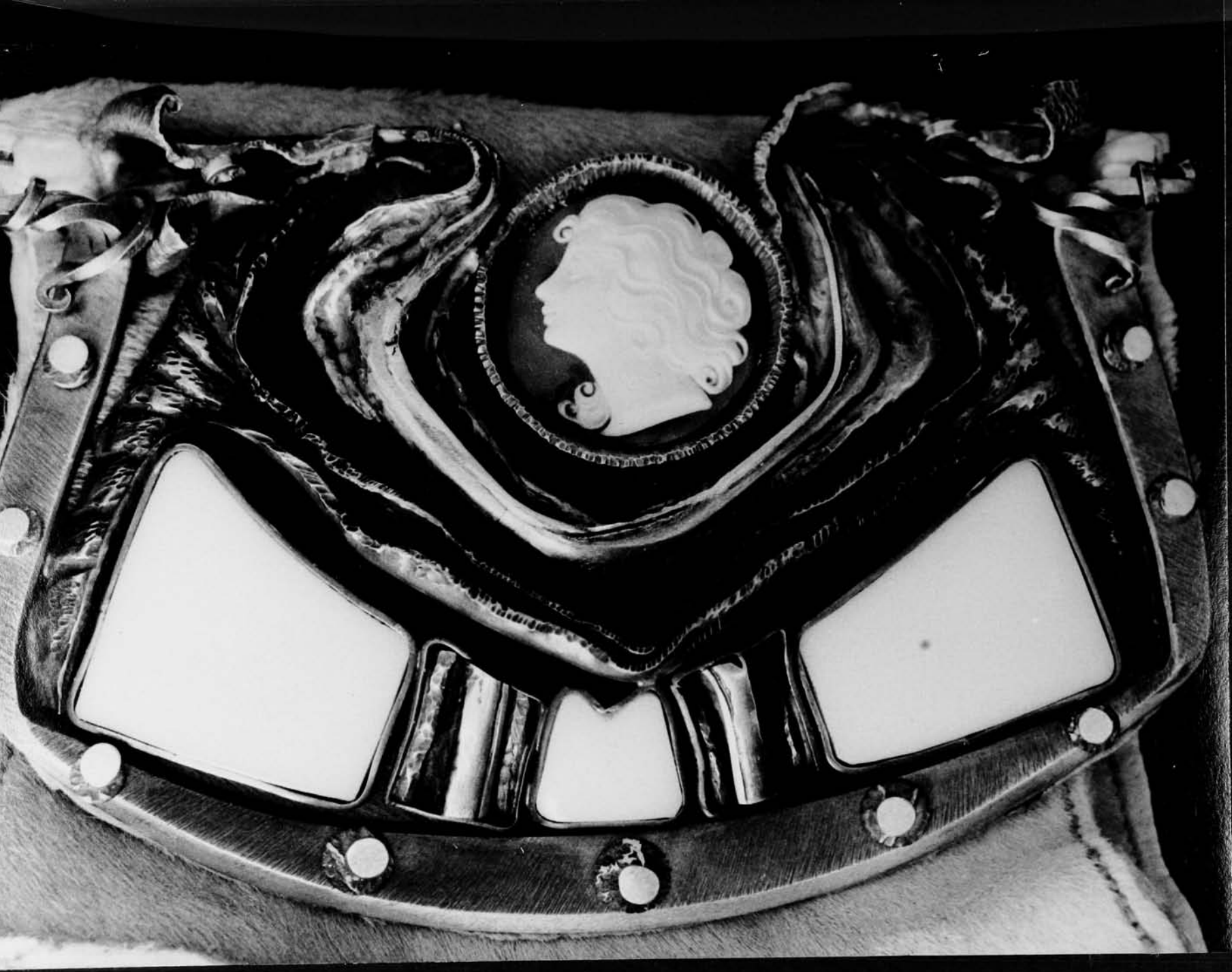

fig.80

