

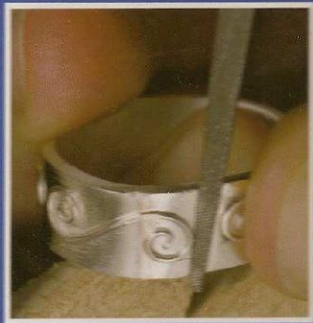
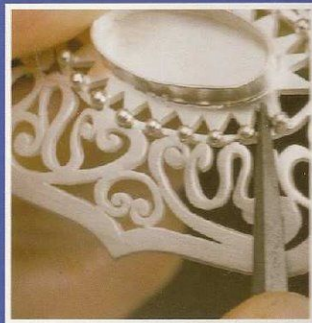
TWO-IN-ONE MANUALS

JEWELLERY



STEP-BY-STEP INSTRUCTIONS FOR 23 INSPIRING PROJECTS

PLUS AN ILLUSTRATED, READY-REFERENCE HANDBOOK OF TECHNIQUES



Madeline Coles

JEWELLERY

TWO books
in ONE



A QUARTO BOOK

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PUBLISHER'S NOTE

Jewellery making can be dangerous. Always follow the directions carefully and exercise caution when using equipment. A list of safety procedures is outlined on page 17. As far as the methods and techniques mentioned in this book are concerned, all statements, information, and advice given here are believed to be accurate. However, neither the author, copyright holder, nor the publisher can accept any legal liability.

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Introduction

Jewelry has been used for bodily adornment and for the display of wealth and social status since man and woman first walked the planet and used the bones of hunted animals as beads. The techniques used by today's jewelry makers have changed very little from those used in ancient times. Jewelry making is a fascinating craft, whether you pursue it as a hobby or as a lifelong career. If you are good with your hands and enjoy the challenge of working on a small scale, you will love making jewelry.

This book is designed with the beginner in mind. Everything you need to get started is fully explained, and the techniques and projects are clearly illustrated with informative step-by-step photographs. The techniques section will teach you all you need to know to start making your own jewelry, from basic skills such as sawing and filing to more advanced tasks like mitering and stone setting. The projects are designed to utilize these techniques to create many classic styles in easy-to-follow stages. When a technique is mentioned in the project text, simply flip through the bottom section of the pages to the appropriate technique number to find a more detailed explanation.

What's more, all the projects can easily be adapted to suit your own



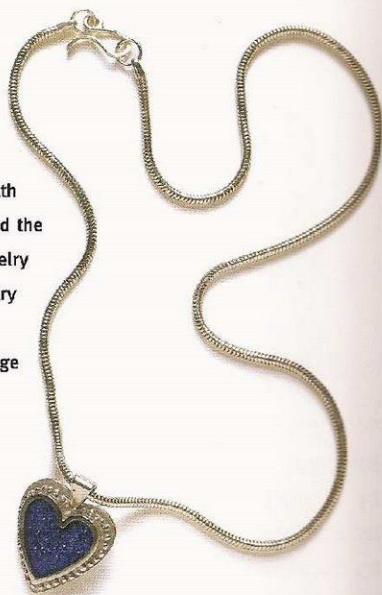
The organic appearance of this twig ring (project 6) is achieved by filing. It would be easy to create your own unique designs using the same technique.

This pendant (project 12) employs the techniques of sawing, bending, soldering, and making solid balls. This intricate ring by Madeline Coles, although much more complex, employs the same techniques.



tastes – for example, by applying different textured finishes to the metal. As you become more confident with the basic techniques, you can begin to explore your own creativity. An inspirational gallery of beautiful jewelry pieces by leading professional jewelers can be found at the end of the book. You will gain enormous pleasure from having the technical knowhow to bring a piece of jewelry to life from your own imagination, and taking your first steps in this rewarding subject may soon become a lifelong passion.

The flexible chain bracelet (project 20) looks extremely complicated to make, but is actually fabricated entirely from jump rings.



How to use this book

The die-cut format of this book provides the ideal introduction for the beginner to jewelry making. The step-by-step projects are illustrated on the top section of the pages; the basic techniques are demonstrated on the bottom section. It is then easy to flip through the techniques section whenever necessary while making the projects.

PROJECTS The top section of the die-cut pages contain the 23 projects in this book. Follow the steps, and when you need extra help, refer to the techniques.

Plain band ring

You will need

Materials:
A band die is the simplest kind of ring to make. Any metal can be used, and experimentation with different wire gauges and sizes will, perhaps, lead you to believe this project shows how to make a basic wedding band, using traditional half-round silver wire.

Use technique Nos. 1, 2, 4, 5, 6, 7, 8, 13, and 17



1 Roll round wire to the desired length. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

2 Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

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PROJECT

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MARKING

Marking is usually the first step of any jewelry project, and is used to transfer measurements or patterns to a metal before working it. Many jewelry pieces have complex designs, and there are several methods you can use to transfer these onto metal. The metal you choose will depend on how precise you need the result to be and how patient you are. Working on a rough metal does not allow much room for error, and using one of the steps will help you to achieve an improved fit.

Always mark with metal that is clean and free from oxidation. For accuracy, check the metal well in advance of marking pages to determine whether you need to use a marking pen or a marker or a pen or a marker to draw the lines. Because they provide a clear line, marking pens can't be used on silver or gold. However, they can be used on copper, brass, and steel. For marking on these metals, use a marking pen or a marker. They are used to draw, parallel lines and circles, and for marking specific measurements to a wire or sheet.

1 Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

2 Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

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TECHNIQUE 1

1 Mark the center of the metal. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

2 Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

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4 Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring. Use a pair of pliers to grip the wire and bend it into a circle. Use a mandrel to shape the wire into a ring.

TECHNIQUES As you follow the step-by-step instructions for making each project, you may need further information about the techniques. The box at the start of each project lists all of the techniques that are used, and cross-references are given

throughout the step-by-steps. Many of the techniques, such as annealing, soldering, and filing, are used again and again in jewelry making, so the die-cut format makes it very easy to flip through to the technique you need to refer to.

NUMBERS All projects and techniques are clearly numbered to aid instant access to the desired section of the book.

The bottom sections of the die-cut pages demonstrate the techniques and can be turned independently from the upper project section, so you always have the basic technique information at your fingertips.

By following the step-by-step projects, you can quickly begin to produce professional-looking jewelry pieces. As you make the projects, you will gradually become more familiar with the basic jewelry-making techniques, and as your expertise grows, you can start to experiment. Try adapting some of the techniques and designs used in the projects, or substitute a technique

with a completely different one – use an alternative texturing effect, for example, or draw your own template design. There are no limits to what you can achieve by following the basic techniques explained in this book.

At the back of the book you will find an inspirational gallery featuring the work of professional jewelers. Each item has been specially selected to demonstrate the wealth of wonderful jewelry pieces that are possible using the techniques described in this book. You will also find some tables of useful information and a glossary of jewelry-making terms.

Tools and equipment

The first thing you need to do is set up a small workshop. Fortunately, jewelers need very little space. A spare room is ideal, but it is possible to set up a small workbench in the corner of any room, provided there is adequate light and it is well-ventilated.

The Workbench

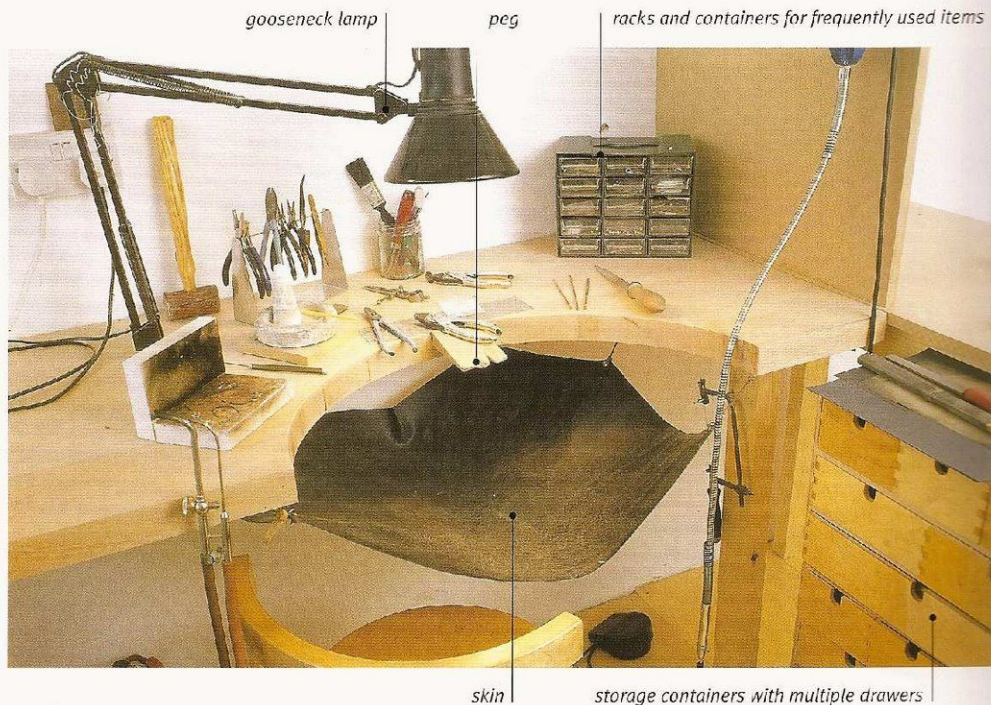
The main piece of equipment you will need is a good, sturdy bench, ideally made with a solid hardwood top that is at least 2in (5cm) thick. A jeweler's bench traditionally has a semicircular hole cut out at the front, making it possible to sit close to the work. This allows unhindered movement of your hands and arms around the peg. Your bench needs to be at least 1 yard (1 meter) high. Use a low stool or an adjustable seat so you can sit with your feet flat on the floor and your peg just below eye level. This will help prevent you from straining your back or your eyes.

It is virtually impossible to work accurately on a small scale without a bright light angled directly over the metal. For this purpose, invest in a

gooseneck lamp that will hold a bright daylight bulb. Bolt it down on one side of the bench, so you can move it out of the way for soldering jobs.

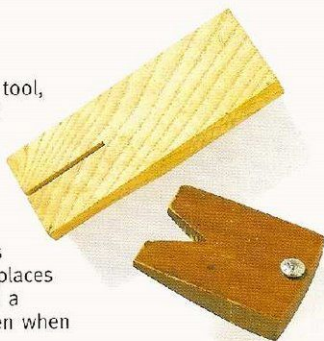
Attach a piece of leather or thick vinyl loosely under the peg to collect dust and scraps of precious metal for recycling. A good thick "skin," as it is called, will also protect your knees from pieces of hot metal that may accidentally fall from the bench.

Keep your tools and materials close at hand in drawers or racks along the bench, ready for use. Have the tools and materials that you use most often nearest to you, so that everything is at arm's reach. Storage containers with multiple sliding drawers are invaluable for keeping things well organized in the jewelry workshop.



The Peg

The peg is a vital piece of equipment and will become your most useful tool, other than your hands. It is simply a small wedge-shaped block of wood that should be securely attached to the center of the cutout semicircle of your workbench, either by screwing or clamping, but better still by forcing it into a chiseled-out slot, making it totally rigid. Use your peg as your primary supporting tool for holding metal steady while sawing and filing. Saw out a V-shaped notch from the center of the peg that allows free access of the blade during piercing. Cutting and filing various small grooves along the front edge of the peg will give you a choice of places to support your work. A peg is likely to last years, and will become such a familiar and useful shape that you will be reluctant to throw it away, even when it has worn down to nothing more than a stump!



The Basic Tool Kit

Once you have set up your working area, you need to invest in some basic tools and equipment. Buy the best equipment that you can afford. Jewelry tools are not cheap, because they are made with precision engineering techniques, but good-quality tools will last a lifetime and will do the job more precisely and effectively than cheaper alternatives.

Tools for Soldering

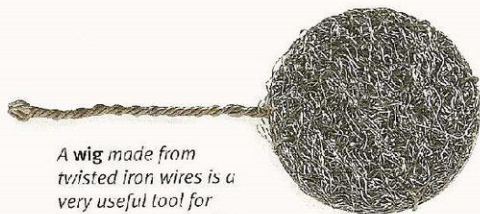
You will need a **blow torch** if you want to try soldering. Probably the most versatile is one that uses bottled gas and is available with a selection of head sizes for different jobs. You will be unlikely to need more than the two smallest nozzles for most jewelry projects.



A **charcoal block** provides a smoother surface on which to solder, and is cleaner and less dusty than a cheaper block.

Use a couple of heat-resistant **soldering mats** or blocks on the bench to avoid burning it.

An **enameled pan** or **heatproof glass lidded dish** is all you need for a pickling solution, either of which can be placed directly on a burner. It is possible to buy small thermometrically controlled pickling units that can sit on the workbench ready for use.



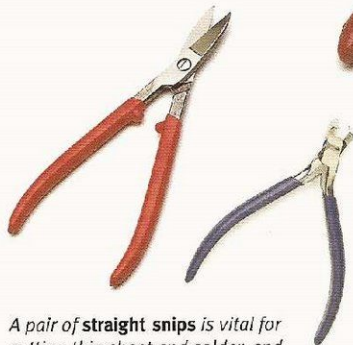
A **wig** made from twisted iron wires is a very useful tool for supporting work when soldering and also allows even distribution of heat, which is vital in some soldering situations.

You will need brass or steel **tweezers** for picking up hot metal and a couple of pairs of **spring tweezers** with insulated handles for balancing while soldering. Use fine steel tweezers for applying solder pallions and making delicate adjustments before soldering. You will also need brass tweezers for removing items from pickling solution.



Tools for Manipulating Metal

The most basic selection of **pliers** would include a pair of **needle-nose**, **round-nose**, **flat-nose**, **half-round**, and a pair of **parallel action pliers**, which are useful for gripping things firmly.



A pair of **straight snips** is vital for cutting thin sheet and solder, and a pair of **end or side cutters** is ideal for cutting wire.

You should buy the best quality **files** you can afford, because cheap ones do not cut as effectively or as accurately. Files are available in different shapes and are graded according to how coarse or fine they are. To start with, 2-cut files will be suitable for any job.

Hand files are useful for removing large amounts of metal and needle files are good for more detailed work. Buy a large flat and a half-round hand file to start with and a selection of needle files; the most useful are round, flat, three-square, safety-back, and half-round.

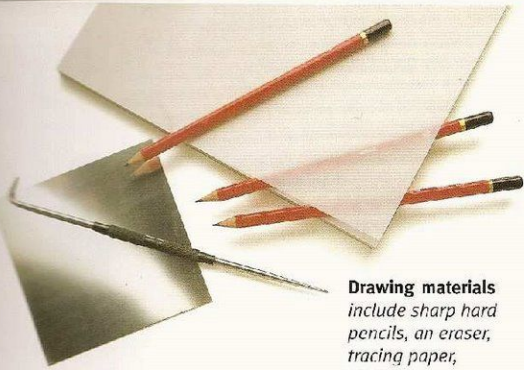


For sawing, you must have a **jeweler's saw frame** and plenty of **jeweler's saw blades**, which are usually sold in bundles of twelve. Blades are available in different sizes, ranging from the thick 0/0 to the fine 6/0. The most useful size for the beginner is probably 2/0 for general sawing and 4/0 for finer work.



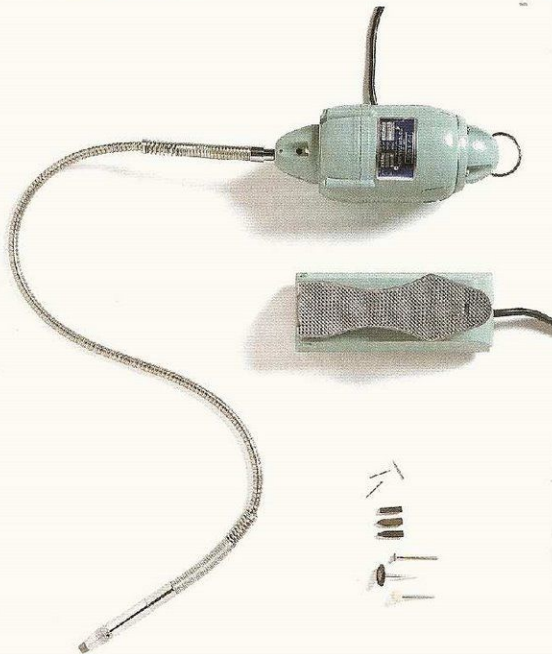
You can make your own **emery sticks** with various grits of paper and pieces of wooden doweling or flat wooden sticks.





Drawing materials include sharp hard pencils, an eraser, tracing paper, and glue.

A small steel flat plate is useful for hammering on and for checking whether things are level.



You will be unable to saw out interior holes or fretwork without a drill of some sort and a couple of twist drill bits. The most versatile is a pendant drill (sometimes called a flexible shaft). This high-speed drill, more commonly seen used by dentists, is designed for precision control and maneuverability. It can be used for drilling, emerying, texturing, carving in wax, and polishing. It is the most expensive individual item you will need, but will soon become indispensable.

A hand drill or a bow drill is a cheaper alternative to a pendant drill, but neither is as versatile as a pendant drill.

The tools most frequently used for measuring and marking patterns onto metal are a scribe, a pair of dividers, a steel ruler, and a center punch.



If you plan to make rings, you will undoubtedly need a plain ring mandrel, a tapered steel tool used for rounding and stretching rings.



Invest in a hide or wooden mallet for hammering metal without marking it, and a general-purpose hammer for use with a center punch and for doming.

Smaller Items

Among the smaller items you will need are a **borax cone** and a **dish** to grind it in, and a **fine paintbrush** for painting on borax and positioning solder pallions. It is likely that you will need three types of **silver solder** to start with: **hard, medium, and easy.**

Rouge powder and **denatured alcohol** are handy for complex soldering jobs. **Binding wire** is useful for soldering jobs that are awkward to balance.

A **brass or glass brush** is used to scrub the surface of metal while rinsing and for creating satin finishes. **Pumice powder**, which is slightly abrasive, is often used with a brass brush for cleaning.

To polish your jewelry pieces, all you require to get started is a small block of **tripoli** and **rouge** with a couple of **polishing buffs**.

SAFETY PROCEDURES

Jewelry making is a surprisingly dusty and dirty occupation, and the use of bottled gases, flammable liquids, and caustic solutions means you should exercise caution if you intend to work in a home environment. Jewelry making is not in itself a dangerous hobby, but careless use of the equipment and materials could lead to accidents. Always make sure you have a first-aid kit handy in case of minor cuts and burns, and having a small fire extinguisher close by would also be prudent.

Follow these sensible precautions to avoid accidents:

- Always work in well-ventilated, well-lit conditions.
- Turn off your gas torch at the bottle when you have finished using it to prevent leaks.
- Never store chemicals or flammable liquids in

unmarked containers. Always keep them out of the reach of children, and preferably in a metal container in the coolest part of the room.

- Keep children and animals well away from the jewelry workshop.
- Tie long hair back and avoid wearing loose clothing that can easily become caught on equipment.
- Always follow manufacturers' directions when using chemicals, resins, and caustic solutions.
- Wear safety glasses when using high-speed polishing equipment and drills.
- Wear a dust mask when using polishing equipment and during any activity that generates airborne dust particles.

Non-essential Items

A **lead cake or sandbag** and a **bossing mallet** are useful if you want to try forming three-dimensional shapes. You can make your own lead cake by filling a shallow cake pan with low melting temperature lead-type alloy that can be bought from hobby and model suppliers.



A **doming block** and a set of **doming punches** are useful for making hollow beads and domes.



A **riveting hammer** is essential for attaching brooch pins and can also be used for texturing metal surfaces. A **planishing hammer**, with its polished faces, is for smoothing out irregular bumps in raised forms.



If you have a strong **vise** bolted to your bench, you can use it for drawing down wire and holding mandrels and other tools. To draw down thicker wire to a thinner dimension, you will also need **drawing plates** and **tongs**.



If you intend to try stone setting, you can make or buy a **setting tool** that is simply a short flat-ended length of polished steel or brass fitted with a round wooden handle. A **burnisher** is used for smoothing and polishing small areas of metal, and a **ring clamp** supports rings while you set the stones.



A **ring gauge** for sizing fingers is a good investment once you regularly make rings for other people, and a **sliding caliper** is useful for accurate measurements of thickness and length.



If you want to try wax carving, the basic requirements will include a couple of coarse files and a craft knife. Wax blades make sawing blocks of wax much easier. Wax files are useful but not essential. You can buy wax in assorted blocks and ring tubes, as well as in different cross-sections of wire.



A **turntable** helps if you are soldering larger items, allowing you to revolve the piece as you solder.

Materials

The most widely used material for the fabrication of jewelry is undoubtedly metal. With its superior malleability, strength, beauty, and durability, it makes an ideal medium in which to work. Other useful materials include beads and stones.

Base Metals and Precious Metals

You will probably start to experiment with the projects in this book by using base metals. This term refers to metals that contain no iron and are abundantly available and relatively cheap to buy. The particular metal you choose will depend largely on the individual working qualities of the metal, its color, and its weight (see the charts on page 123). With very few exceptions, notably aluminum, the projects in this book can be made with any of the base metals.

Once you develop confidence with the techniques of jewelry making, using precious metals will undoubtedly be the next step. Precious metals are rare metals that resist oxidation and corrosion. Precious metals are much more pleasurable to use for jewelry making, since they are easier to saw and file, solder more cleanly, and respond readily to shaping and bending. The only drawback is the cost of buying the raw materials. Careful planning is essential to avoid waste, and collecting all scrap material to sell back for cash is advisable.

All metals are sold in sheet form, wire coils, and variously shaped rods and tubes.

Precious metals are sold by weight, the cost of which fluctuates daily according to the commodities markets.

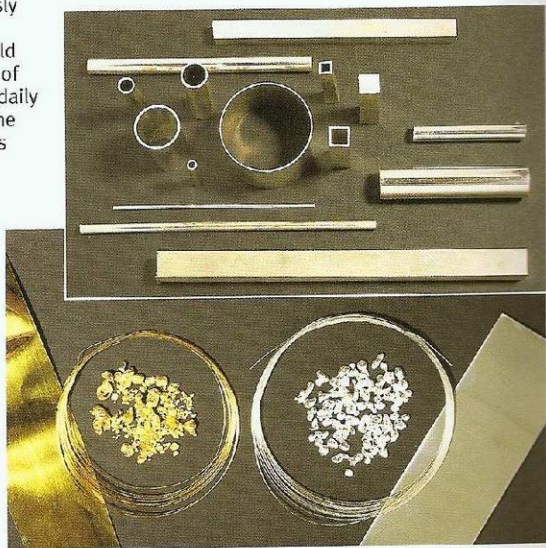


Metals can be bought in sheet form (left), in variously shaped rods and tubes (above right), and in wire form (right).

MEASUREMENTS

Metals are sold and used in metric, imperial, and gauge measurements. Many of the measurements used in jewelry making are minuscule, but such tiny measures are necessary to achieve a satisfactory result. Over the past few decades, therefore, manufacturers and jewelry makers have started to standardize measurements to the metric system, since this is the most accurate method.

Both inches and metric measurements are given throughout this book. Never interchange between the two systems when making a project. If your supplier sells wires and sheet metal by gauge, refer to the table on page 122 to figure out which gauge to buy.



Findings

Jewelry components are known as “findings,” and can be anything from simple ear posts for stud earrings to complex mounts for diamond rings. A wide choice of readymade components is available for the beginner jeweler to incorporate into his or her jewelry designs. Beautiful chains, links, and clasps in myriad styles are readily available, and they can often be more cost effective to buy than to make yourself.



There are many beautiful chains available to buy, which you can embellish with your own jewelry pieces – a pendant, for example.

Findings, such as earring fittings, clasps, links, and brooch pins, are available readymade in many different styles.



Stones and Beads

One of the great pleasures of making jewelry is learning to incorporate the colors and textures of other materials with metals. Using semiprecious and precious stones can be both exciting and rewarding. It is possible to buy these materials either as drilled beads for stringing, or as individual stones, which can be either smooth and flat-backed (cabochon) or cut to increase the stones' natural brilliance (faceted). Cabochon stones are the simplest to use for the beginner jeweler.

If you want to try stringing pearls or beads, you will need pearl silk or nylon and fine twisted threading needles. Gimp, available in gold or silver color, is a fine coil of wire used to protect the threading silk from wear at the point where it threads onto the clasp and catch.



Strategic use of faceted and cabochon stones can provide beautiful touches of color to your jewelry pieces.

Plain band ring

You will need

Half-round wire

Basic tool kit

Ring gauge or paper strip

A band ring is the simplest kind of ring to make. Any metal can be used, and experimenting with different wire shapes and sizes will provide innumerable variations. This project shows how to make a basic wedding band, using traditional half-round silver wire.



Uses technique flaps

1, 2, 4, 5, 6, 7, 8,
10, and 11



1 First, measure the finger. Use a ring gauge if you have one; it should fit snugly over the knuckles. Refer to the ring size table on page 122 to figure out the length of metal required; add the depth of the half-round wire to your calculations.



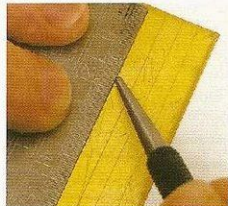
2 If you do not have a ring gauge, cut a strip of paper and wrap it around the finger. Mark where the paper overlaps precisely, and cut across the line. Measure the strip of paper and add on the depth of the metal.

MARKING

Marking is usually the first stage of any jewelry project, and is used to transfer measurements or patterns onto metal before cutting out. Many jewelry pieces have complex designs, and there are several methods you can use to transfer these onto metal. The method you choose will depend on how precise you want the result to be and how patient you are. Working on a small scale does not allow much room for error, and taking care at this stage will help you to achieve a professional look.

Always start with metal that is clean and free from scratches. If necessary, clean the metal with a piece of emery paper to obtain a smooth surface (see technique 5). Always use a scribe or a pair of dividers to draw marks on metal, because they provide a clear line. However, since you can't erase the line, check measurements carefully before you begin. A scribe is used like a pencil to draw patterns and lines onto metal. Dividers can be set to a specific measurement and used to mark this measurement onto metal. They are used for drawing parallel lines and circles, and for marking repeated measurements onto wire or sheet.

Drawing Straight Lines

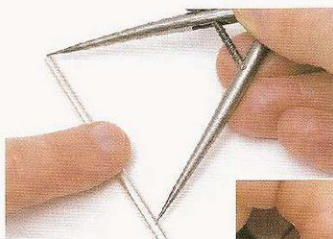


1 Use a scribe and steel ruler to draw individual straight lines. Hold the scribe so the very tip rests against the ruler and draw the line.

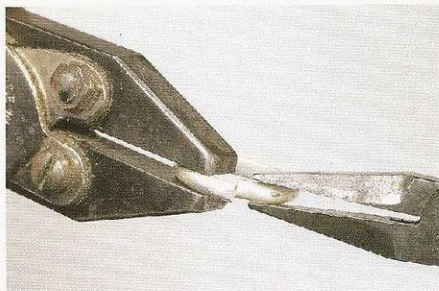


2 Use a square to mark lines at right angles to a straight edge on a sheet of metal. Hold the square and the metal in one hand while you draw the line with a scribe in your other hand.

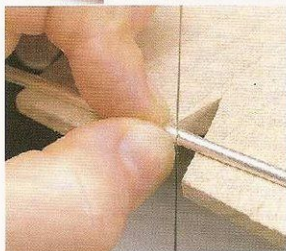
3 Set your dividers to the required length against a steel ruler, and carefully mark the strip of wire to show where to saw (see technique 1).



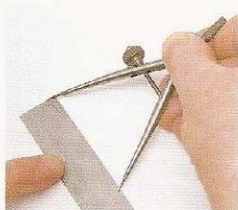
5 Grip one end of the wire in a pair of half-round pliers. Make sure you have the rounded side of the pliers on the flat side of the wire. Bend the rest of the wire around into a semicircular shape. Repeat this process at the other end of the wire to form a rough circle, annealing the wire if it becomes stiff (see techniques 8 and 7).



4 Saw through the wire on the waste side of the line (see technique 2). File off any excess metal up to the line with a flat file (see technique 4).



6 Hold the ring between two pairs of flat pliers and maneuver the ends of the wire toward each other to close the seam. Spring fit the seam by pushing the metal a little farther than necessary; it will then spring back a fraction, creating a tight seam that stays closed due to the tension in the metal.

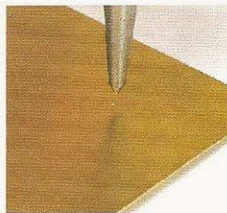


3 To set a pair of dividers to a specific measurement, lean them against the edge of a steel ruler and adjust the screw until the points rest exactly against the appropriate measurement on the ruler. Lean the dividers to one side so you can see the minute divisions on the ruler more accurately.

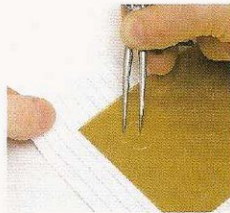


4 Use the dividers to draw parallel lines and to mark repeated measurements. Hold the dividers so they lean at an angle rather than straight up. This helps you to see the lines you are drawing clearly and gives you more control.

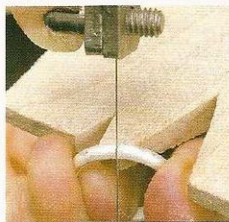
Drawing Circles



1 Mark the center of the circle on the sheet of metal by gently tapping a center punch once with a hammer. The mark you make should look like this. Be careful not to tap too hard, since this will distort the metal. Place the sheet of metal on a piece of paper.



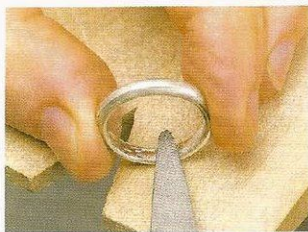
2 Set your dividers to the radius measurement (see drawing straight lines, step 3). Place one of the points of the dividers in the center mark and tilt them so you can see the metal clearly. Hold the dividers steady in that position and turn the paper around to form a circle. This is easier than turning the dividers.



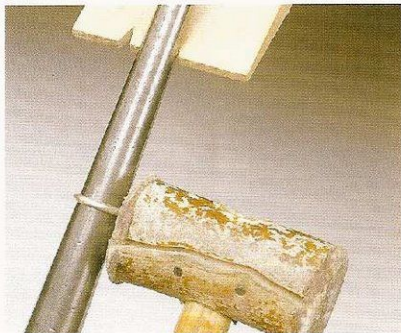
7 Hold the ring tightly against the peg and saw through the seam a few times to make sure the faces of the metal fit neatly together (see technique 2).



8 Solder the seam shut with hard solder and pickle, supporting the ring with spring tweezers while you do this (see techniques 11 and 10).



9 File off excess solder from inside and outside the seam (see technique 4).



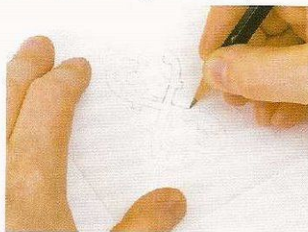
10 Shape the ring into a perfect circle by slipping it onto a ring mandrel and tapping around it with a wooden or hide mallet. Turn the ring over to prevent it from developing a flared shape. If you have any difficulty shaping the ring, anneal it (see technique 7).

MARKING

Transferring Designs

There are several ways to transfer complex designs onto metal before sawing them out. Once you have created your design on paper, you can choose any one of the following techniques. Methods 1 and 2 require a steady hand; method 3 requires the most patience, but it is useful for those without a steady hand.

Method 1 – Using Tracing Paper

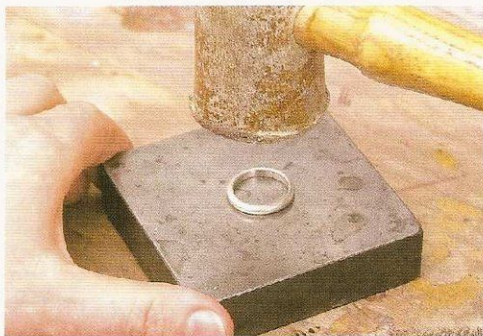


1 First, place a sheet of tracing paper over the design and trace over the outline. Use a fine, hard pencil or an ultrafine pen. The thinner the line, the more accurate the result.

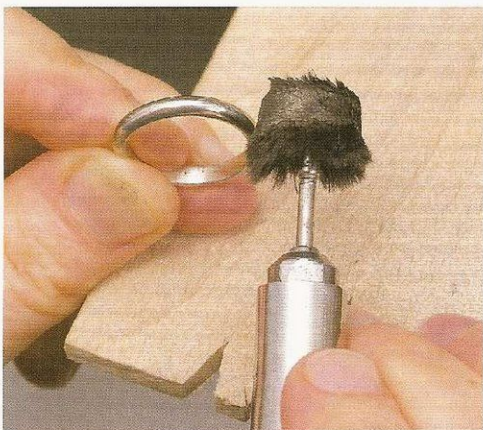


2 Trim the tracing paper, leaving a little extra paper around the edge of the design. Do not cut out the shape.

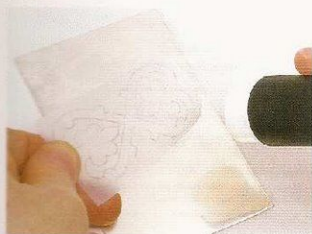
11 Make sure the ring is flat by placing it on a flat plate and tapping it with a wooden or hide mallet.



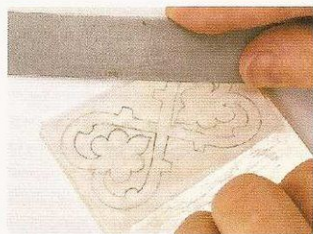
12 Emery the inside and outside of the ring using various grits of abrasive paper to remove file marks and to achieve a smooth finish (see technique 5).



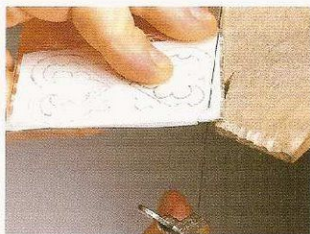
13 Polish the ring to a mirror finish with tripoli and rouge (see technique 6).



3 Put a thin layer of paper glue on the reverse of paper and on the metal. Let both become touch dry and then join the two firmly together.



4 Run the straight edge of a ruler across the design to smooth out any wrinkles.



5 Saw around the design, following the drawn lines (see technique 2). Always saw on the waste side of the line, so you are left with an exact duplicate of your original design. Complete all sawing and filing before removing the paper template, since it provides you with accurate guidelines. Remove the paper with nail polish remover, or burn it off with a soft flame.

Russian wedding band

You will need

$\frac{1}{16}$ in (3mm) wide, $\frac{1}{16}$ in (2mm) deep half-round wire
Basic tool kit
Ring gauge or paper strip

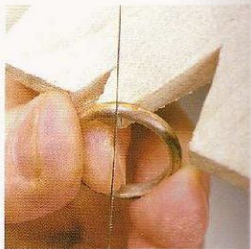
This ring is made from three interlocking bands, though it is possible to use many more. It is traditional to make each band from a different colored gold, but here we have used silver for all three. It is advisable to use half-round wire, because alternative wire shapes do not sit well on one another.



Uses technique flaps
2, 4, 5, 6, 7, 10,
and 11

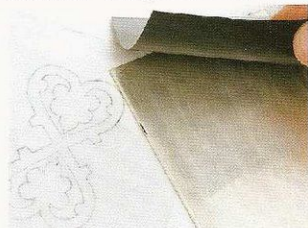
1 Make three identical plain band rings (see project 1, pages 16–19), but do not polish them. To allow the rings to interlock, they need to be three sizes larger than the finger size. Remember to add the depth of the metal to your calculations. If you use a strip of paper to measure the finger, refer to the ring size table on page 122 to figure out the corresponding ring size and the one that is three sizes larger. It is important to make sure the rings are perfectly circular at this stage, because it becomes impossible once they are linked together.

2 Warm two of the rings with a gentle flame. This will allow you to see the solder lines of the seams. Let the rings cool, then saw through them on the solder lines (see technique 2).

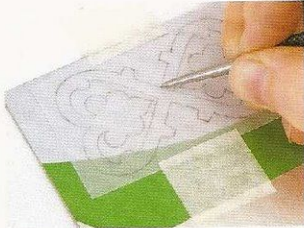


MARKING

Method 2 – Using Carbon Paper



1 After cleaning the metal with fine emery paper, rub the surface with a piece of modeling clay, which will leave a greasy residue. Lay a sheet of carbon paper on top of the metal, then place your design on top of the carbon paper. Secure both with masking tape to prevent them from slipping.

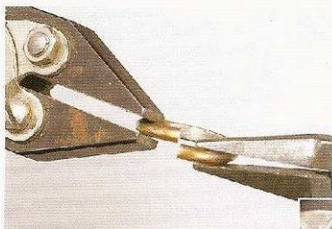


2 Use a scribe or sharp pencil to trace firmly over the design, making sure you use even pressure, and do not miss any part of the design.



3 Lift the carbon paper and template to reveal a faint pattern on the metal. When you are satisfied the whole design has been transferred, remove the carbon paper, design, and masking tape.

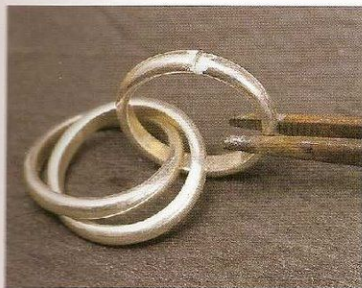
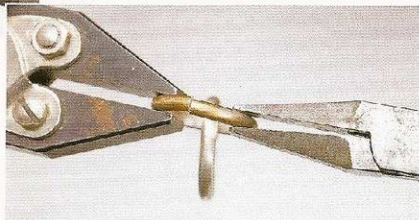
3 Gently open the rings by holding each side in a pair of flat pliers and opening the seams sidwise. This prevents distortion of their circular shape.



5 Slip the two linked rings through the remaining open ring and spring fit the seam back together.



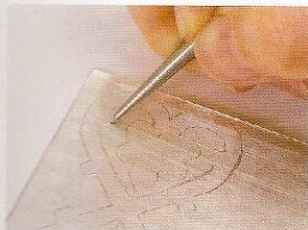
4 Slip the closed ring through one of the open rings. Spring fit the ends of the open ring back together by pushing them toward each other a little farther than necessary and then allowing them to spring back to form a tight seam.



6 Solder the seams of the two open rings with hard solder, using spring tweezers to hold each seam clear of the other rings while soldering, thus reducing the chance of accidental melting (see technique 11).

7 Pickle the completed ring and file off any excess solder, taking care not to change the profile of the wire (see techniques 10 and 4). Emery both the outside and the inside of the three bands where you have filed, and polish with tripoli and rouge (see techniques 5 and 6).

Method 3 – Using Pin Pricks



4 Carefully draw over the lines of the design with a scribe, as the carbon line can easily be erased. You are now ready to saw out the pattern, as shown in method 1, step 5.



1 Secure your design to a clean sheet of metal with masking tape. Use a sharp scribe or a dressmaker's needle held in a pin vise to prick through the paper onto the metal. Mark around the whole design with pin pricks as close together as possible. Lift a corner of the template to check that you are using the correct pressure: too much and the edge of the metal will be rippled; too little and the dots will be invisible.



2 Lift the paper and use a scribe to join the dots, working slowly around the design. You are now ready to saw out the pattern as shown in method 1, step 5.

Ball ring

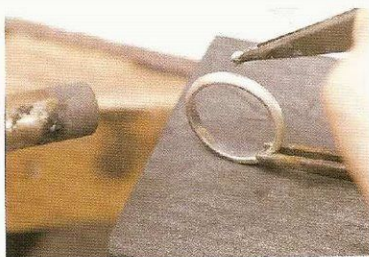
You will need

Half-round wire
8 solid balls (see
technique 12)
Basic tool kit
Bristle brush

This pretty version of the band ring is decorated with silver balls, but gold balls on a silver ring would also look attractive. It can be adapted by using different shapes of wire and a variety of ball sizes. Here, the balls are the same width as the band of the ring.

1 First, make a plain band ring (see project 1, pages 16–19), but do not polish it. Prepare a small pile of medium solder pallsions and mix some borax, in readiness for soldering the solid balls onto the band ring (see technique 11). Using spring tweezers, balance the ring in an upright position and paint a little borax on top of it.

2 Light your torch and hold it in your non-writing hand. With your other hand, pick up a ball with a pair of steel tweezers and warm it a little. Dip it in the borax dish, then touch it on a pallion of solder. The ball will pick up one pallion of solder.



3 Warm the ring until it is almost at soldering temperature; it will be a dull red color. Lower the ball toward the ring and warm that as well, until both the ball and the ring are the same color. Place the ball on the ring just as the solder starts to flow and hold it steady. Remove the flame and then the tweezers, leaving the ball in place. Pickle and rinse (see technique 10).

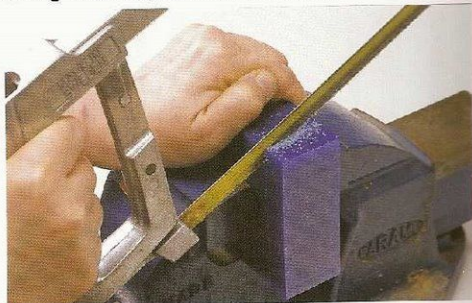
Uses technique flaps

2, 4, 5, 6, 7, 10,
11, and 12

CUTTING AND SAWING

Metals used in jewelry making come in the form of sheet, rod, wire, and tube. They can be bought in an enormous variety of thicknesses, shapes, and sizes. Unless you have access to a rolling mill and a guillotine, you will need to buy small quantities of metal in the thickness you require. You can then cut them, provided you have a few basic hand tools.

Cutting Thick Rod, Bars, and Wax Blocks



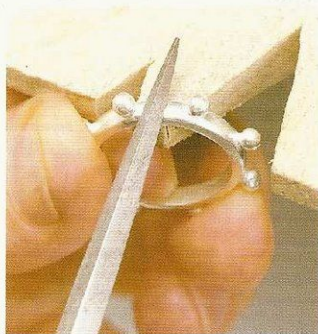
Use a hacksaw with a coarse blade. Support the work firmly in a vise with jaw protectors to prevent the metal from being marked. This is suitable for rough work only.



4 Rouge the seam (see technique 1), then solder a ball on the opposite side of the ring in the same way, judging the position by eye. You may like to balance the ring in a wig so there is no pressure on the first ball.

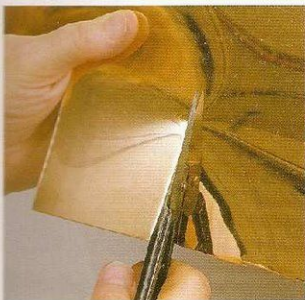


5 Repeat until all the balls are evenly spaced around the ring, rouging each seam once it has been soldered to prevent it from melting.



6 Remove any excess solder with a safety-back needle file and then emery the ring carefully to remove any file marks (see techniques 4 and 5). Polish the ring with tripoli and rouge (see technique 6). Use a bristle brush to gain access around the balls.

Cutting Thin Metal



1 Use snips to cut solder and thin sheet. Again, this is for rough cutting only. Where accuracy and a clean edge are required, use a jeweler's saw.



2 Hold snips in the way shown here. They work the same way as a pair of scissors, but you use your middle fingers to lever the handles open and closed.



3 For thin wire, rod, and chain, use end or side cutters. Unless you have a spring-action pair, use your fingers to open and close them. They damage easily, so never force them to cut through thick wire.