fig. 81

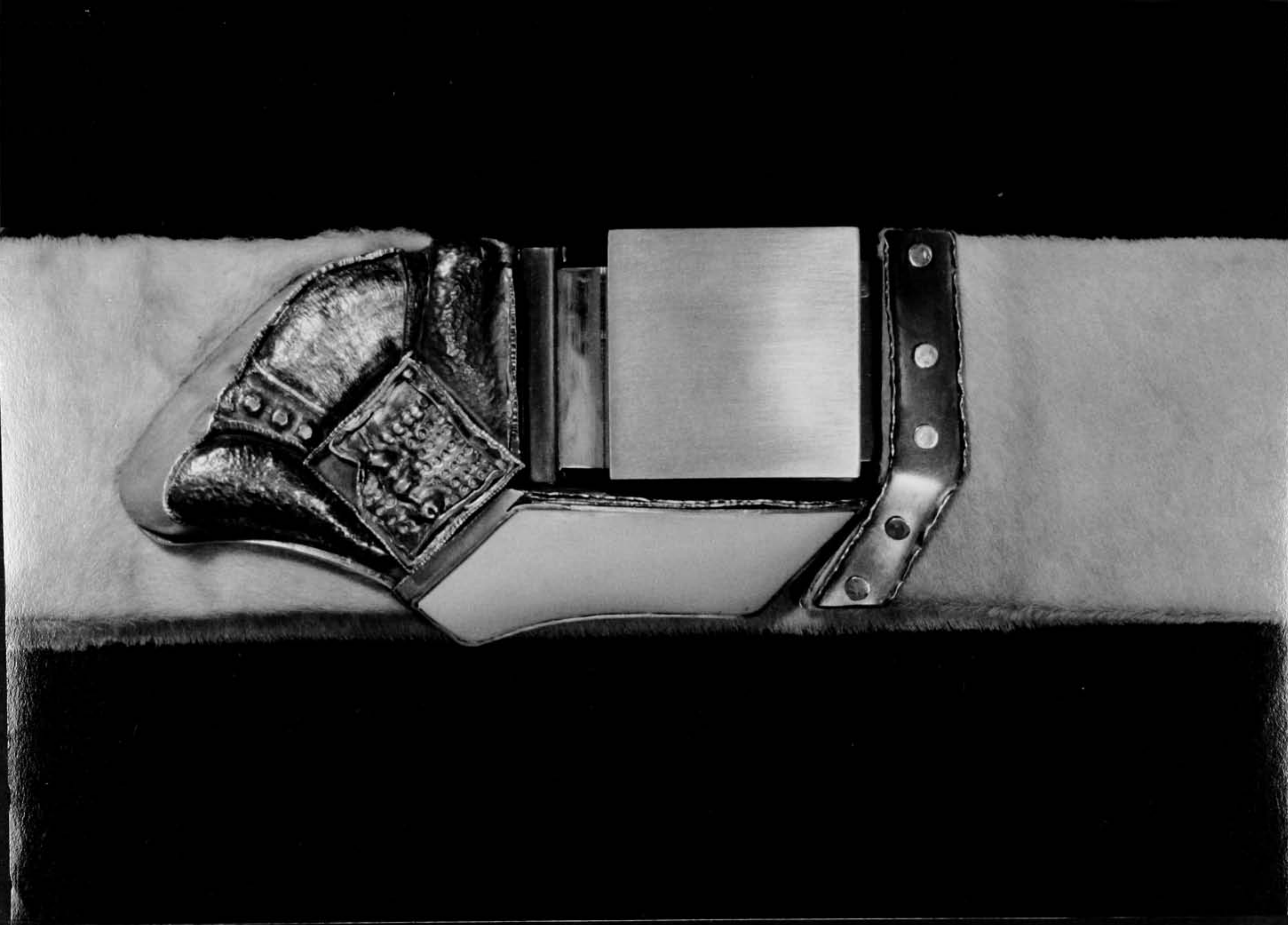

fig.82