Wax-carved ring

You will need

$\frac{1}{4}$ " (4cm) square of
 $\frac{1}{4}$ " (1cm) deep carving
wax in blue or green

Basic tool kit

Wax blades for your
piercing saw

Hacksaw (optional)

Old coarse hand files
and needle files

Ring gauge or paper strip

Glass brush and pumice
powder or ball-end
hammer (optional)

Wax carving is a fun, relatively fast way to achieve strong sculptural shapes that cannot be created from sheet metal. This ring is first carved from a block of wax, and then cast by a professional in your chosen metal, ready to be filed and polished by you.



Uses technique flaps

1, 2, 3, 4, 5, 6,
and 19

Using a Saw

The jeweler's piercing saw is the most versatile of cutting tools and will probably be used more than any other piece of equipment in your tool kit. The technique of sawing is utilized for making most jewelry pieces, so it is worth taking some time to learn how to saw quickly and accurately, but without breaking too many blades! Jewelry-making students often become disheartened when they realize sawing is more challenging than it looks, but by practicing the following simple exercises, you will soon be cutting out complex patterns.

Choose a blade that suits the thickness of the metal you are using and the complexity of the design. A 2/0 blade is a good size to start with.

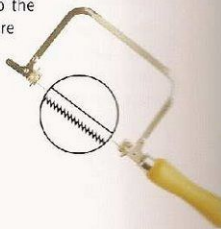
Fitting the Blade



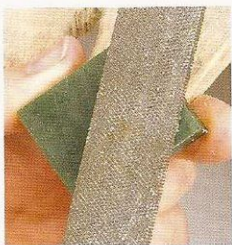
1 Sit at your workbench and hold the frame of the saw against your peg or the edge of the bench. Support the handle against your chest. This leaves both hands free to fit the blade. Hold the blade with the teeth uppermost and angled toward the handle of the saw.



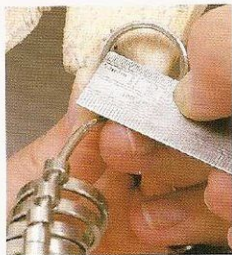
2 Loosen both nuts a little, and slide the blade into the top nut, making sure the teeth are still facing in the correct direction.



1 If you are starting with a large block of wax, cut it to the required dimensions, using a wax blade in your saw or a hacksaw (see technique 2). Use a coarse flat file to even out each face of the block, so you have a smooth surface with square edges and straight sides.

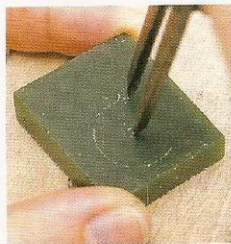


2 Next, measure the finger. Use a ring gauge if you have one; choose one size larger than the finger, as the wax shrinks slightly when cast. Measure the diameter of the chosen ring size with a ruler. Halve this amount to calculate the radius and set your dividers to this figure.

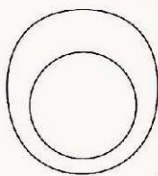
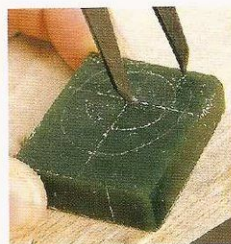


3 If you don't have a ring gauge, cut a strip of paper and wrap it around the finger. Mark where the paper overlaps precisely, and cut across the line. Measure the strip of paper and refer to the table on page 122 to find the corresponding ring size. Use the next size up on the chart. The figure given in the chart is the circumference of the central hole of the ring. Divide this figure by 3.142 to calculate the diameter of the ring, then divide this measurement in half to find the radius. Set your dividers to this number.

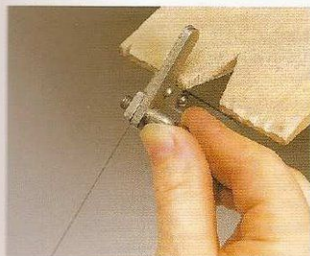
4 Drill a fine hole in the center of the wax block, making sure you keep the drill straight (see technique 3). Draw a circle with the dividers on the front and back of the block, using the drilled hole as the central point (see technique 1).



5 With a ruler and scribe, draw a horizontal and vertical line across the center of the circle, on both the front and back of the wax block. Open the dividers another $\frac{1}{8}$ in (3mm) and draw a small arc across one end of the vertical line on the front of the block. Do the same on the back of the block. This arc marks the underside of the ring. Open the dividers another $\frac{1}{8}$ in (2mm) and draw an arc across each side of the horizontal line. Repeat on the back of the block. These



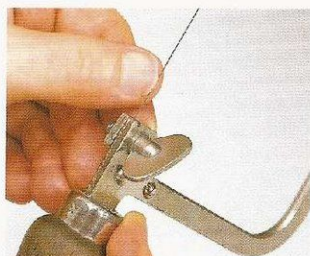
arcs mark the sides of the ring. Open the dividers another $\frac{1}{8}$ in (4mm) and draw an arc across the remaining end of the vertical line. Do the same on the back of the block. This arc marks the top of the ring. Draw smooth curved lines between the arcs to create the outline of the ring, as shown here.



3 Tighten the top nut. Press the frame against the bench. It will contract slightly under the pressure.



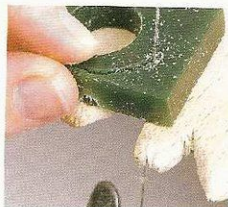
4 Keeping the frame slightly contracted, slip the lower end of the blade into the bottom nut and tighten it securely. Release the pressure on the frame of the saw and the blade will be stretched across it.



5 To check the blade's tension, gently pluck it with your fingernail. If it makes a high-pitched note, you are ready to start; if it twangs, undo the bottom nut and try again.



to make sure you maintain the circular shape. Place the ring on the appropriate finger to check the size.



7 Saw around the outline of the ring, keeping well away from the drawn lines as the blade removes a lot of wax (see technique 2).



8 File carefully around the outline with a coarse flat file, until you are left with the drawn shape and it is the same on both sides (see technique 4).

9 Set your dividers to $\frac{1}{16}$ in (5mm), which is half the depth of the wax block. Rest one point of the dividers at the edge of the wax ring and draw a central line around the outside of the ring with the other point.



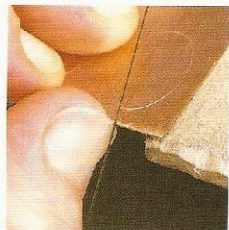
10 File the front and back of the ring with a broad flat file, until the bottom of the ring is $\frac{1}{16}$ in (6mm) deep and the top of the ring remains $\frac{1}{16}$ in (1cm) deep (see technique 4).



11 Shape the ring into the profile shown below. File around the edges at an angle with a coarse, flat file; you are, in effect, filing off the corners. Be sure not to go over the central line. Once you have filed off the corners, continue to develop a more rounded shape. Work systematically on one section at a time to make sure the shape is balanced and symmetrical. Wax files more easily than metal, so be careful not to remove too much in one area.



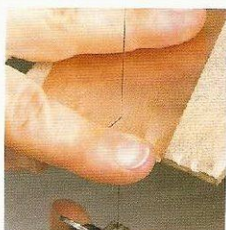
Basic Sawing Techniques



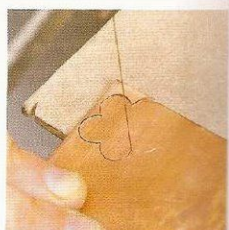
1 To start sawing, work should be held firmly on the peg. If the metal springs up or moves suddenly, the blade will snap. Use your thumbnail as a guide to begin sawing. Make a couple of upward cuts first. These will act as a tooth for the blade to get a firm grip on the metal.



2 Now saw up and down using the full length of the blade. Use a steady rhythm and let the blade travel forward without forcing it. Keep the frame vertical; do not let it fall to either side or the blade may snap. Try to keep your cutting arm relaxed.



3 Steer around the curves of your design by moving the metal gradually in the direction you want to go. Do not steer with the blade. Your frame should always point forward.



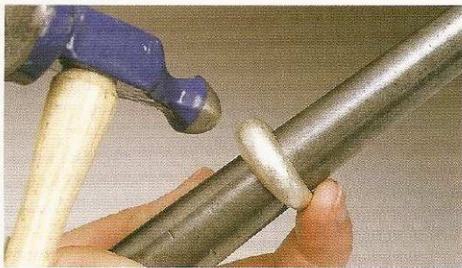
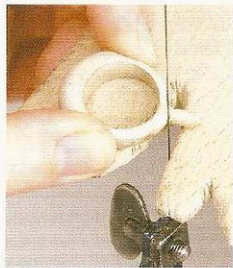
4 Always saw on the outside of the line; this is known as the waste side of the line. Never saw on the line itself, because this will leave you with no markings to work with and after filing will result in inaccurate and misshapen pieces.

12 Use the edge of an old needle file to smooth the surface of the wax and to make final adjustments to the shape. Emery the surface gently, until it is smooth and scratch-free (see technique 5). Do the same on the inside of the ring.

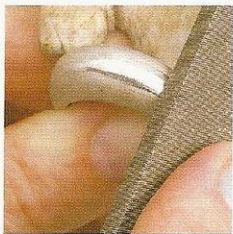


15 Choose a surface finish for the ring. You could polish it to a mirror finish (see technique 6) or, as shown here, create a matt sheen by rubbing the metal with a glass brush dipped in pumice and water (see technique 19).

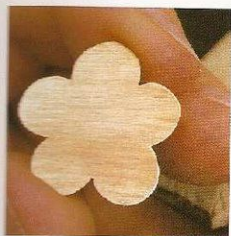
13 Ask a caster to attach a sprue to the base of the ring (this will create the opening in the mold through which the metal is poured) and to cast the ring in the metal of your choice (see the wax to metal conversion table on page 123). When you have the cast ring, saw off the sprue with a coarse blade (see technique 2).



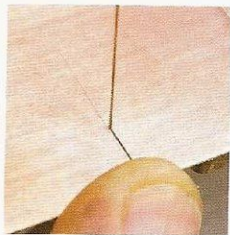
14 File the ring to remove any air bubbles and to achieve a smooth surface (see technique 4). Emery with a buff stick or a split pin on the inside and outside until it is completely mark-free (see technique 5).



16 Alternatively, hammer the surface with a ball-end hammer, then finish with a quick polish to enhance the textural qualities (see techniques 19 and 6). This surface finish has been applied to the ring shown on page 24.



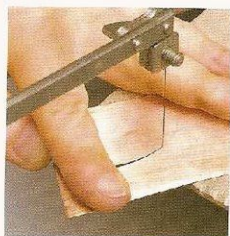
5 Saw as close to the line as you can without going over it. Remember: the more precisely you saw, the less filing there will be.



6 Try to saw in a direction that lets you see the line without it being obscured by the blade. For right-handed people, this usually means working on the right hand side, and for left-handers, on the left.



7 You can lubricate the blade by running a block of beeswax along its teeth before starting to saw. If the blade becomes stuck while sawing, wiggle it up and down in the same spot without moving the metal until the blade moves forward again, or loosen the bottom nut to pull it free.



8 If a blade snaps in the middle of a sawing line, fit a new blade and work your way back along the line. Alternatively, attach a new blade to the top nut of the frame, thread the blade through the saw cut, then tighten it in the bottom nut of the frame underneath the piece of metal.

Stone-set ring

You will need

A plain band ring made with $\frac{1}{8}$ in (4mm) wide, $\frac{1}{8}$ in (2mm) deep half-round silver wire (see project 1, pages 16–19)

2 solid silver balls, $\frac{1}{8}$ in (3mm) in diameter (see technique 12)

$\frac{1}{8}$ in (2mm) round silver wire (enough to fit around the stone)

Strip of $\frac{1}{8}$ in (0.5mm) silver sheet for the bezel setting

Oval-shaped flat-back cabochon stone

Basic tool kit

Stone-setting tool

Burnisher

This design uses a bold bezel setting to maximize the clarity and beauty of a blue moonstone. It can be made with any color or size of stone, provided it has a flat back and the proportions of the finished ring look attractive.

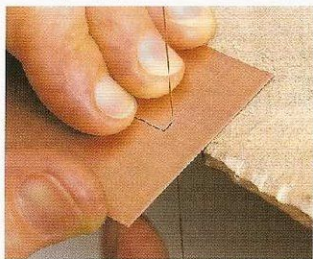


1 Anneal the round wire (see technique 7), then grip one end of the wire in a pair of half-round pliers and bend the other end around to form an oval shape that is $\frac{1}{8}$ in (2mm) bigger than the stone (see technique 8). Always hold the pliers with the rounded face on the inside of the curved wire to prevent marking the metal. Saw off the excess wire (see technique 2). Gripping one end of the wire in the pliers and the other end in your fingers, spring fit the two ends together by pushing them toward each other a little farther than necessary; they will then spring back a fraction, creating a tight seam.



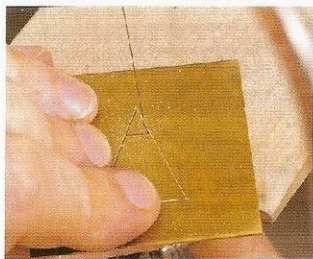
Uses technique flaps 2, 4, 5, 6, 7, 8, 10, 11, 12, and 20

Sawing Sharp Outside Corners



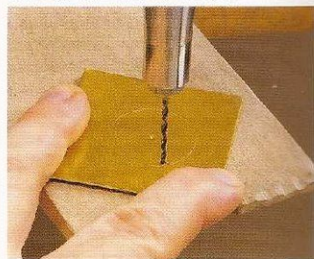
First, cut along the first side to a blade's width past the corner. Then, use tiny up-and-down movements on the spot, without pushing forward. Use your supporting hand to turn the metal around until the blade is facing in the direction you want to cut, and then start to saw forward again.

Sawing Acute Inside Angles



To saw an acute inside angle, first saw as far as you can into the corner and then back the blade out by moving it up and down. Next, cut across the waste area and then saw into the corner on the other side. This produces a much sharper result than trying to steer around the angle. To make the corner even sharper, tip the blade forward a little on the last stroke.

Sawing Out Internal Shapes

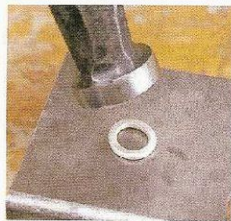


1 Before you start to saw, drill a small hole close to, but not on, the line (see technique 3).



2 Solder the seam with hard solder, then pickle and rinse (see techniques 11 and 10). Adjust the wire into a symmetrical oval shape by gently squeezing it with half-round pliers. Alternatively, shape it around an oval mandrel if you have one.

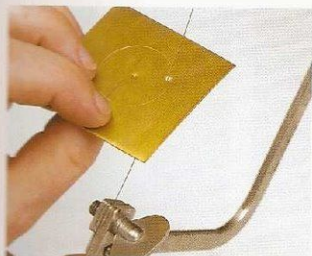
3 When the oval ring is exactly the right shape and size for the stone to sit neatly on top, file off any excess solder (see technique 4) and hammer the ring flat with a smooth-faced hammer on a flat plate. This will flatten the wire and stretch it a little.



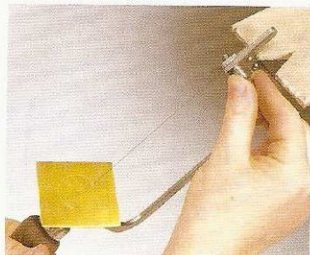
4 Next, use the silver sheet to make a bezel setting for the stone (see technique 20). Make sure the seam fits together neatly and solder it with hard solder (see technique 11). Use a gentle flame because the sheet is very thin. Pickle and rinse (see technique 10).



5 File off any excess solder (see technique 7) and make sure the stone fits snugly in the bezel. Adjust the shape by gently squeezing the bezel with half-round pliers if necessary, holding the rounded face of the pliers on the inside of the curve. When it is a perfect fit, flatten the bottom edge of the bezel by rubbing it on some emery paper secured to a flat plate with double-sided tape.

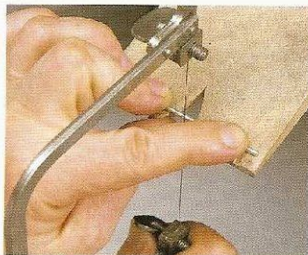


2 Thread the blade through the drilled hole, having first secured it in the bottom nut of the saw frame. Make sure the marked lines of your design are uppermost.



3 Tip the frame up so the metal slides down toward the handle end of the saw, and then tighten the top nut. Start to saw in the usual way.

Sawing Tube and Rod

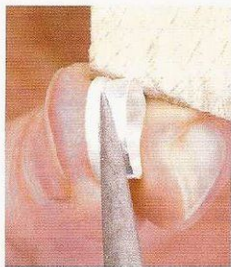


When sawing tube or rod, hold it firmly on the peg with a finger on each side of the line to prevent unwanted movement. Use a fine 6/0 blade when cutting fine tube; otherwise, use your standard 2/0 blade.

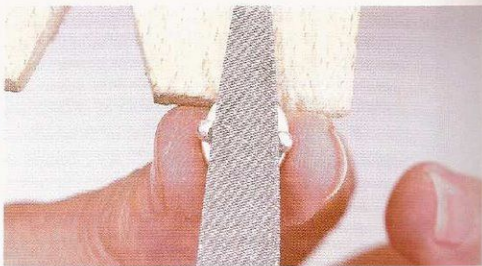
6 Dip the bezel in some borax (see technique 11) and position it on top of the flattened oval ring on a mat or charcoal block. Position pallions of medium solder around the seam. Warm gently, then solder the two pieces together (see technique 11). Pickle (see technique 10).



8 Place the setting upside-down on a charcoal block and use a dot of borax to mark each side of the flattened oval, across the narrower measure. The two silver balls will be soldered here. Dip each ball in the borax dish before placing it in position on the flattened oval. Check that they are central and symmetrical. Tuck a pallion of medium solder under each ball and solder them on (see technique 11). Pickle and rinse (see technique 10).



7 Carefully clean the seam with a safety-back or half-round file to avoid marking the base wire (see technique 4). Take care not to file too much from the bezel setting or it will be too weak to hold the stone securely.



9 Use a half-round hand file to make a depression across the middle of the balls (see technique 4). Hold the file carefully so that it is flat across the top of the ring and turn the ring around to ensure even filing. This will enable the curve of the plain band ring to sit neatly on the balls, thus creating a strong seam once soldered. Check that the filed depression is neat before attempting to balance the band on the balls.

DRILLING

Drilling is most often used by jewelers to allow a saw blade to be threaded through a sheet of metal for sawing out the internal shapes of a design. Other uses are to drill holes through beads or to create decorative effects.

There are various kinds of drill you can use: pendant drill, hobby drill, bow drill, or hand drill. When using a high-speed power drill, it is advisable to wear protective goggles. The most useful size of drill bit is $\frac{1}{16}$ in (1mm).

Using a Power Drill



1 Carefully mark the spot where you want to drill. First, mark it with a scribe, then position a center punch over the mark and tap the end of the punch once with a hammer. This will leave a slight indentation that will act as a tooth for the drill bit and prevent it from skidding across the surface of the metal when you start to drill.



2 Select the drill bit and a chuck that it fits without being forced. Position the drill bit in the center of the chuck, replace the cap, and tighten with the chuck key. Using a lubricant will aid the cutting action and lengthen the life of your drill bits. Use oil, a burr lubricant, or cheapest of all, spit. Yes, it works!

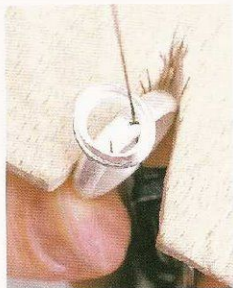


3 Hold your piece of work firmly on a block of wood. If necessary, use a vise or clamp to prevent it from moving. Position the drill bit on the mark, and drill, using a steady downward pressure. Hold the drill straight or it is liable to snap. When you have drilled through the metal, remove the drill while it is still turning.

10 Balance the plain band ring on the balls. Position the seam of the ring so it sits between the balls. It is advisable to use spring tweezers for this unless you have a very steady hand. Use easy solder to join the two together (see technique 11). You may prefer to paint rouge on all the previous solder seams for added security. Pickle the ring and rinse (see technique 10).



11 Next, thread your saw blade through the setting of the ring and saw out the middle section of the plain band ring to create a neat V shape at each end of the half-round wire (see technique 2).

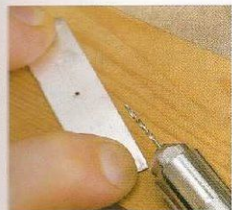


12 File the ends of both V shapes so they create a crisp angle (see technique 4). Emery the whole ring to remove any scratches and file marks (see technique 5).

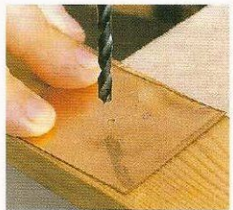


13 Put the stone in the setting, and use a stone-setting tool to push the bezel over the stone (see technique 20). Be sure to use even pressure all around the stone and follow the sequence of movements described in the techniques section.

14 Complete the setting by burnishing around the edge to create a smooth, shiny finish (see technique 20). Use a little soap or a tiny drop of oil to lubricate the burnisher. Finally, polish the ring with tripoli and rouge (see technique 6).



4 You will find it extremely difficult, if not impossible, to drill holes in tiny metal shapes. Always plan ahead so you can drill any holes while you still have plenty of metal to hold.

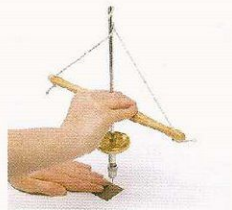


5 Do not use a very large drill bit without first drilling a pilot hole with a smaller drill bit. This will prevent the metal from catching in the drill and kicking from the pull.

Using a Bow Drill



1 Mark the spot where you want to drill a hole in the same way as when using a power drill (see step 4). Insert the drill bit into the chuck and tighten. Spin the handle of the drill so the cord winds tightly.



2 Support the drill with your index and third finger on the wooden bar, and register it on the center punch mark. Now press lightly on the bar. As you do so, the cord will unwind. The drill will develop a steady rhythm of winding and unwinding as you exert a gentle pressure.

Twig ring

You will need

$\frac{1}{16}$ in (3mm) round silver wire to form the main stem

Two $\frac{1}{16}$ in (5mm) pieces of $\frac{1}{16}$ in (2mm) round silver wire for the branches

$\frac{1}{4}$ in (1.5cm) square of $\frac{1}{8}$ in (1.5mm) silver sheet for the leaf

$\frac{3}{16}$ in (2cm) of $\frac{1}{16}$ in (1mm) round silver wire for the tendrils

Basic tool kit

Ring gauge or paper strip

Abrasive rubber tip (optional)

Lead cake (or doming block) and round punch

Styled to look like a delicate twig curled around the finger, this ring uses filing as its principal technique. An ivy leaf motif is used here, but you can adapt other motifs to suit your own tastes.



Uses technique flaps 1, 2, 4, 5, 6, 7, 8, 9, 10, and 11

1 First, measure the finger. Use a ring gauge if you have one and refer to the ring size table on page 122 to figure out the length of metal required. Alternatively, wrap a strip of paper around the finger, mark where it overlaps, and measure this length. Remember to add on the thickness of the metal, whichever method you use. Set your dividers to the required length against a steel ruler, and carefully mark the strip of wire for the main stem to show where to cut (see technique 1). Saw through the wire on the waste side of the line (see technique 2), then file off any excess metal (see technique 4).

FILING

Filing is necessary to remove any excess metal after sawing out your designs, and to achieve a smooth and even surface, ready for emerying. Filing can also be used to shape and contour your work.

Files are available in a variety of shapes and grades. For most jewelry purposes, a 2-cut will suffice. Always use the coarsest and largest file appropriate to your needs. If you choose too smooth a file where there is a lot of excess metal, filing will be painfully slow. Similarly, avoid using a needle file unless you are filing something tiny, or need the control a needle file allows.

Always support your work firmly on a peg. Use long, even strokes with the pressure on the forward motion, and watch the line you are working toward or the marks you are leaving rather than the file itself. This allows you to keep reassessing the exact pressure and position needed for the next stroke. Once you have removed excess material, the file can be used with less pressure to smooth away any scratches and marks ready for emerying.

Common Types of File



Flat file

For use on flat surfaces and outside curves. Good general-use file.



Square file

For use in slots and grooves, and for inside angles.



Triangle or three-square file

For use in tight angles and awkward small areas.



Round file

Use on small inside curves and holes.



Half-round file

Use the curved side for inside curves, and the flat side for general use.



Knife file

Only use where there is very limited access to corners.



Crossing or sage-leaf file

Good for filing various inside curves.



Safety-back file

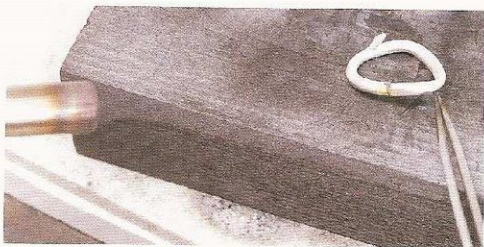
Good for access to tight corners and angles, because it is only serrated on one side.

2 File an angle on one end of each of the branches, so they sit against the main stem at a slight angle (see technique 4). Position the three pieces on a charcoal block or fire mat, and solder them together with hard solder (see technique 11). Pickle and rinse (see technique 10).



3 Use a half-round file to shape the wire, creating an uneven surface (see technique 4); this produces a more organic look than perfectly smooth wire. Use the curved side of the file to bend the file strokes. Emery the surface of the wire thoroughly (see technique 5).

4 Grip one end of the wire in a pair of half-round pliers and lever the rest of the metal around with your fingers (see technique 8). Make sure the rounded face of the pliers is on the inside of the curve. Do the same at the other end of the wire until you have a rough circular shape. Saw through the seam once or twice to ensure a tight fit, and solder with hard or medium solder (see techniques 9 and 11). You may wish to apply rouge to the branches. Pickle and rinse (see technique 10).



5 Slip the ring onto a ring manrel and tap it with a wooden or hide mallet until you achieve a perfect circle.



Fitting a File Handle



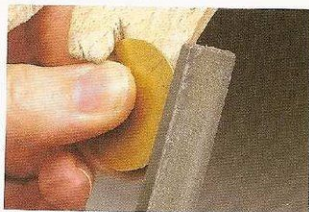
Needle files have an integral handle; hand files do not. However, handles are cheap to buy and simple to fit. Hold the file in a vise with the tang pointing upward. Protect the teeth of the file by placing a piece of metal over the vise jaws. Heat the tang of the file until it is red hot, angling the flame away from the file itself. Push the file handle onto the red-hot tang, which will burn into the wood and create a firm grip. Hammer into position.

Filing a Straight Edge



Use a flat hand or needle file. Avoid using a triangle or half-round file. Hold the piece of metal either flat on the peg or vertically against one of the slots. File using long, flat strokes. Do not sweep on and off the metal, as this will taper the ends. Lift the file cleanly off at the end of each stroke, to achieve greater accuracy and control.

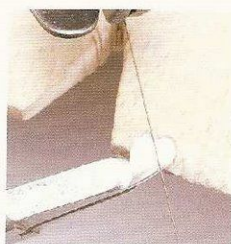
Filing an Outside Curve



Use a flat file in long, sweeping strokes that follow the shape of the curve. Be sure not to rub away in one area, because this will create a faceted edge. Always overlap the strokes and keep the file moving.



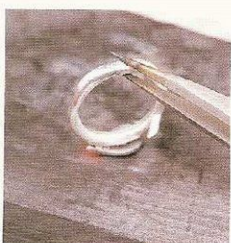
6 Once the ring is perfectly round, file off any excess solder (see technique 4). Remove scratches using emery paper or an abrasive rubber tip with a pendant drill (see technique 5).



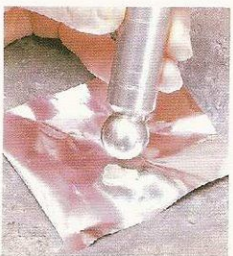
9 File off any sharp edges with a flat file (see technique 4). Secure the leaf in a pair of half-round pliers if you have difficulty holding it. Use a saw blade to mark the veins of the leaf down the center and at angles toward the edges (see technique 2).



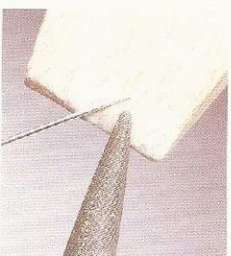
7 Transfer the leaf shape onto the silver sheet (use method 1, technique 1). Saw around the leaf and file the edges to neaten the shape (see techniques 2 and 4), and remove the tracing paper template.



10 Place the leaf upside-down on a mat or charcoal block, and use spring tweezers to balance the ring on top of it; the leaf should sit between the branches on the opposite side to the ring's seam. Sweat solder together and pickle (see techniques 11 and 10).



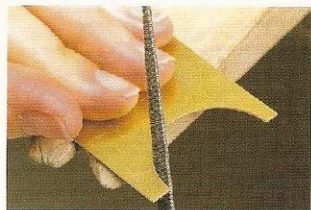
8 Anneal the leaf (see technique 7), then place it on a lead cake or doming block and hammer a doming punch into it until it becomes slightly curved (see technique 9).



11 File a gentle taper on each end of the silver wire for the tendril (see technique 4).

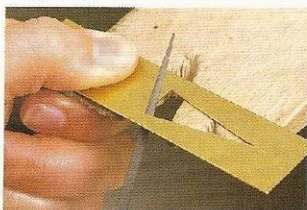
FILING

Filing an Inside Curve



Choose a crossing or half-round file with a profile that most closely corresponds to the curve. File using broad, sweeping strokes that follow the curve. Do not file up and down in one place, which will create grooves.

Filing a Tight Corner



Where there is a tiny corner or bend, most people make the mistake of using a three-square or square needle file. Instead, use a safety-back file, which will allow you to reach right into the corner without damaging the other edge of the metal inadvertently with the back of the file. You will achieve a crisper and more precise result.

Filing Tiny Spaces



If you have a tiny hole that a file will not fit, use the blade of your piercing saw as a file. Thread the blade through the hole before tightening the second nut. Lean the blade against the metal and gently rub the metal with the side of the blade. Use tiny strokes, moving backward and forward only minimally. For greater control, hold your thumb on the blade under the peg. This technique takes a lot of practice.

12 Next, balance the ring in a wig and solder the tendril to it (see technique 11). Light your torch, hold the wire in a pair of spring tweezers, and heat one end with the tip of the flame. Dip the hot end in some creamy borax and pick up a single pallion of easy solder on the wet tip. Heat it a little so it starts to flow.



14 Wind the rest of the wire tendril tightly around the main stem. It should be soft enough to pull around with your fingers. Use round-nosed pliers to create a tiny curl at the unsoldered end (see technique 8). Position the curl so it sits neatly on the main stem, squeezing it gently with half-round pliers until it sits flat.

13 Heat the ring until it glows bright red and lower the wire onto the cleft of the leaf as the solder starts to flow again. Remove the flame, and when the solder stops flowing, remove the tweezers. The wire should now be attached to the ring. Pickle and rinse (see technique 10).



15 Carefully paint borax around the wire tendril where it meets the main stem, and position pallions of easy solder in the seams. Warm gently until the borax settles, then heat until the solder flows along the seams (see technique 11). Pickle and rinse (see technique 10). File off any excess solder with a safety-back file, then emery thoroughly (see techniques 4 and 5). Finally, polish the ring with tripoli and rouge (see technique 6).

Filing a Taper

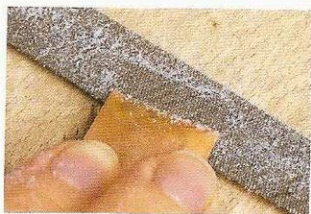


To file a tapered end on a piece of rod or wire, lean it in a groove cut into your peg. Then, twist it with your supporting hand as you file across the length in long, smooth strokes with a flat file.

Cleaning Files



1 Files become clogged with metal during use and become less effective. Keep them in good condition by cleaning them regularly. Use a file brush to brush firmly across the file in the direction of the teeth.



2 Alternatively, rub a scrap of copper with a straight edge across the file in the direction of the teeth. This will create tiny teeth on the copper that are tailor-made for scraping debris out of the file.

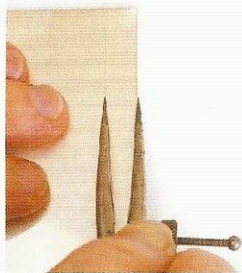
Ornate ring

You will need

| |
|--|
| $\frac{1}{8}$ in (1mm) silver sheet for the wide band |
| $\frac{1}{4}$ in (3mm) round silver wire for the outer rings |
| $\frac{1}{8}$ in (0.5mm) round silver wire for the spiral decoration |
| Basic tool kit |
| Ring gauge or paper strip |
| Masking tape |
| Sliding caliper (optional) |
| Silver cleaning cloth |

This ring is decorated with fine wire spirals and can be adapted by experimenting with different-shaped ornamentation, or by using alternative profiles of wire around the top and bottom of the ring.

1 First, measure the finger. Use a ring gauge if you have one and allow two sizes extra because it is a wide band. Refer to the ring size table on page 22 to figure out the length of metal required; remember to add the thickness of the metal to your calculations. If you do not have a ring gauge, wrap a strip of paper around the finger. Mark where the paper overlaps, and cut across the line. Measure the strip of paper and refer to the table to figure out the corresponding ring size and the one that is two sizes larger.



2 Set your dividers to the required width of the ring – $\frac{1}{8}$ in (8mm) in this example. Mark this width by running a pair of dividers along the straight edge of the sheet of silver (see technique 1). You may need to file one edge of the metal straight before you do this (see technique 4).



3 Use a square to mark a line that is at a right angle to the straight edge (see technique 1). This will form one end of the ring. Set your dividers to the required length of the ring against a steel ruler and mark the other end of the ring along the line that you marked in step 2.

Uses technique flaps
1, 2, 4, 5, 6, 7, 8,
10, 11, and 19

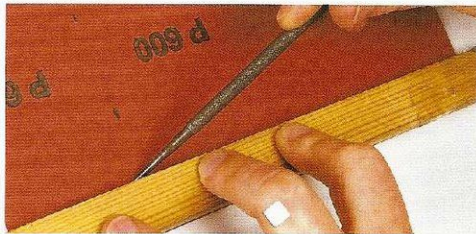
EMERYING

Emerying is the next step after filing, and is necessary before you can polish your work. Emery paper removes any marks left by the file, and by using progressively finer grits of paper, your piece will be ready for the final surface treatment. Emery is the most commonly used abrasive paper, but many jewelers prefer waterproof abrasive paper, since it lasts longer and is less dusty to work with when using a polishing motor. Both types of paper can be used by hand or with a battery-powered motor.

You should always keep a selection of buff sticks readily available for emerying by hand, but abrasive papers can also be used very effectively with battery or motor-powered polishing equipment. These allow you to work at high speed and to achieve faster results, but this method is not suitable for flat surfaces and intricate detail.

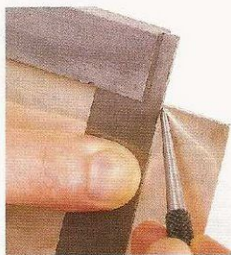
Safety note: Always wear protective goggles and a dust mask when emerying with a power tool; pieces of paper can fly off at high speed and it generates much more airborne dust than manual methods.

Emerying by Hand

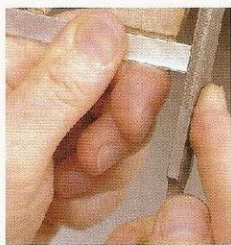


1 Make some differently shaped buff sticks with a few grits of paper. These let you apply more pressure and work with greater control than using paper alone. Use buff sticks in the same way you would use a file. To make flat buff sticks, you will need some flat wooden sticks; for curved buff sticks, you will need pieces of round dowel. They should be about 8in (20cm) long. Cut a sheet of paper $\frac{1}{8}$ in (1cm) shorter than the wood, but long enough to wrap around the wood three or four times. For a flat stick, lay the wood along one edge of the paper and use a scribe to score the next edge. Fold the paper along the scribed edge and wrap it over the stick.

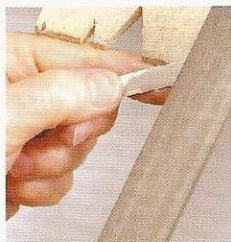
4 Mark the remaining end of the ring across the width of the metal strip, holding the square tightly against the straight edge to ensure a perfect right angle (see technique 1).



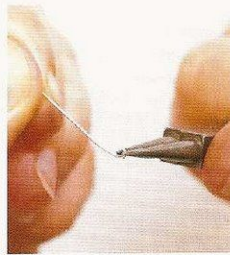
5 Carefully saw out the rectangle of metal on the waste side of the lines (see technique 2). File the short ends (see technique 4), and use the square to check that they are still at right angles with the long sides. File the long edges with a flat hand file.



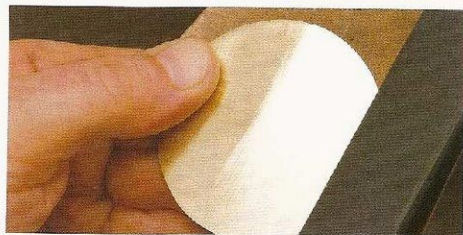
6 Emery the surface to remove any scratches (see technique 5). It is important to achieve a good surface now as it is difficult once the decorative wire scrolls have been soldered on.



7 Cut four 1/4in (3.5cm) lengths of the narrow wire for the spirals (see technique 2). Grip the end of one piece of wire in a pair of round-nose pliers and lever the wire around with your fingers to create a curl (see technique 8).

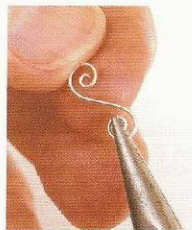


2 Continue to score and wrap until there are three or four layers around the wooden stick, then secure it at both ends with masking tape. With round dowel, there is no need to score the paper; simply wrap it tightly around the stick several times and then secure with masking tape. As your buff stick becomes worn, simply tear off a layer to reveal a fresh piece. Don't be in a hurry to discard used paper; worn pieces can be used in place of a finer grit paper, allowing you to purchase fewer grits. If you have an area that is too small for a buff stick, wrap a small piece of paper around a needle file. This will be more effective than paper alone.



3 The prime aim of emerying is to remove file marks, and each grit of paper will remove the marks left by the previous one. It is important not to rush this stage, or you will be unable to achieve a mirror polish. Do not always work in the same direction. With a large surface area, work across the whole surface in one direction, then turn the piece a quarter turn to work across the previous strokes. Continue emerying and turning in this way. This process is called lapping and will remove marks much more quickly than working in only one direction.

8 Continue the spiral by holding the curl gently in a pair of needle-nose pliers as you pull the wire around. Do the same at the other end to create an S-shaped spiral. Make three more spirals in the same way.



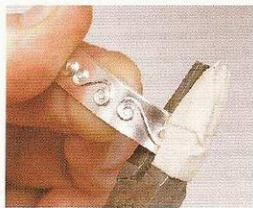
9 Place the spirals on the cut strip of silver sheet to make sure they fit. As ring sizes vary, you may need to make more than four spirals, or space them a little farther apart than on the ring featured here. Make sure the spirals are flat by tapping them gently on a flat plate with a mallet.



10 Cut up tiny pallions of hard solder and place the silver strip on a wig, ready to solder the spirals in place (see technique 11). Dip each spiral in some creamy borax, then position them on the strip. With the tip of your borax brush, tuck pallions of solder under the spirals at evenly spaced intervals. Make sure each spiral is positioned correctly and securely. Let the borax dry before starting to solder. This prevents undue bubbling of the borax, thus preventing the spirals from moving when the metal is heated.



allow the solder to flow fully along the spirals, touching them down with the tip of your tweezers if necessary. Pickle and clean with a glass or brass brush and soap (see technique 10).



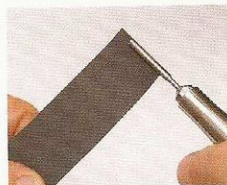
12 Grip one end of the metal strip in a pair of half-round pliers and lever the metal around with your fingers (see technique 8). Make sure the rounded face of the pliers is on the inside of the curve. Wrap some masking tape around the flat side to prevent marking the spiral decoration. Do the same at the other end of the strip to produce a circular shape. You will probably need to anneal the ring at least once before the seam will fit together (see technique 7).



Emerging with a Power Tool



1 Select a split spindle or pin that fits the chuck of your drill. Cut strips of paper that are a tiny bit wider than the pin and about 4in (10cm) long. Secure the pin in the chuck and tighten. Make a fold at one end of paper that is the same width as the pin.



2 Slide the folded edge of the paper into the pin with the abrasive side facing you. Wrap the remainder of the paper around the pin, and secure with a small piece of masking tape.

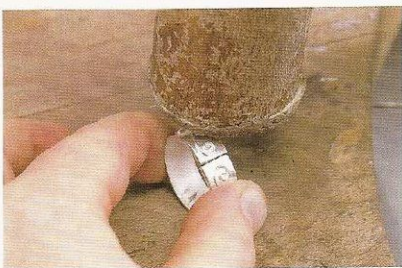


3 Holding your work firmly, start the motor with your foot. Move the emery over the surface in a series of overlapping motions. Start slowly, because the turning spindle may pull the work out of your hands.

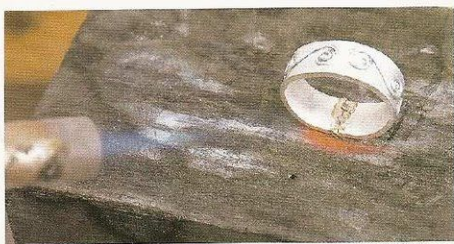


4 A split pin covered with emery paper is very useful for cleaning the insides of rings. Once you have removed all marks and you can see a faint reflection in the metal, you are ready to polish.

13 Tap the ring with a mallet to create a tight seam. Hold the ring firmly against the peg and saw through the gap a couple of times to make sure the faces of the seam fit snugly together (see technique 2). It does not matter if the ring is an odd shape, provided the seam is neat.



14 Solder the seam with medium solder (see technique 11). Place the pallions of solder along the inside of the seam and heat the ring both inside and out to make sure the solder flows through the seam to the front of the ring. You may wish to apply rouge to the spiral decoration to prevent the solder beneath the wire from flowing again. Pickle and clean with a brass or glass brush and soap (see technique 10).



15 Hammer the ring around a ring mandrel with a hide or wooden mallet, turning it over once or twice to prevent it from developing a flared shape. Anneal the ring if the metal becomes too hard (see technique 7).



16 File off any excess solder with a three-square or safety-back needle file (this prevents damage to the wire decoration), then emery the filed areas with a scrap of emery paper (see techniques 4 and 5). Do not use a buff stick because it will flatten the wire spirals.



POLISHING

Polishing is usually the last stage of any jewelry project. It is possible to achieve a flawless mirror finish, provided you have been methodical in your preparation with abrasive papers. If polishing reveals marks that were previously hidden, it is wise to repeat the cleaning stages.

The first stage of polishing is to remove any marks left by the abrasive papers with a compound called tripoli, followed by a final burnish with a compound known as rouge. Polishing buffs are available in a variety of textures to suit any job, but for the beginner it is adequate to use a firm muslin (calico) buff for tripoli and a soft muslin (swansdown) buff for rouge. Bristle brushes are useful for a finely detailed surface where a firm buff might cause areas of erosion.

Polishing needs to be done at high speed to be effective, so ideally you should invest in a flexible shaft or a fixed polishing motor. It is possible to polish by hand using chamois sticks, but this method is rather laborious.

Safety note: Always wear goggles and a dust mask when polishing to protect your eyes and lungs. Take great care when using high-speed polishing equipment, since it can be extremely dangerous when used carelessly.

Polishing Compounds

Tripoli

Used for initial polishing on most metals. Quite abrasive, and will remove marks left by emery paper.

Rouge

For final polishing of silver and gold and most other metals.

Radio rouge

Used as the final stage for brass and other base metals.

Hyfin

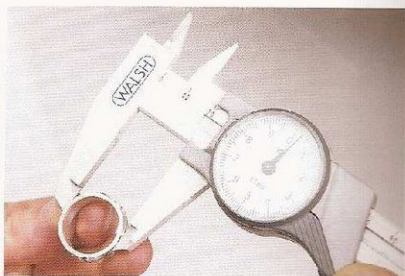
Use for hard metals, such as stainless steel. Some jewelers use it for flat surfaces with a felt buff instead of tripoli.

Vonax

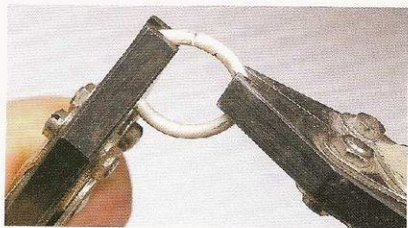
A polishing compound for use on plastics.



17 File a flat edge on both sides of the ring with a flat hand file (see technique 2). Check it is flat by placing the ring on a flat plate to see if there are any gaps. File the inside of the ring with a half-round or crossing file, then emery the inside thoroughly to remove any marks; this will not be possible once the end rings are soldered on. A split pin or round buff stick is the simplest method (see technique 5).



18 Next, measure the external diameter of the ring with a ruler or sliding caliper. Multiply this figure by 3.142 to calculate the length of wire needed for the two outer rings.



19 Cut two pieces of the thick round wire to this length with your saw, remembering to saw on the waste side of the line (see technique 2). Bend both pieces into rough circular shapes with half-round pliers in the same way as before (see step 12), annealing them if necessary (see technique 7). You do not need to wrap tape around the pliers this time. Lever the ends together with flat-faced pliers. Saw through the gap in both rings a couple of times to make sure the faces of the seams fit snugly together.



20 Position a pallion of hard solder on the seam of each ring. Solder them both shut, then pickle (see techniques 11 and 10). Tap the rings around a ring mandrel with a mallet, annealing them if they do not make a perfect circle easily (see technique 7). Make sure the rings are flat by tapping them on a flat plate with a mallet.

Polishing Buffs

Firm muslin (calico)

A firm buff made of stiff cotton fabric, usually used for initial polishing with tripoli.

Soft muslin (swansdown)

This very soft buff is used for the final stage of polishing with rouge.

Wool

Less abrasive than a soft muslin buff, wool is useful for final polishing with rouge on intricate pieces.

Felt

Felt buffs are very firm and should only be used for flat work. They can be used with tripoli or rouge.

Finger felts

These finger-shaped felt buffs are ideal for polishing the insides of rings.

Brushes

Designed to gain access to intricate detail that would be inaccessible with buffs. Can be used with tripoli or rouge.

Brass wheels

These create a satin finish on metals, and should be used with a soapy lubricant and water.

Flick wheels

Plastic wheels covered with tiny metal pins, designed to create special textured finishes on metal. They are available in a number of different grades.





21 File off any excess solder from the inside and outside of the rings, taking care not to change the profile of the wire (see technique 7). File a flat edge on one side of each ring with a flat hand file. This will ensure that the rings sit neatly on the decorated band.



22 Sweat solder the rings onto the band (see technique 11). Place the decorated band on a soldering mat or wig. Paint borax around the top edge and position pallions of easy solder at regular intervals. Sweat the pallions on by heating the ring until the solder starts to run and then quickly remove the flame.



23 Dip the flat edge of one of the round rings in the borax, then place it on top of the sweated pallions. Make sure it is centrally positioned and that the seam in the round ring is in the same position as the seam in the decorated band before soldering it in place. As the rings reach soldering temperature, the solder will start to flow and the round ring will sit down onto the wide ring. Make sure the solder flows all around the seam by following it around with the torch. Pickle (see technique 10). Follow the same sequence with the remaining round ring. Pickle and scrub with a brass or glass brush dipped in soap and water.



24 Carefully file off any excess solder with a three-square file (see technique 4). Emery the decorated band with small pieces of abrasive paper and use a buff stick to emery the outside rings (see technique 5). If you have a

pendant drill, use a split pin with emery paper to remove any marks from the inside and outside of the ring before polishing. Polish with tripoli and rouge, using a bristle brush to clean around the wire spirals (see technique 6). Finally, oxidize the ring (see technique 19), then buff with a silver cleaning cloth to highlight the wire decoration.

Breaking in a Buff



1 A new buff needs to be broken in before use. Thread it firmly onto the motor and hold the tang end of a file against it as it turns. This will remove loose strands and fluff from the buff.



2 Next, briefly set light to the surface of the buff to burn off any remaining fibers. Buffs used with a pendant motor are the exception; they do not need breaking in.

Polishing with Tripoli



1 First, put tripoli on the buff by holding the block of tripoli firmly against the buff for a few seconds as it spins. You will need to reapply the compound periodically throughout the polishing process.

Single-strand necklace

You will need

Drilled stones

Pearl silk or nylon in a color that complements or contrasts with the beads

A clasp and catch with closed jump rings attached – a figure-eight clasp made with twisted gold wire is used here (see techniques 14, 16, and 17)

$\frac{1}{16}$ in (2cm) of gimp in a color that matches the clasp and catch

Basic tool kit

Fine threading needle

Clear nail polish if using silk thread, or a soldering iron if using nylon thread

This necklace is made with a strand of faceted amethyst beads, but you can use any drilled bead or pearl. The technique of knotting between each bead is most often used where the value of the beads is high. It also makes the necklace more flexible and looks attractive, especially when a contrasting color thread is used.

1 However long you want your necklace to be, use four times that length of threading silk or nylon. This will allow you to knot between each bead for extra security should the necklace break. Thread the silk or nylon onto the needle, and take the needle to the middle of the thread so you have a double strand.



Uses technique flaps 14, 16, and 17

POLISHING



2 Hold the piece of work firmly against the buff, just below the level of the central spindle. A good polishing action is to use short upward strokes in the bottom quarter of the buff, applying a little pressure. If you hold the piece too low or too high, it will be pulled out of your hands, possibly causing irreparable damage to the piece and danger to yourself.



3 Keep the work moving and overlap the strokes for maximum effect. Take care to avoid getting anything caught on the mop as it turns, but always hold work in such a way that you can let go easily if it does become caught. Be careful not to put too much pressure in one area, as tripoli is very abrasive. Details and delicate pieces can develop a worn look if overpolished.

Polishing with Rouge

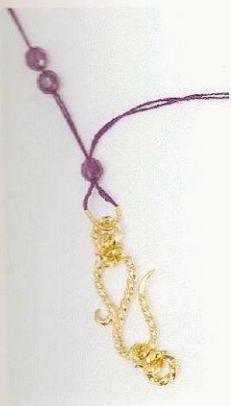


When you have achieved an even shine with tripoli, polish in the same way with rouge. Always use a separate buff for rouge, because one contaminated with tripoli will not produce such a good result. Finally, wash your piece with hot water and detergent to remove any traces of polish. Solutions specially made for cleaning greasy compounds are readily available. Use an old nylon toothbrush for detailed work.

2 Cut the length of gimp in half. Slip three beads and then a piece of gimp onto the thread, followed by one of the rings on the clasp and catch. Pull these down to about 4 in (10cm) from one end of the thread.



3 Holding the short end of the thread taut, pass the needle back through the first bead, as shown on the left. Pull the thread tight so the gimp forms a loop around the ring of the clasp and catch.



4 Use the long end of the thread to tie a knot around the shorter end, as shown on the right. Pull tight against the first bead.

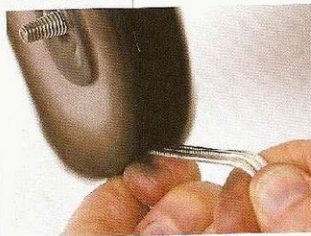


Using a Pendant Motor or Drill



Small buffs attached to a pendant motor or drill are particularly useful for gaining access to fine detail and for polishing the insides of rings. Take care not to catch the chuck accidentally on the surface of the piece of jewelry.

Polishing Chains



Chains are very likely to become caught in the buff. Tuck the loose ends of the chain into the palms of your hands, and keep it taut as you polish a short piece at a time. Alternatively, wrap the chain around a block of wood first so there are no loose ends. You can then only polish a section at a time.

Polishing Interior Holes

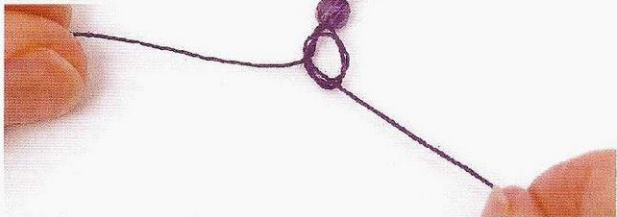


Attach a few polishing threads to your workbench with a thumbtack or nail. Rub the block of polish against them, then thread them through the hole in the piece of jewelry. Move the piece carefully up and down the threads.

5 Pass the needle through the next bead and tie another knot. Do the same with the third bead.



6 Next, thread another bead onto the long end of the string and tie a loose knot in it (the short end of the string will be trimmed later). Work the knot along with your finger until it is close to the bead, then open out the two threads to tighten the knot snugly against the last bead. Continue with all the beads, following the sequence shown above and right, until you have only three beads left.



ANNEALING

Metals that are to be bent or formed into shapes need to be heated regularly to maintain their malleability. This process is known as annealing and is likely to be a vital part in most jewelry projects. Heating metals to a specific temperature rearranges their cellular structure, so they feel softer to work with and are easier to manipulate into different forms. Metal that isn't annealed regularly will be tough to work with and will eventually become so brittle that it splits and splinters.

When trying to change the shape of metal by hammering, doming, bending, etc. it will gradually become springier and harder to manipulate. This is called "work hardening," and it is at this stage that the metal should be annealed.

Different metals must be heated to different temperatures. This is most easily achieved by watching the color of the metal as you heat it. Turn out bright overhead lights so you can see the color change. Always set your torch to a full, soft flame for annealing, because this will warm a larger surface than a small, sharp needle flame. Annealed metal should be pickled to clean off surface oxides before continuing work on your project (see technique 10).

Sheet Metal and Jewelry Items



1 Lean a sheet of metal upright against a soldering block and heat it evenly with a soft flame. Positioning the sheet this way will speed up the process by reducing the conduction of heat from the metal. (The metal shown above is copper.)



2 Jewelry items can be placed directly on top of a charcoal block for annealing. (The metal shown above is silver.)

Multistrand necklace

You will need

Freshwater pearls or similar-size beads

Pearl silk or nylon in a color that complements the pearls

A clasp and catch with closed jump rings attached – a silver figure-eight clasp is used here (see flaps 14 and 17)

2 1/2 in (6cm) of gimp in a color that matches the clasp and catch

Basic tool kit

Fine threading needle

Clear nail polish if using silk thread, or a soldering iron if using nylon thread

As a variation of the single-strand necklace, this classic style uses several rows of different-colored freshwater pearls. Any combination of colors can be used to good effect, provided the pearls are of similar size. This necklace can also be worn without the twist for a more unstructured look.

1 Decide how long you want the necklace to be; test different lengths using a piece of string around the neck. Add an extra 30 percent to the length to allow for the twist; each finished strand of the necklace should be this long. Cut six lengths of silk or nylon, each piece three times longer than the required finished length of the strands. Cut the gimp into twelve 1/4 in (5mm) lengths.

2 Make a single-strand necklace using one set of colored pearls (see project 8, pages 42–45). There is no need to knot between each pair of beads, however; just tie knots at regular intervals to keep the necklace taut and secure.



Uses technique flaps 14 and 17

BENDING

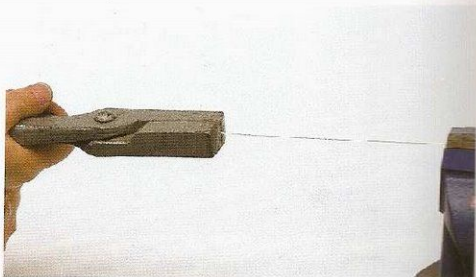
BENDING

You can change the shape of metal by bending and wrapping it around formers, pliers, and mandrels. Use your fingers to manipulate thin wire and sheet whenever possible, since fingers are less likely to mark and damage the surface of the metal than steel tools. If you require more control, accuracy, or strength, however, you will need to use tools to help you.

When you are using pliers, they should hold the metal steady and support it while your fingers lever or manipulate the metal around them. Choose pliers carefully for each job. The wrong pair used carelessly will mark or dent your piece. When creating repeated shapes with pliers and wire – for example, a pair of ear wires – it is much easier to duplicate one small step several times than to complete each piece and then try to replicate it, so break the task down into a sequence of small stages.

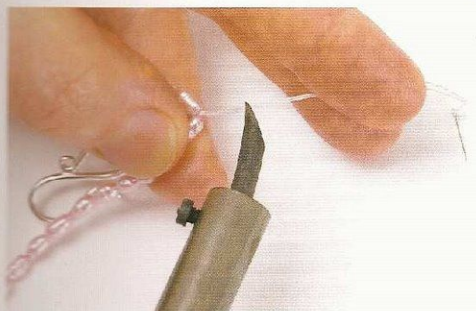
Metal should always be annealed prior to bending and shaping, and at regular intervals throughout the process (see technique 7). Even fine wire will create smoother curves that are easier to control if it is annealed first.

Straightening Fine Wire

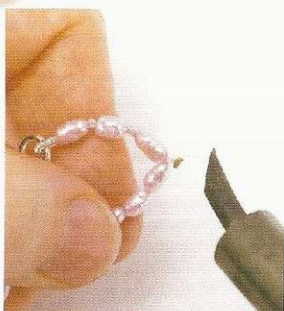


Fine wire that has become bent and misshapen should first be straightened if you want to use it for creating shapes and filigree work. However, if the wire is used directly from the spool you bought it or, it is unlikely that you will need to do this. Place one end of the annealed wire in a vise and grip the other end in a pair of draw tongs or pliers with serrated jaws. Stand firmly and pull on the wire. You will feel it stretch as it straightens. Pull the wire until there are no kinks and the wire no longer gives.

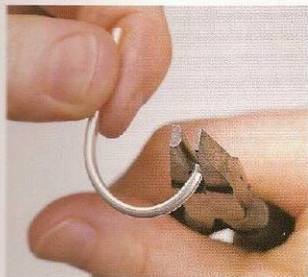
3 Continue the necklace by making five more single strands of pearls, attaching all of them to the same clasp as the first strand and using a different color for each of the new strands. Make sure the strands are of equal length and that you join them in the same color sequence to each end of the clasp or the necklace will not lie flat. If you have used silk thread, secure the end knots with a dot of nail polish. Let the varnish dry, then snip off the excess silk with end cutters (as demonstrated in step 8 of project 8, page 45).



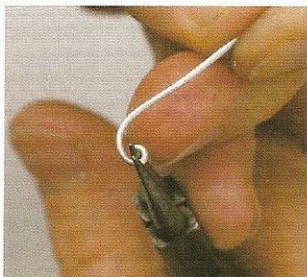
4 If you have used nylon thread, use a hot soldering iron to cut the thread about $\frac{3}{16}$ in (1cm) from the bead or pearl (left). Use the hot tip of the iron to melt the ends of the thread so they are fused together close to the knot (right). Trim off all the excess threads in the same way. Simply twist the necklace before putting it on.



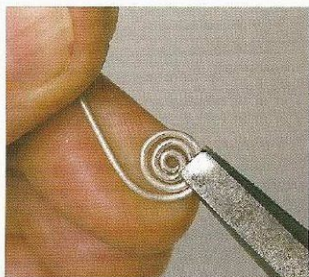
Bending Thin Wire into Circles, Spirals, and Sharp Angles



1 To bend wire into a circular shape, grip one end in a pair of half-round pliers. Make sure the rounded face of the pliers is on the inside of the curve. Lever the rest of the wire around with your fingers into a semicircular shape. Repeat this process at the other end of the wire to form a circle. Alternatively, wrap the wire around a mandrel.



2 To make a spiral, grip the tip of the wire in a pair of round-nose pliers. Push the rest of the wire around the pliers with your fingers to form a tight loop. Tuck in the end of the loop by squeezing it with a pair of needle-nose pliers. To make an S-shaped spiral, repeat this process at the other end of the wire in the opposite direction.



3 To enlarge the spiral, hold the loop in a pair of flat pliers and wind the longer end of the wire around. Remember that if the wire becomes stiff and difficult to bend, it needs annealing again. Using flat pliers will reduce the risk of marking the metal.

Bead-drop choker

You will need

Approximately 100 pearls
or drilled stones in
assorted colors

14ft (4.25m) of $\frac{1}{16}$ in
(0.5mm) round silver wire

Silver rope chain

A clasp and catch –
a twisted T-bar clasp is
used here (see techniques
14 and 16)

2 open jump rings (see
technique 17)

Basic tool kit

This choker can be made with any selection of beads or pearls, provided the colors work well together. It can also be made as a bracelet by using a shorter length of chain. The most suitable type of chain to use is a rope chain, since it allows the maximum number of beads to be attached.

1 Decide on the length of chain you require. The typical length for a choker is 16in (40cm); if you have decided to make a bracelet, the length is usually 7in (18cm). Once you have measured the correct length, cut through the chain with end or side cutters (see technique 2).



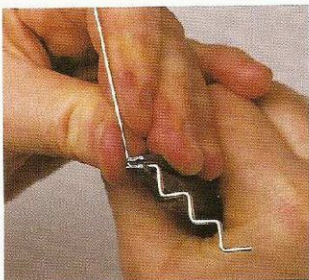
2 Slip an open jump ring through the last two links of the rope chain and then through the ring of the catch. Close the jump ring carefully (see technique 17).

Uses technique flaps
2, 6, 8, 10, 11, 14,
15, 16, and 17

BENDING



4 Make a loose spiral by holding the very end of the annealed wire in a pair of round-nose pliers and wrapping the wire around them with your fingers. You should not need to move the pliers along the wire when you do this, which eliminates unnecessary marking of fire wire.



5 Use flat or needle-nose pliers to create sharp bends and angles. Grip the annealed metal firmly in the pliers, and push your thumb hard against the edge of the pliers to fold the metal as tightly around as possible.

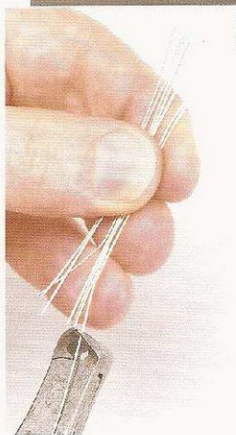
Curving Thick Wire and Rod



1 When working with thick wire and rod, always allow extra length to provide leverage. Make large circles and bangles by wrapping the annealed rod around a bangle mandrel or other suitably shaped tool. Use your hands to wrap the wire as tightly as possible before cutting off the excess.



3 Solder the jump ring shut, supporting it in a pair of spring tweezers so the chain hangs away from the flame (see technique 11). Attach the clasp to the other end of the chain in the same way, then pickle and rinse (see technique 10). Polish the chain now; it will not be possible once the beads are attached (see technique 6).



4 Decide how many beads you want to attach, and cut this number of strips of round wire, each 2in (5cm) long, using end or side cutters (see technique 2). One hundred beads and strips are used here. If you do not have the correct size of round wire, use the drawing-down technique (see technique 15).

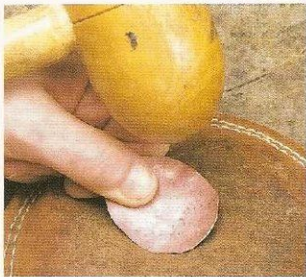


2 Use a vise if you need extra leverage for very thick rod. Hold one end of the rod in the vise, and use large pliers and hammers to help you shape the wire as required.

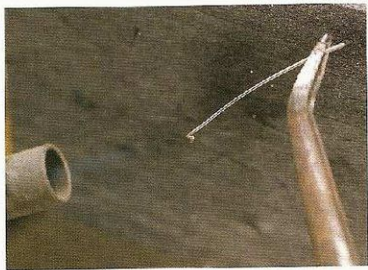
Curving Sheet Metal



1 Use a steel swage block together with a steel or wooden punch to create controlled curves in sheet metal. If you want to make a tight curve, start with the shallowest hollow in the block and continue with progressively smaller depressions until you achieve the correct shape.



2 Use a sandbag and a wooden mallet with a rounded end to contour sheet metal into shallow domed shapes. The metal should be annealed, then placed face down on the bag and hammered in a circular pattern that radiates out from the central point. This prevents the metal from rippling around the edges.

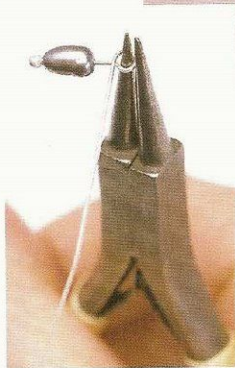


5 Hold one of the strips of wire in a pair of tweezers and dip one end of it into some borax (see technique 11). Light your torch and heat the end of the wire with a fine flame, directing the flame upward. Heat the wire until the tip melts into a ball; this will roll up the wire a little. Withdraw the flame quickly. Repeat with all the remaining strips, then pickle them in a small glass dish immersed in the pickle bowl (see technique 10). This saves time taking them out one by one from the pickle with tweezers.



6 Slip a bead onto each piece of wire.

7 Make a loop in the wire a little way from the bead by levering the wire around a pair of round-nose pliers (see technique 8).



8 Thread the loop through any link in the chain.

DOMING

DOMING

This technique is used to create hollow dome shapes from sheet metal using a doming block, lead cake, or sandbag and a set of wooden or steel punches. Steel punches are more expensive than wooden ones, but make the job of doming a good deal quicker. If you use a doming block, you can create perfect spherical shapes, such as hollow beads. Hollow beads are widely available readymade, but they are usually very thin and you may not always be able to find beads that are suitable for your designs. It is more difficult to achieve a perfect sphere using a lead cake or sandbag, but you can create sculptural curves and 3D effects with irregular shaped pieces of metal.

Some metals are easier to come than others. Copper and silver are more malleable than brass and nickel. Gold is easy to work with if you are able to invest in the raw material.

You will need to anneal the metal regularly during the doming process (see technique 7).



9 Hold the loop gently in the pliers and wrap the long end of the wire around, back toward the bead.



10 Snip off the excess wire as close to the bead as possible with end cutters (see technique 7).



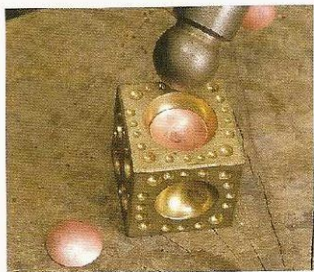
11 Continue to attach beads to the chain, spreading the different colors randomly along its length until you have a pleasing effect.

PROJECT 10

Using a Doming Block

Always start with a depression in the doming block that is closest in size to, but no smaller than, the circles of metal you wish to dome. If the metal is very thick or difficult to hammer, start in a shallower depression and gradually increase the curvature. Use a punch that fits the depression tightly, allowing for the thickness of the metal.

Remember to anneal the metal regularly when it becomes too hard to work with (see technique 7).



1 Place a circle of metal over the hole in the doming block, and with a large flat-faced hammer, strike the doming punch firmly once or twice on the metal. The metal will shrink into the hole and form a shallow dome.



2 Continue with this process, using progressively smaller depressions and smaller punches. If you use a punch that is too small, you will flatten the bottom of your dome. If you try to miss out any stages, you will create a rippled effect around the edge of the dome.

TECHNIQUE 9

Filigree necklace

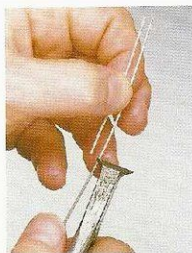
You will need

- 30 small faceted beads
 - 10 large faceted beads
 - 48in (120cm) of $\frac{1}{8}$ in (0.8mm) round silver wire for panels A and B
 - 10 round solid silver balls, $\frac{1}{8}$ in (1.5mm) in diameter, for panel B (see technique 12)
 - 30 closed silver jump rings for panels B and C (see technique 17)
 - 5 flat-bottomed solid silver balls, $\frac{1}{4}$ in (3mm) in diameter, for panel C (see technique 12)
 - 15ft (4.6m) of $\frac{1}{4}$ in (0.5mm) round silver wire to join the elements together
- Basic tool kit
Rolling mill or plannishing hammer
Bristle brush

Uses technique flaps
1, 2, 4, 6, 7, 8, 10,
11, 12, and 17

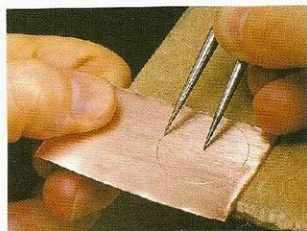
This delicate necklace is made from three silver filigree panels interspersed with faceted glass beads in assorted sizes and colors. The finished necklace simply slips over the head, so no clasp and catch is required.

1 Panel A is made from 30in (75cm) of the round silver wire. Flatten it slightly by rolling it through a rolling mill. Alternatively, hammer the wire on a flat plate with a plannishing hammer, or use ordinary round wire. Anneal the wire before making the filigree shapes (see technique 7). You need to make five of this panel. Each panel is made up of the following strips of wire: one $2\frac{1}{4}$ in (55mm) strip, one $1\frac{1}{2}$ in (37mm) strip, and two $\frac{1}{2}$ in (25mm) strips.

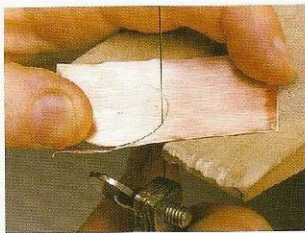


2 Set your dividers to the required length against a steel ruler and carefully mark this length onto the wire (see technique 1). Cut the first strip of wire with end cutters (see technique 2). Using the first strip as a guide, snip the required number of wire strips to make five panel A pieces.

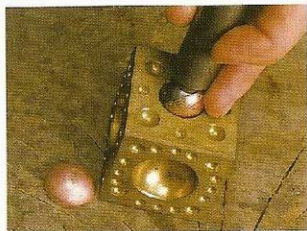
Making a Hollow Bead



1 First, mark two circles with your dividers on a piece of metal that is $\frac{3}{8}$ – $\frac{1}{2}$ in (0.8–1.5mm) thick (see technique 1). A thicker metal will be hard to stretch, and a thinner material will result in very thin walls. The diameter of the circles should be approximately a third wider than you want the finished bead to be.



2 Saw out the circles on the waste side of the line (see technique 2). If necessary, file up to the line (see technique 4). Anneal both circles, and when cool, pickle and rinse them (see techniques 7 and 10).



3 Dome both circles of metal in the usual way until they are the correct size. If you wish to create a perfect sphere, select a smaller hole in the doming block, turn the come on its side, and strike the punch several times as you turn the dome with your middle finger. This will stretch the edges of the metal around the punch to achieve a rounder bead. The marks around the edges of the metal can be filed off later.



6 Once you have bent all the wires into shape, assemble them on a charcoal block in the pattern shown. Paint a thin borax where each piece touches another, and put a tiny portion of hard solder on each seam with the tip of your brush (see technique 11). Warm gently with a tiny flame, moving from one seam to the next. Do not attempt to solder all the seams at the same time, because the wire is so fine it will easily melt. Pickle and polish using a bristle brush (see techniques 10 and 6). Complete all five panels.



3 Bend the longer strips of wire into 5-shaped spirals (see technique 8). Hold one end of the wire firmly in a pair of round-nose pliers, and coil the long end gently around to make a spiral.



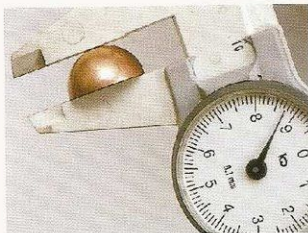
4 Do the same with the other end in the opposite direction, and form a gentle curve in the central section with your fingers.



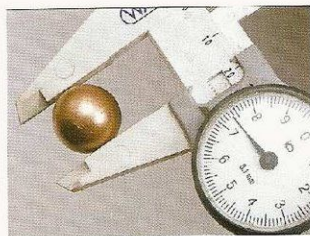
5 Bend the smallest strips of wire into heart-shaped spirals by curling each end in toward the other.



4 When both domes are as deep as you want them to be and evenly sized, file off any excess metal from the bottom edges using a large flat file (see technique 4).

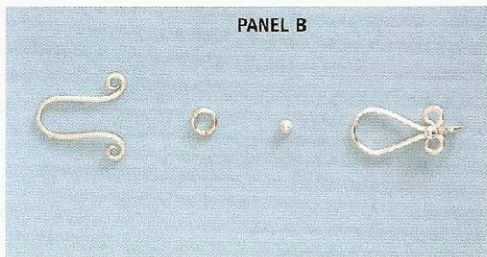


5 Check the measurements of both domes to make sure they are identical. First, measure how deep they are. The easiest way to do this is to use a slicing caliper.

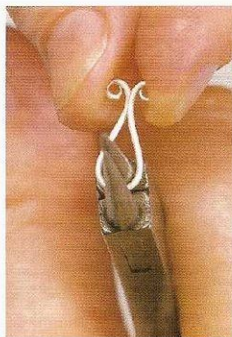
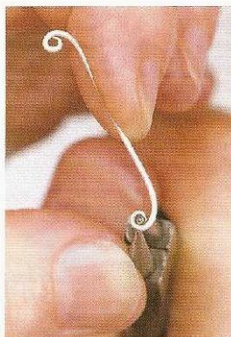


6 Then measure across the diameter of the domes. If making a perfectly round sphere, this should be exactly twice the first measurement.

7 Each panel B is made from one 2½-in (40mm) strip of the remaining round silver wire, one closed jump ring, and one small round solid ball. Remember to anneal the wire before cutting it to length (see technique 7). You need enough pieces to make ten of this panel.



8 File a taper on each end of the wire strips (see technique 4). Hold one end of a wire strip in a pair of round-nose pliers and wrap the rest of the wire around with your finger to create a small curl. (see technique 8). Do the same at the other end of the wire; the curls should face in the same direction. Curl all ten wire strips.



9 Hold each wire strip in the middle with round-nose pliers and ease the ends together until they meet.



10 Solder the seam where the two ends meet and solder a tiny ball on top (see technique 11). Hold the piece upside-down in a pair of spring tweezers and solder on the closed jump ring with the seam pointing in toward the ball. Complete all ten panels, then pickle and polish them (see techniques 10 and 6).



7 Put the two halves together to create a hollow bead. Once you are happy with the shape, it is advisable to drill a hole in the bead to allow air to escape when soldering the two pieces together. A central hole will also be useful for assembly or stringing later.



8 To find the center for the drilled hole, open your dividers to roughly half the diameter. Place the dome on a flat surface and lean the dividers against the edge. Mark several arcs across the top of the dome, moving the dividers to different positions around the edge of the dome. The point where the arcs overlap is the center. Mark this position with a scribe.

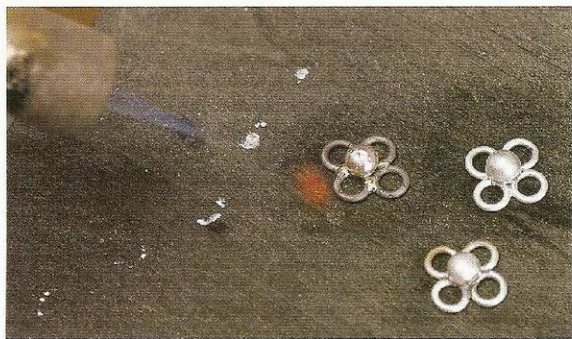


9 Lap a center punch on the point where you want to drill the hole. If you place the dome on the end of a punch, you will not squash its base.

11 Each panel C is made from four closed jump rings and one flat-bottomed ball. You need five of this panel.

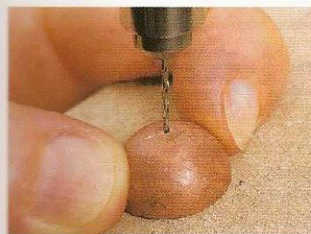


12 Position the jump rings in groups of four with the seams all facing inward. Paint a thin line of borax where they touch and position a tiny pallion of hard solder at each seam (see technique 11).



13 Solder all the seams with a gentle flame, nudging the rings together with fine tweezers if they move apart. Solder the ball in the middle of each panel, flat side down, with easy solder. Pickle and polish each piece (see techniques 10 and 6).

14 Next, assemble the chain. Snip the long strip of round wire into 3in (8cm) lengths, in the same way as before (see step 2). Do not anneal the wire.



10 Drill a hole in the center of each dome (see technique 3).



11 The easiest way to solder the two halves of the bead together is to use sweat soldering (see technique 11). Place each upturned dome on a soldering mat or wig. Paint creamy borax around the edge and position pallions of solder at regular intervals.



12 Heat the domes one at a time until the solder just starts to flow, then immediately remove the flame. This process is known as sweating on the solder.

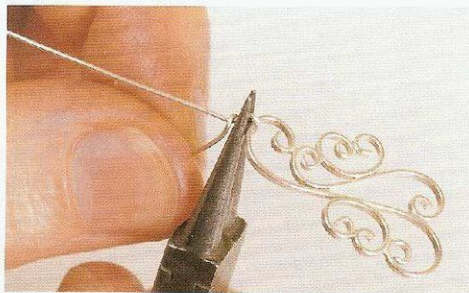
15 Lay out your components in the correct sequence on a piece of paper. The sequence used here is: small bead, large bead, small bead, panel A, small bead, large bead, small bead, panel B, small bead, panel C, small bead, panel B, then repeat the sequence from the beginning.



16 Make a right-angled bend about 1in (3cm) from the end of one of the strips of wire using round-nose pliers. Fold the wire firmly over the edge of the pliers with your finger (see technique 8).



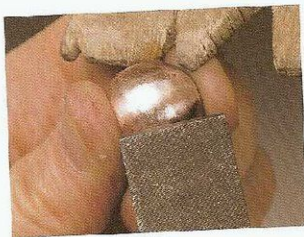
17 Hold the wire in the round-nose pliers slightly to one side of the bend, and cross the shorter end of the wire over the longer end to form a loop.



18 Slip the first panel in the sequence onto the loop; here we have started with panel A. Hold the loop gently with round-nose pliers and twist the short end of the wire around the long end a couple of times. Snip off the remaining short end of the wire with end cutters (see technique 2).



13 Place the two halves together and balance them on a soldering wig, which will allow heat to move around the domes evenly. Apply borax to the seam again. Make sure they are sitting exactly on top of one another. Heat both domes evenly so they reach soldering temperature at the same time. When the solder starts to flow, the domes will settle down onto each other and the seam will seal.



14 Let the sphere cool and then pickle (see technique 10). Shake out any excess pickle and rinse. File off excess solder and any doming marks (see technique 4). When filing, make sure you turn the bead evenly.



15 Emery the bead either by hand using flat buff sticks, or with a pendant drill (see technique 5). The bead can then be polished prior to assembly (see technique 6).

19 Thread the first bead onto the wire. Make a loop a little way from the bead by holding the wire in a pair of round-nose pliers and bending it at a right angle (see technique 8). Hold the wire in the pliers just past the right-angled bend and lever the other end around with your fingers to form a loop.



20 If the next piece in the sequence is another bead, close the loop by twisting the long end of the wire a few times around the short end, then cut off the excess wire with end cutters (see technique 2).



22 Make a loop at the other end of the bead in the same way as before (see step 19). Check whether the next piece in the sequence is a bead or a panel. If it is another bead, close the loop (see step 20).



21 When adding the next bead, make a loop in a new strip of wire in the same way as before (see steps 16 and 17) and thread it onto the chain. Thread on the next bead. Holding the loop in a pair of round-nose pliers, wrap the end of the wire around itself toward the bead. Snip off the excess wire with end cutters (see technique 2).



23 If the next piece in the sequence is a panel, however, slip the panel onto the loop before closing it. Continue in this way, adding each of the pieces in the correct sequence. Finish by joining the last piece of the necklace to the first piece.

Using a Lead Cake or Sandbag

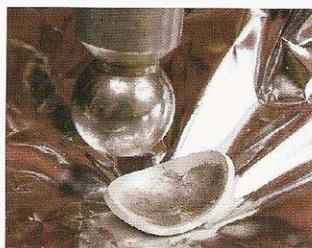
Hollow 3D forms can be created using a lead cake or sandbag and steel or wooden doming punches. Both are used in a similar way to a doming block. A lead cake will allow you to make controlled shapes. It is soft enough to give under pressure from a hammer blow, but hard enough to hold the shape you are forming.

Lead has a very low melting temperature, and when heated, can eat into the surface of other metals. Always use a barrier between the lead and your work to prevent direct contact; an opened-out foil chip packet is ideal.

Safety note: Lead is highly toxic and must be handled with care, so avoid touching the lead and always wash hands thoroughly after use.



1 First, mark the shape you want onto the metal (see technique 1). Add a small allowance around the edge. As this technique produces soft cushion shapes, it is most successful if you use designs that have rounded rather than sharp edges, for example, ovals, hearts, circles, crescents, and teardrops. Saw out the shape and anneal the metal (see techniques 2 and 7).



2 Select a doming punch that is a little smaller than the curve you want to create. Place the metal face down over the protective foil on top of the lead cake. Lightly hammer the end of the punch repeatedly while moving it slowly across the surface of the metal.

Resin heart pendant

You will need

$\frac{1}{4}$ in (3cm) square of
 $\frac{1}{16}$ in (1mm) silver sheet
 $2\frac{1}{4}$ x $\frac{1}{4}$ in (7cm x 5mm) of
 $\frac{1}{16}$ in (1mm) silver sheet
 $\frac{3}{4}$ x $\frac{1}{8}$ in (2 x 1cm) of
 $\frac{1}{16}$ in (0.5mm) silver sheet
 40 solid silver balls, $\frac{1}{16}$ in
 (2mm) in diameter (see
 technique 12)
 Snake chain with end caps
 2 open jump rings (see
 technique 17)
 A clasp and catch – a
 silver hook clasp is used
 here (see technique 14)
 Basic tool kit
 Clear casting resin and
 catalyst, and resin colors
 Mixing pots, popsicle
 sticks, and plastic gloves
 Glitter glue pen
 Polish suitable for plastics

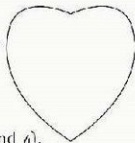
Uses technique flaps

1, 2, 4, 5, 6, 7, 8,
10, 11, 12, 14,
and 17

This stylish design uses clear casting resin (available from hobby and art supply stores) that has been slightly colored with transparent pigments. The chain is available ready-made, and any alternative style could be used.



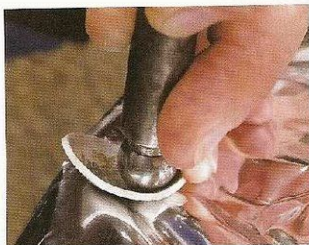
1 Transfer the heart shape onto the square of silver (use method 1, technique 2). Saw out the heart, then file around the edges with a flat hand file (see techniques 2 and 4). Emery the sides, front, and back with a flat buff stick (see technique 5).



2 File the long strip of silver sheet along both long edges to make sure they are straight (see technique 4). Use a flat hand file and take care not to apply excessive pressure at the ends. Saw the strip into two pieces (see technique 2), one $\frac{1}{4}$ in (3cm) long and the other $\frac{1}{4}$ in (4cm). Anneal both pieces ready for bending (see technique 7).



3 This will create smooth overlapping depressions that together begin to form the overall shape.

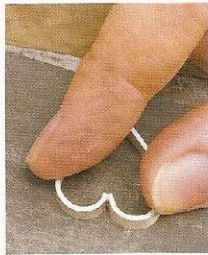
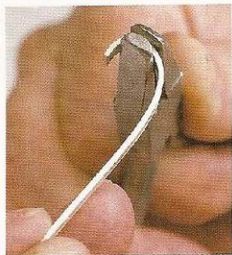


4 Anneal the metal repeatedly, whenever you feel it has become work hardened (see technique 7). Continue with different-sized punches, gradually pushing the metal outward.



5 When the metal bows, remove it from the lead cake and tap it gently on a flat surface with a wooden mallet to level off the base.

3 Grip the end of one of the pieces in a pair of half-round pliers and lever the rest around into a smooth curve with your fingers (see technique 8). Make sure you hold the rounded face of the pliers on the inside of the curve. Do the same with the other strip of wire.



6 Make sure the bottom of the soldered heart is flat by filing it with a flat file and then rubbing it on a flat sheet of emery paper (see techniques 4 and 5).

4 Once you have created two even curves, lay them on a flat surface to see if they make a neat heart shape when placed together. Adjust the shape if necessary. Paint a little borax and place a pallion of hard solder where the two pieces touch, then solder them together (see technique 11).



5 Saw off the excess silver after you have soldered them together (see technique 2). This method is easier than starting with two strips of metal the same length, which would make fitting the seam difficult. File off any excess solder from the seams and use a flat buff stick to remove the file marks (see techniques 4 and 5).



7 Dip the soldered heart in some creamy borax and position it carefully in the middle of the flat heart. Place them on a charcoal block or a wig. Paint a little more borax along the inside of the seam and position pallions of medium solder at regular intervals around the inside edge with the tip of your borax brush (see technique 11). Heat them both evenly. If the pallions move, nudge them back into position with the tip of your tweezers. Allow the solder to flow fully along the seam. There must be no gaps, so add extra solder if necessary. Pickle (see technique 10).

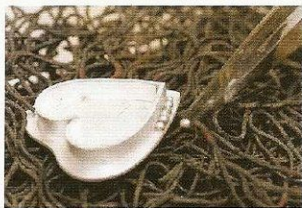


6 Use punches held vertically in a vise (protect them with a pair of vise jaws) to stretch the metal further around the sides and to smooth out an irregular surface.

7 Tap the metal repeatedly with a smooth-faced hammer or a planishing hammer, overlapping the strokes while moving the metal across the punch in tiny circular movements.

8 When you have achieved the shape you want, file the surface until it is smooth, and use burrs in a pendant drill to smooth the convex side (see technique 4). If you don't have a pendant drill, you could leave the hammer marks showing on the inside of the dome or try using a riffler file. These are available specially shaped to reach into awkward places. File the edges of the dome flat with a flat hand file.

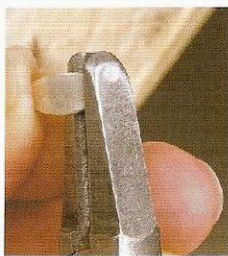
8 Place the heart on a wig or charcoal block. Pick up a ball in a pair of tweezers and dip it in borax. Place the ball on the edge of the heart with the borax side down. Continue with a few more balls. Tuck a tiny pallion of easy solder under each ball (see technique 11). Warm the whole piece; don't just concentrate on the ball area. When the solder starts to flow, be sure to nudge any stray balls back into position. Pickle and rinse (see technique 10).



9 Continue soldering a few balls at a time around the heart. You may wish to paint rouge on the ones you have already soldered to prevent them from moving (see technique 11). Be sure not to get rouge anywhere near the soldering area, since it will prevent the solder from flowing. Pickle and scrub with a brass brush and soap (see technique 10).



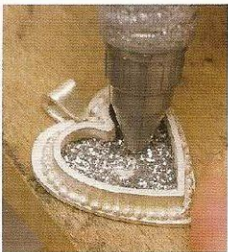
10 Transfer the oval shape onto the remaining piece of silver sheet (use method 1, technique 1). Saw out the oval, then file around the edges with a flat needle file (see techniques 2 and 4).



11 Hold one end of the oval in a pair of half-round pliers and bend it in half with your fingers to form a bail (see technique 8). This may take more than one attempt since small shapes have little leverage; anneal it if it is too hard to bend (see technique 7).



12 Adjust the opening of the bail until it is a tight squeeze over the top edge of the heart. Solder it in position with easy solder (see technique 11). Pickle and clean thoroughly (see technique 10).



13 Next, use the glitter glue pen to cover the base of the heart with glitter. Let it dry.

PICKLING

Metals that have been heated either for annealing or soldering develop a dirty oxidized surface, and the flux used for soldering will have become a hard, glassy layer on the surface. Metals can be cleaned and the flux removed by immersion in a hot solution of caustic liquid. This process is known as pickling.

It is possible to use readymade preparations bought from any jeweler's suppliers. These solutions are commonly known as "safety pickle." An easier option, and one that is more readily available, is to use a solution of alum, which can be bought as a cry powder from pharmacies. You will also need a glass or enamel heat-proof dish with a lid that can be placed on the burner to hold the pickling solution.

Safety note: All pickling solutions, with the exception of alum, are dilute acids. They should therefore be handled with care. Always follow the manufacturer's instructions when mixing and using pickle. Always use brass or plastic tweezers to put work into the solution and to take it out. Do not put hot work straight into the pickle, because it can cause the solution to boil furiously and overflow.



1 To make your own pickling solution, dissolve two heaped teaspoonfuls of powdered alum in half a pint (half a liter) of water. Heat the solution, either by placing it in a heatproof dish on the burner or using a hot plate. Many jewelers use a slow burner that keeps the pickle at an even temperature.



in a pair of spring tweezers so it is easier to isolate the seam. Pickle the ends of the chain by dangling them into the pickle bowl (see technique 10).

14 Slip the snake chain through the bail of the heart. Solder the end caps onto the ends of the chain (see technique 11). Slip a jump ring through each end cap, and attach the clasp and catch to them. Close and solder the jump rings (see techniques 17 and 11). Hold each jump ring

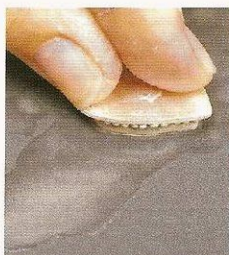
15 Mix the clear casting resin with the catalyst according to the manufacturer's directions. You will only need a very small amount. Safety note: Polyester resins have powerful fumes so use only in a well-ventilated room. Wear disposable gloves to prevent direct contact with the skin because it can be an irritant. Add a couple of drops of translucent color to the resin and mix thoroughly.



16 Place the heart on a flat surface, then use the wooden stick to dribble the colored resin into the center until it is half full. Let it dry overnight to allow any air bubbles to escape.



17 When the first layer is dry, mix a little more resin, but this time do not add any color. Carefully drip the clear resin on top of the colored layer. Be sure to fill it to the top, but do not let any overflow. Let it dry overnight.

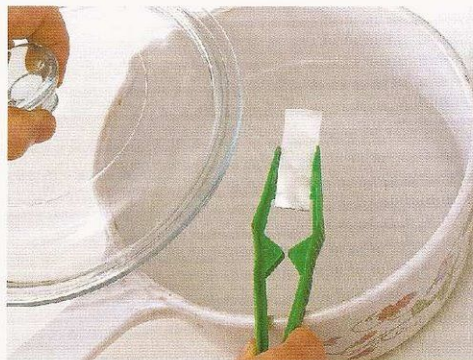


18 When the final layer of resin is dry, rub the surface of the heart on waterproof 250-grit paper (see technique 5). Use a little water on the paper. When the surface is completely flat, rub

it on 600-grit paper, again with a little water. Rinse and then use plastic polish to achieve a sheen on the resin (see technique 6). Use tripoli and rouge to polish the metal heart. Be very careful not to get the chain caught while polishing.



2 Use brass or plastic tweezers to place the work that needs to be cleaned into the hot solution. Never put steel or iron in the pickle; it will create a chemical reaction that will coat everything with a thin copper film.



3 Leave the piece in the solution until all borax and oxides have disappeared. Remove the piece from the solution, again with brass or plastic tweezers, taking care not to splash the pickle, which will burn holes in your clothes. Once items are removed, they should be rinsed thoroughly under a faucet.

Gypsy hoops

You will need

10in (25cm) of $\frac{1}{16}$ in (1.5mm) square silver wire, twisted (see technique 16)

2 silver ear posts and butterflies (see technique 13)

Basic tool kit

$\frac{1}{2}$ in (3cm) diameter round mandrel or doming punch

This is probably the simplest style of earring to make and can be varied in many ways, by using different profiles of wire and by making them larger or smaller. The only limitation on size is how much they weigh, so if you want to make large hoops, use hollow tube wire instead of solid wire.

1 Wrap the wire tightly around the mandrel or doming punch, either by securing the mandrel and the end of the wire in a vise or simply by wrapping it by hand (see technique 8). Using a vise enables you to wrap the wire more tightly and so create a more even, circular shape. The amount of wire recommended in the materials list is more than you need, but the extra length provides leverage and makes the wire easier to bend.

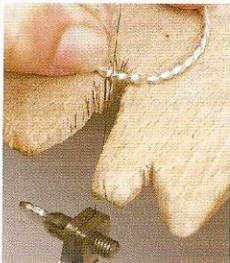


Uses technique 2, 4, 6, 8, 10, 11, 13, 16, and 17

2 Saw through the coil, holding it firmly against the peg in the same way as for jump rings (see techniques 2 and 17). Set your dividers to $\frac{1}{2}$ in (1cm) against a steel ruler and mark this length on both hoops.



3 Saw through the wire on the waste side of the line (see technique 2). Do this on both hoops.



SOLDERING

Soldering is the most common method of joining two or more pieces of metal together. With the exception of aluminum and steel, jewelry metals can be soldered together to create an almost invisible seam. It is one of the most complex techniques you will need to learn, but also one of the most rewarding since no two soldering jobs will be alike, providing you with continual challenges and a lot of satisfaction from a job well done.

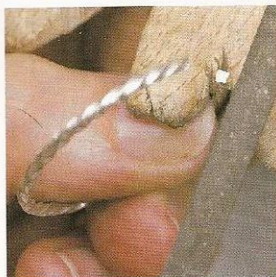
A piece of jewelry may need to be soldered in several stages. To make sure a previous seam does not open when reheated, solder is made in varying melting temperatures. The most frequently used are hard, medium, and easy solder. Enameling solder is only used if the piece is to be enameled, and extra-easy solder is most often used for repairs. Their names refer to their melting temperature, not to their strength. In a complex piece, start with hard solder, which has a high melting temperature, and finish with easy solder, which has a low melting temperature. All solders melt at a lower temperature than the metal you are working on. Another way to prevent previous seams from melting is to coat them carefully with rouge powder mixed with denatured alcohol.

As metals are heated, they oxidize and become dirty, inhibiting the flow of solder. Flux is used to coat the seam to keep it clean as it is heated. Borax is the most commonly used flux.

The basic soldering method outlined here is used in most soldering situations. There will be innumerable variations, in the balancing of a seam, and the complexity and number of seams to be soldered, but the basic steps will always apply. Sweat soldering is most often used where large surface areas need to be joined face to face; stick feeding is traditionally used for silversmithing, but it is also useful if you have very long, continuous seams to solder. You do need a very steady hand for this method, so it takes a lot of practice. Once mastered, however, it will save you a lot of time and is very satisfying to do.

It is good practice to hold the soldering torch in the opposite hand to your writing hand. This may feel unnatural at first, but it will allow you to use the more adept hand for precise movements of the piece being soldered. A turntable will allow you to move work around as you solder, which is very useful for beads and larger items.

4 Next, taking each hoop in turn, align the two ends with your fingers. If you are using thicker wire, you may need to use pliers for this. File each end flat with a flat needle file, then round off the edges so they are smooth and snag-free (see technique 4).



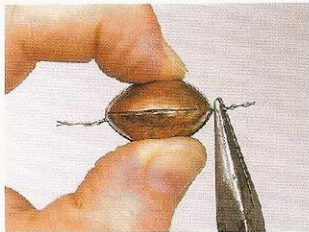
5 Balance each hoop in an upright position on a soldering mat using spring tweezers. Use another pair of spring tweezers to balance the post on the end of the hoop. Borax the seam between the two and place a pallion of hard solder where the post touches the end of the hoop (see technique 11). Heat them both; the hoop will need a little more heat than the post. Let the solder flow and then remove the flame. Pickle and rinse, then polish with tripoli and rouge (see techniques 10 and 6).



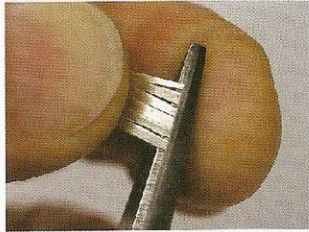
Preparation for Soldering



1 Careful preparation is the secret to successful soldering. Make sure all seams are tight fitting; solder will not fill gaps or holes. All seams should be clean and free from grease. This is most easily done by lightly filing or emerying the surface to be soldered (see techniques 4 and 5).



2 Support seams that may move when heated either by holding them in place with binding wire or by using tweezers or cotter pins. This process is called balancing, and figuring out how you are going to balance a soldering job will usually be the first step. It is useful to keep small pieces of charcoal and broken soldering mats to help you balance awkward pieces.



3 Flatten your solder by hammering it on a flat plate or by rolling it through a rolling mill. It should be thin enough to cut with a pair of snips. Rub the surface with coarse emery paper to remove any dirt or grease. Cut the solder into five or six strips, then cut across these to create tiny pieces. These are known as pallions. Hold your index finger behind the snips to prevent the pallions from scattering.

Pearl-drop clusters

You will need

40 small drilled beads in assorted colors

4ft (120cm) of $\frac{1}{16}$ in

(0.5mm) round silver wire

2 figure-eight silver ear hooks (see technique 13)

2 open and 2 closed jump rings (see technique 17)

Basic tool kit

These pretty earrings are made using any combination of drilled stones or beads. Here we have used gray and cream freshwater pearls and turquoise.



1 Solder a closed jump ring to the bottom of each of the figure-eight ear hooks (see technique 10). Hold the ear hook upside-down on a pair of spring tweezers. Balance the closed jump ring in another pair of spring tweezers so the seam in the jump ring touches the ear hook. Paint a little borax on the seam and apply one pallion of hard solder.

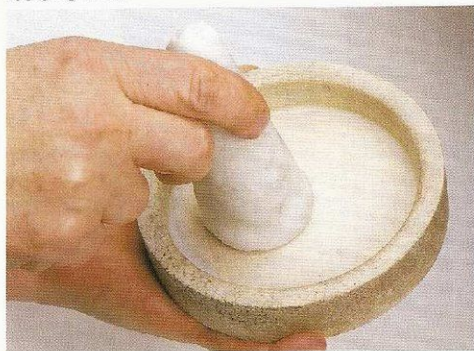


Heat the seam very carefully until the solder flows. Repeat with the other ear hook, then pickle and polish them both (see techniques 10 and 6).

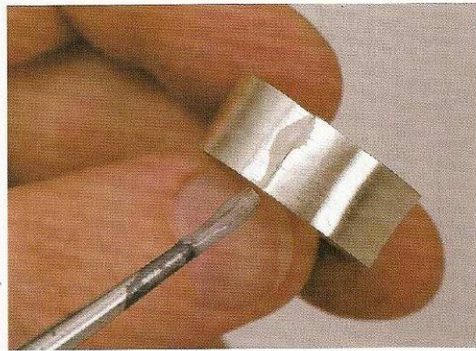
Uses technique flaps

1, 2, 6, 8, 10, 13, and 17

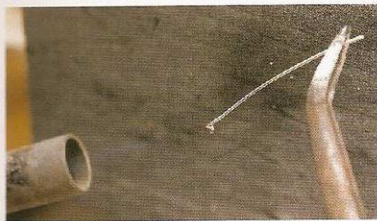
Applying Borax



1 Prepare the flux by grinding the cone of borax with a little water in the borax dish, until it achieves the required consistency. Use a borax mixture that is the consistency of milk for average soldering jobs. For sweat soldering and slick feeding, use a creamier borax. A thin borax is good for very fine soldering of delicate pieces.

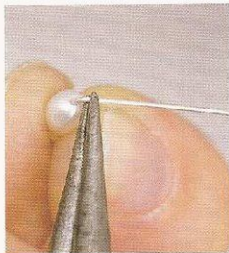


2 When you are ready to start soldering, paint borax on both sides of the seam. The solder will flow wherever the borax is, so take care when you apply it.



2 Set your dividers to $\frac{1}{4}$ in (3cm), and mark and cut a strip of wire to this length with end cutters (see techniques 1 and 2). Using the first strip of wire as a guide, cut nine more wire strips. Hold a strip of wire in a pair of spring tweezers and dip one end in borax. Heat the end of the wire with a fine flame until it starts to melt and a bead forms. Withdraw the flame as soon as the bead is evenly formed. Repeat with the remaining strips of wire and pickle them all (see technique 10).

3 Decide on the color sequence in which you want the beads to hang; here we have chosen a cream pearl to hang at the bottom of the clusters, followed by a turquoise bead, then a gray pearl, and finally another cream pearl. Thread the bead you want to hang at the bottom of the clusters onto each of the ten wires.



4 Holding each bead between your finger and thumb, use needle- or round-nose pliers to make a right-angle bend in each wire as close to the bead as possible (see technique 8).

5 Trim off the wires about $\frac{1}{8}$ in (5mm) from the bend with end cutters (see technique 2).



6 Make a small loop in each wire by gripping the very end in a pair of round-nose pliers and bending the wire back toward the bead.

Basic Soldering



1 Use a pair of fine tweezers or the lip of your borax brush to apply the solder pallions to the seam. Solder should always sit evenly over the seam.



2 Warm the whole piece with a very soft flame. The borax will boil and settle down. You may need to reposition your pallions at this point. For this reason, some jewelers prefer to heat the piece a little before putting on solder.

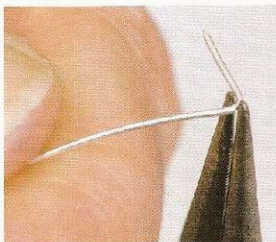


3 Turn off any bright overhead lights to help you see the color of the metal as it heats. Solder will always flow toward the hottest spot, so it is important to heat both sides of the seam evenly. First, heat the whole piece a little using a stronger flame. Watch the color of the metal change. Build up the heat around the seam until both sides glow a bright red. The solder will roll into a ball at this point. Then, when the metal starts to glow bright orange, the solder will flow along the seam in a silvery stream. Remove the flame immediately after the solder has run or your piece may melt. Let the seam cool and then pickle to remove the borax and oxidation (see technique 10). Rinse thoroughly under a faucet.

7 When you have finished this process with each of the pieces, you should have ten beaded wires that look like this.



8 Cut the remaining wire into $\frac{1}{4}$ in (3cm) lengths (as described in step 2, but do not solder the ends). Make a right-angle bend in each one, about $\frac{1}{4}$ in (5mm) from one end, using needle- or round-nose pliers (see technique 8).



9 Slip the next bead in your color sequence onto the long ends of ten of the wires and make a neat loop with the short bent end, using the very tip of the pliers to bend the wire around.



10 Make a right-angle bend in the wire on the other side of the bead, as close to the bead as possible (see step 4). Trim off the excess wire about $\frac{1}{4}$ in (5mm) from the bend with a pair of end cutters (see technique 2).

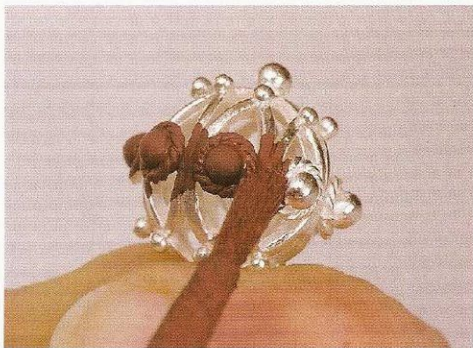


11 Make another loop in the wire by gripping the end in a pair of round-nose pliers and bending it back toward the bead. Do not close the loop completely.

Applying Rouge



1 In a complex piece, if you are worried that a previously soldered seam may come undone when you reheat it, use rouge. Mix a little rouge powder with a dribble of denatured alcohol until it is creamy.

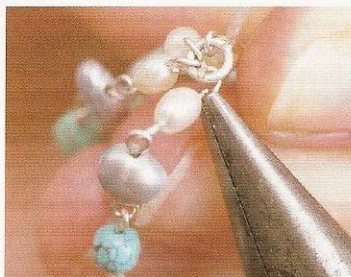


2 Paint the rouge mixture onto any solder seam that you are worried may come apart. Always use a separate brush for rouge and for borax. The grease in the rouge prevents the solder from flowing, so you should use it with care. When you have finished soldering, pickle as usual and remove the rouge with detergent and a brush.

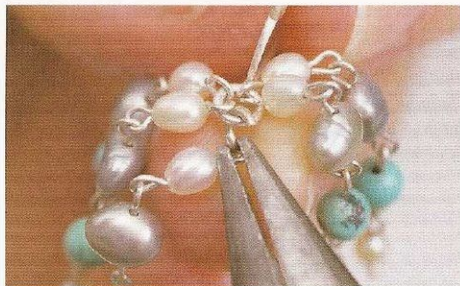
12 Thread on one of the drops that you made to hang from the bottom of the clusters and then close the loop.



13 Repeat this process with the next two beads in the color sequence. You should now have ten strands of four beads each.



14 Attach four beaded strands to each of the jump rings on the ear hooks. Simply open the top loop of each strand with a pair of pliers until it is wide enough to allow the jump ring to slip on and then close the loop again.



15 Attach an open jump ring to the top loop of both remaining strands, and holding each open ring in a pair of needle-nose pliers, slip it through the closed jump ring on the bottom of the ear hooks. Position these strands centrally between the strands that have already been attached; they will hang a little lower than the others. Use another pair of flat pliers to close the jump rings carefully (see technique 17).

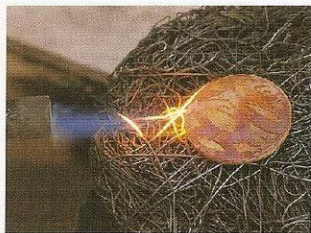
Sweat Soldering



1 Warm both surfaces a little, then paint borax on both pieces. Position pallions of solder at regular intervals over both surfaces. This will usually be the back of the top piece and the front of the bottom piece. If you want to solder a pierced-out pattern onto a back plate, as here, apply solder only to the back of the pierced section to prevent solder from flowing all over the bottom plate.



2 Heat the pieces separately until the solder starts to flow. Remove the flame immediately; this is called sweating the solder on. Let both pieces cool, then position them together, binding them if necessary.



3 Now heat the whole piece evenly. Use a wig to help you heat underneath the item, so both sections reach the same temperature simultaneously. When the metal glows bright orange, the solder will flow between them and create a strong seam.

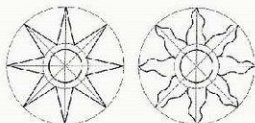
Stone-set earrings

You will need

| |
|---|
| Two $\frac{1}{8}$ in (8mm) diameter round flat-back cabochon stones |
| $\frac{1}{2}$ in (5cm) square of $\frac{1}{16}$ in (1mm) silver sheet |
| $1\frac{1}{2}$ x $\frac{1}{8}$ in (3 x 1cm) of $\frac{1}{16}$ in (0.4mm) silver sheet |
| 2 silver ear posts and butterflies (see technique 13) |
| Basic tool kit |
| Stone-setting tool |
| Ring clamp (optional) |
| Burnisher |

These earrings use the radiating rays of the sun to display a cabochon stone to stunning effect. Any stone can be used, but amber or citrine work particularly well because they are transparent and yellow or gold in color.

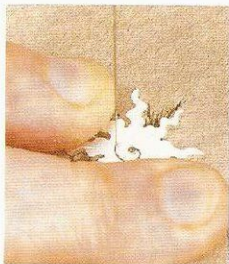
1 Mark two of each design on the square of silver sheet (see technique 1). Use a center punch to mark the center of each sun, then draw three concentric circles around each center point (use the templates below to set your dividers to the required radius for each circle). Use method 3 to mark the points around the outer two circles where the rays start and end; push the point of your dividers through the center of the templates to position them accurately on the metal. Draw the straight and wiggly lines with a scribe and ruler.



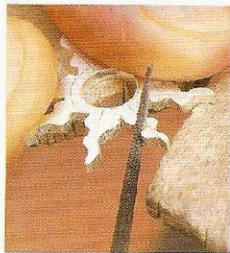
Uses technique flaps

1, 2, 3, 4, 5, 6, 10, 11, 13, and 20

2 Saw around each sun with a fine $\frac{1}{16}$ or $\frac{1}{8}$ blade; refer to technique 2 to achieve accurate sawing and acute inside angles. Take care not to go over the lines. Drill a small hole in the center of each sun (see technique 3), then saw out the central hole, taking care not to wander over the line.



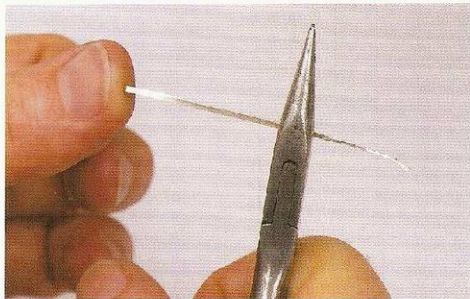
3 File inside the central holes with a round hand file so they are perfectly round (see technique 4). Turn the suns over and work from the back as well as the front to avoid a lopsided result. File the indented sections of the wiggly rays with a round needle file up to the central straight lines.



Stick Feeding



1 Prepare the solder by flattening it and cleaning it with emery paper as usual. Wherever possible, use hard solder, which flows better. Cut long, thin strips of solder with a pair of snips.



2 Straighten the strips of solder with a pair of pliers.



4 Continue filing, using the round needle file at an angle to "sculpt" the wiggly rays a little, so the edges are more rounded. Use a flat needle file to round the tips of each ray so they are no longer sharp to the touch.



5 File the straight-rayed suns with a safety-back needle file, held at an angle across the top of each ray, to create a more three-dimensional look. Use a half-round file to smooth between each pair of rays in toward the inner circle. Then file the tips of the rays with a flat needle file so they are no longer sharp. Emery each sun thoroughly to remove all file marks, both back and front (see technique 5). Use a flat buff stick on the back but not on the front, because it will not allow access to the smaller areas. Either use a split pin or wrap the different grits of paper around a suitably shaped needle file.



3 Coat the strips in borax and hold them in a pair of heatproof tweezers at a slight angle that will allow you to touch the seam at exactly the right point simply by lowering your hand toward the work. Prepare the seam in the usual way, using a slightly thicker borax, which will encourage the solder to flow a long way. Use your writing hand to hold the solder in the insulated tweezers, and rest your arm against the bench to steady it.

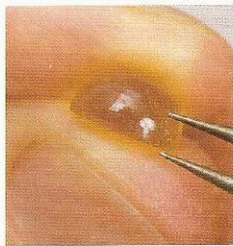


4 Heat the work evenly. When the metal reaches soldering temperature, touch the solder to the end of seam. The solder should flow along the seam in a continuous stream. Use the heat of the flame to pull the solder along the seam. If the solder sticks, you haven't heated the piece enough. Reapply solder where the solder seam has stopped flowing. The secret of stick feeding is in the timing of when to apply the solder stick. Do not be tempted to heat the solder stick.

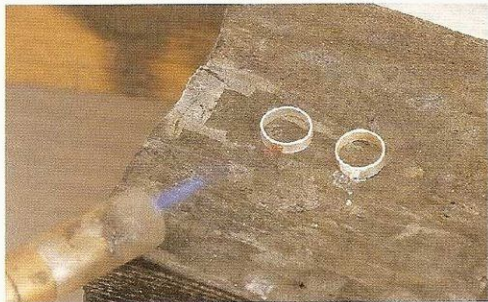
6 The two pairs of suns are now ready to be sweat soldered together (see technique 11). Paint borax on the reverse of one of the wiggly suns and the front of a straight-rayed sun. Position pallions of hard solder on the central area of the wiggly sun and sweat solder them on.



8 Use your dividers to measure how deep the bezel setting for the stone should be, and make a setting for each stone from the thin silver (see technique 20).



7 Place the wiggly sun solder side down on top of the straight-rayed sun, making sure they are central and that the rays of the suns alternate. Place the pair of suns on a wig, because it will allow more even heating of the two pieces. Heat both pieces evenly, so the top and bottom suns come to soldering temperature at the same time. That way you can be sure the solder will flow between the two pieces. Repeat with the remaining pair of suns. Pickle both earrings and scrub with a brass brush and soap (see technique 10).



9 Paint borax on the seam of each bezel and place a single pallion of hard solder over each seam. Use a tiny flame because they are very easy to melt. Solder them shut (see technique 11). Pickle each circle and remove any excess solder with a flat needle file (see techniques 10 and 4). Adjust the shape of each setting until you have a neat circle and check the size again by inserting the stone. Rub the top and bottom of each circle on a flat hand file to make them perfectly flat.

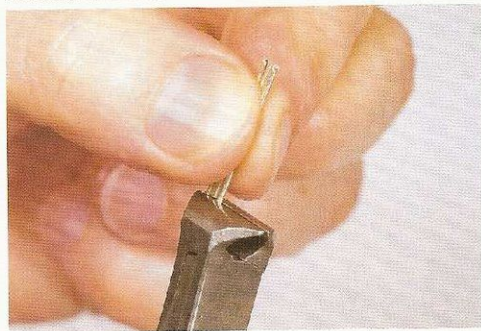
MAKING SOLID BALLS

Tiny balls of gold or silver can be used to embellish jewelry. The simple methods outlined here will allow you use silver as well as gold, and to make balls of varying sizes to decorate your jewelry pieces. Although it is possible to use base metals to make balls, you will achieve better results with precious metals. Make a batch of balls at one time, then pickle them and rinse (see technique 10). You can then store them in small compartments ready to use.

Use silver or gold wire. Using wire rather than sheet makes it easier to cut pieces of uniform length, and thus make identical-sized balls. It does not matter how thick the wire is, provided you can cut it with end cutters.

Whether you choose to make perfectly round balls or slightly flattened ones will depend on your design. Flat-bottomed balls are easier to solder onto jewelry pieces.

Flat-bottomed Balls



1 Cut pieces of wire with end cutters (see technique 2). It is a good idea to experiment with different lengths, until you find the size you require for a particular job. Set a pair of dividers to the required length against a steel ruler and make a note of the measurement for future reference. Cut as many lengths of wire as you need; it is a good idea to make extra, since the balls tend to roll away.

10 Dip the bottom of one of the circles in borax, then position it precisely in the center of a sun. Place four pallions of medium solder on the inside of the circle, then place the sun on a wig. Solder the circle carefully onto the sun (see technique 11). Pickle and scrub with a brass brush and soap (see technique 10). Repeat with the remaining circle and sun.



11 Solder an ear post in the center of one of the pointed rays and a little above the open hole of one sun. Support the ear post in a pair of spring tweezers and use easy solder (see technique 11). Repeat with the other sun. Pickle and scrub with a brass brush and soap (see technique 10).

12 Now you are ready to set the stones (see technique 20). It is important to remember that the ear post is extremely vulnerable during this process, so either hold the earrings in a ring clamp or position them on your peg so the post is protected in a slot in the wood. Make sure you push the bezel evenly over the stone.

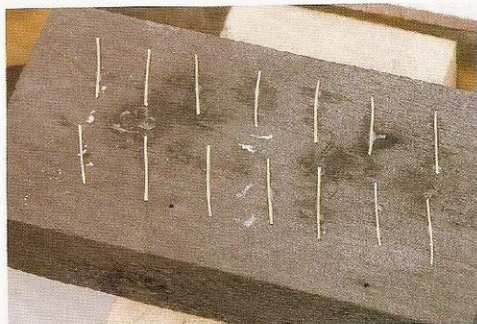


13 File off any bumps around the setting with a three-square or safety-back needle file (see technique 4). Take care not to file either the stone or the rays of the sun. Use a burnisher to smooth out the file marks (see technique 20). Finally, polish the suns with tripoli and rouge, then clean

thoroughly with detergent to remove any scraps of polish from around the stones (see technique 6).



2 Mix a thin borax solution by grinding the borax cone in the borax dish with a little water until it becomes milky in consistency. Immerse the wires in the borax until they are thoroughly coated.



3 Use tweezers to place the wires on a charcoal block, spacing them evenly apart. Charcoal provides a cleaner surface than most soldering mats.

Filigree earrings

You will need

- 1½ x 2in (3 x 5cm) of ⅛in (1mm) silver sheet
- 4 large closed silver jump rings made from ⅛in (0.9mm) round wire wrapped around a ⅛in (6.5mm) mandrel (see technique 17)
- Four ⅛in (1.5mm) diameter solid silver balls (see technique 12)
- 2 small closed silver jump rings (see technique 17)
- 2 silver figure-eight ear hooks (see technique 13)
- Basic tool kit
- Doming block and round punches
- Bristle brush

These exquisitely detailed filigree balls are suspended from delicate hooks for maximum effect. They are quite light and would also look beautiful in gold.



Uses technique flaps

- 1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, and 17

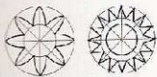


4 Heat the wires, taking care that the force of the flame does not blow them away. Heat them steadily until the metal glows brilliant orange and then melts. When it melts, it will roll into a tiny sphere of molten metal. Remove the flame and let the metal cool.



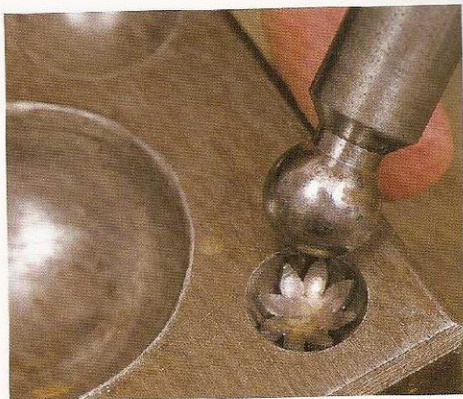
5 Pickle the balls by placing them in a small glass dish in the pickle bowl, and then rinse (see technique 10).

1 Mark four of the curved petal shapes and two of the zigzag shapes on the silver sheet (see technique 1). Use a center punch to mark the center of each design, then draw the concentric circles around each center point (use the templates to set your dividers to the required radius for each circle). Use method 3 to mark the various points around the circles where the rays start and end; push the point of your dividers through the center of the templates to position them accurately on the metal. Draw the straight and curved lines with a scribe and ruler. Saw around the four petal shapes with a fine 4/0 or 6/0 blade (see technique 2).



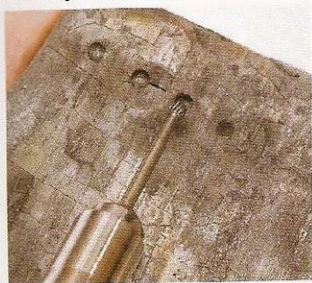
2 File up to the lines around the edges of the petals with a safety-back needle file (see technique 4).

3 Use the same file to sculpt the edges of the petals on one side only, so they are filed at an angle. Use the file to work a groove backward between each pair of petals, almost to the center of the flower.

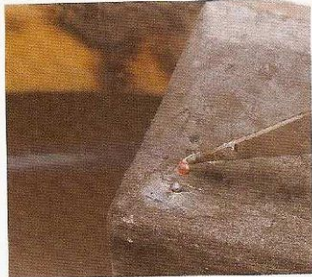


4 Anneal the four flowers, then dome them in a small depression in the doming block (see techniques 7 and 9). Place them in the block with the filed side downward. Use a small doming punch that corresponds in size with the depression in the doming block.

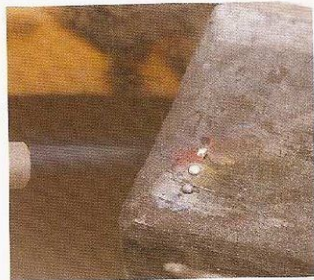
Perfectly Round Balls



1 Select a round steel burr that is the same size as the ball you wish to make. Use the burr either in a pendant drill or a hand drill to make depressions in a charcoal block. Only drill down to half the depth of the burr. Blow away the dust.



2 Prepare the strips of wire the same way as for flat-bottomed balls (see steps 1 and 2). Hold a wire in a pair of insulated tweezers over one of the holes. Direct the flame at the bottom of the wire. When it starts to melt, the ball will travel up the wire; as it does, drop the ball into one of the holes.

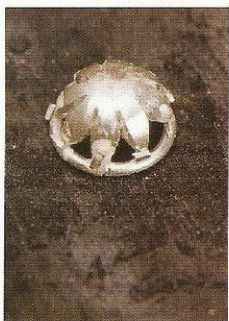


3 Hold the flame over the ball until it is fully formed, then remove the flame and pickle (see technique 10).

5 Continue to dome them until they are cup-shaped and identical. Rub the domed flowers gently on a flat file to level off the very tip of each petal.



6 Take the large closed jump rings and place them on a soldering block. Place a domed flower on top of each ring. Check they are centrally positioned and that a petal tip lines up with the seam in the jump rings. Paint a minute amount of thin borax on each petal tip where it touches the ring, then apply one tiny pallion of hard solder at the tip of each petal with your borax brush. Solder the flowers and rings together, using a gentle flame (see technique 11). Pickle them all (see technique 10).



7 Emery the inside of each flower. The easiest method is to use a split pin (see technique 5).



8 Drill a hole in the center of the two zigzag shapes (see technique 3). Thread your saw blade through the hole and saw out the central circle (see technique 2). Saw around the zigzag edges. Do not turn the blade in the tight corners; use the methods described in technique 2 to achieve a crisp result. File the points with a three-square needle file, then file the central holes to neaten them (see technique 4). Rub the zigzag shapes on a flat buff stick (see technique 5).

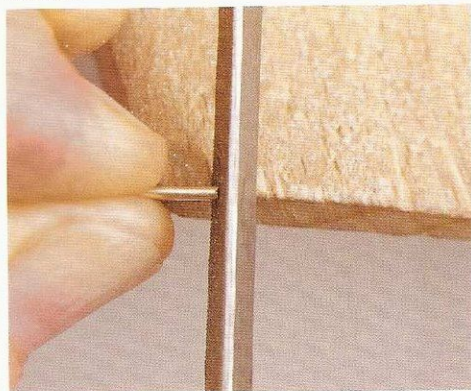
MAKING EAR WIRES

There are many different styles of ear wires, some plain and simple, others forming part of the decorative effect of the finished earrings. Ear posts and butterflies are the most widely used findings and are available readymade. However, it is often useful to make your own, ready for soldering into position on the back of stud earrings. An elegant ear hook is the simplest form of ear wire for any ball or bead drop, which can be threaded on before wearing. Safety-hook ear wires have a spring closure at the back for extra security and are more difficult to make.

As wire bending is an acquired skill, it may take a few attempts before you can make two hook-style ear wires that look the same, so allow extra wire if necessary. When trying to make identical shapes with wire bending (see technique 8), it is a good idea to repeat each individual step on both pieces of wire as you work, rather than trying to make one complete piece before starting again with the other one.

It is advisable to use precious metals for all earring findings to avoid allergic reactions.

Ear Posts

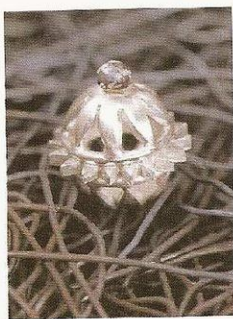


1 Cut two $\frac{1}{4}$ in (1cm) lengths of $\frac{1}{16}$ in (0.9mm) wire with end cutters. Flatten one end of each wire with a flat needle file (see technique 4). This is the end that is soldered in position on the piece of jewelry.

9 Rub the ring edge of the curved flower petal shapes on a flat file so they are slightly flattened. Dip the ring edge of one flower in borax, then place it centrally on top of a zigzag shape on a soldering wig. Position tiny pallions of medium solder around the seam. Heat them carefully until the solder flows around the seam (see technique 11). Pickle (see technique 10), then turn the piece the other way up so the zigzag shape is uppermost. Place another flower petal shape on top and repeat the borax and solder application. Make the second filigree ball in the same way. Pickle and scrub them with a brass brush and soap (see technique 10).

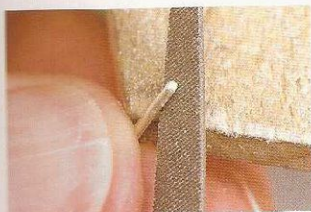


10 Emery the outside of the filigree balls until they are smooth and scratch-free (see technique 5). Balance each ball in the wig to prevent them from rolling. Solder a solid silver ball on top of each filigree one, using a small pallion of easy solder (see technique 11). Turn the filigree balls over and solder a solid ball on the other side. Make sure they are centered. Pickle (see technique 10).



11 File the top of one solid ball on each earring slightly flat (see technique 4). Balance one of the earrings in a wig and position a small closed jump ring on top of the ball, with the closed seam facing down. Use spring tweezers to hold the jump ring in position. Place one pallion of easy solder and a little borax on the seam. Solder the ring on (see technique 11). Repeat with the remaining earring, then pickle them both (see technique 10).

12 Finally, polish the earrings with a bristle brush to gain access to the intricate detail without wearing it away (see technique 6). Slip each earring onto a hook, ready to wear.



2 Round the other end of the wire with the flat needle file. Hold the wire against a slot in the peg while you do this. This is the end that is inserted in the earlobe, so it needs to be smooth and rounded. Use your index finger to feel the end, as your finger will be a more accurate judge than your eyes alone. Ear posts are normally soldered into position at this stage and then finished with the following steps.



3 Create a groove at the end of the post to prevent the butterfly from slipping off. Gently hold the post about $\frac{1}{16}$ in (2mm) from the end in a pair of end cutters and turn it around until you have formed a shallow groove. Do not grip hard with the cutters or you will cut through the post.



4 Alternatively, gently squeeze the post in a pair of needle-nose pliers to create a groove. Finally, straighten the post when it is soldered in position by holding it in a pair of flat pliers and twisting it a couple of times. This also makes the post a little less liable to bend.

Resin flower studs

You will need

- $2\frac{1}{4} \times 1\frac{1}{4}$ in (6 x 3cm) of $\frac{1}{8}$ in (0.8mm) silver sheet
- Two $2\frac{1}{4} \times \frac{1}{8}$ in (7cm x 5mm) strips of $\frac{1}{8}$ in (0.8mm) silver sheet
- 2 silver ear posts and butterflies (see technique 13)
- Clear casting resin and catalyst
- Acrylic paints in various colors
- Basic tool kit
- $\frac{1}{8}$ in (1cm) diameter round mandrel or doming punch
- Mixing pots, popsicle sticks, and gloves
- Polish suitable for plastics

These unusual earrings feature pretty painted centers and use the process of reticulation to give a softer look to the metal. As a finishing touch, they have been gold-plated.



1 Reticulate the largest silver sheet (see technique 19). Transfer two flower shapes from the template onto the side of the reticulated sheet that has the most attractive effect (use method 1, technique 1). Saw out the flowers, taking care to saw on the waste side of the line (see technique 2).

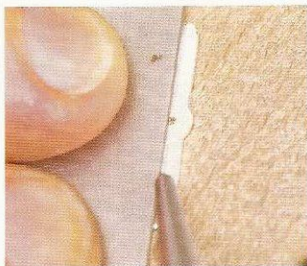


Uses technique flaps 1, 2, 4, 5, 6, 7, 8, 10, 11, 13, and 19

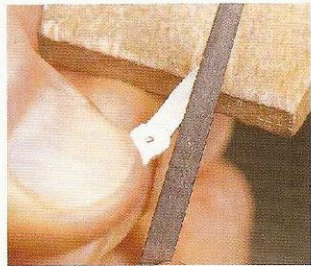
Butterflies



1 Mark the template design onto a sheet of $\frac{1}{8}$ in (0.5mm) metal (see technique 1). Mark the central hole with a center punch. Use the template to set your dividers to the correct radius for the central circle, and use a drill bit the same width as your ear post to drill the hole through it (see technique 3). Use the template to set your dividers to the correct width for the straight lines of the template, and draw these lines with the dividers and a ruler. Draw the rounded ends with a scribe. Now carefully saw out the shape on the waste side of the line (see technique 2). Use a fine 6/0 blade, because the metal is very thin.

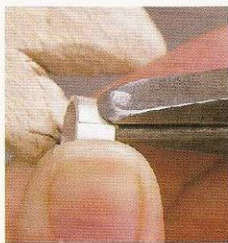


2 Score the central line deeply, leaning the scribe against a steel ruler (see technique 1).



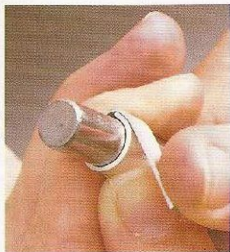
3 Carefully file around the shape with a safety-back needle file (see technique 4).

2 File all around the edge of each flower with a flat file until the shape is perfect before removing the paper pattern (see technique 4). Emery around the edges with a flat buff stick to remove any file marks (see technique 5).



5 Use a pair of half-round pliers to squeeze the seams snugly shut. Do not attempt to solder them unless the seams are tightly shut. Make sure you hold the pliers with the rounded face on the inside curve.

3 Anneal the two strips of silver so they are easier to bend (see technique 7). Wrap each strip tightly around the mandrel or doming punch (see technique 8). You should be able to bend the wire with your fingers.

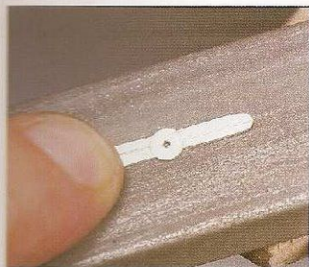


6 Paint borax on each seam and place one or two pallions of hard solder on the inside (see technique 11). Heat until the solder flows through the seam, then remove the flame. Pickle both circles (see technique 10).

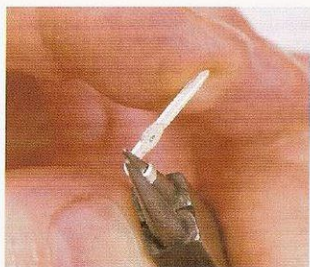
4 Saw through each strip where there is an overlap, holding each one securely on the peg (see technique 2).



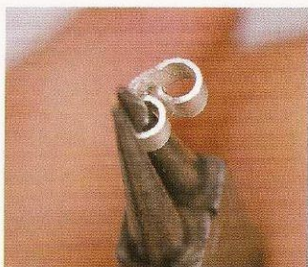
7 File off any excess solder from the outside of the rings (see technique 4), then tap the rings around the mandrel with a mallet to make sure they are perfectly round. Emery to remove the file marks (see technique 5).



4 Rub the piece on a buff stick or a flat sheet of emery paper to remove any scratches (see technique 5).

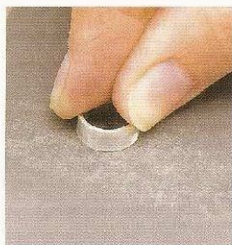


5 Next, hold one end of the piece in a pair of round-nose pliers and make a neat curl by bending the rest of the metal around with your fingers (see technique 8).



6 Do the same at the other end so both curls meet in the middle of the circle. Repeat this process to make a second butterfly.

8 Either rub the rings on a flat piece of emery paper to even up the edges, or file them flat with a flat hand file (see techniques 5 and 4).



9 Place a flower face up on a soldering mat or charcoal block, then dip the edge of one of the rings in creamy borax and place it in the center of the flower. Position at least six pallions of medium solder around the seam on the inside of the ring. Solder the ring on, making sure there are no gaps in the seam and applying extra solder if necessary (see technique 11). Pickle (see technique 10). Repeat with the remaining flower and ring.

10 Next, solder the ear posts in position on the back of a flower with easy solder (see technique 11). Use a pair of spring tweezers to hold the post in position a little above the center of the post. Be sure to heat the flower more than the post to get them both to the correct temperature at the same time. Remove the flame the instant the solder starts to pool up the post. This will provide a stronger seam on such a small area. Pickle (see technique 10).



11 Hold each post in a pair of flat pliers and twist it a couple of times. This will straighten the post and make it less likely to bend.

MAKING EAR WIRES

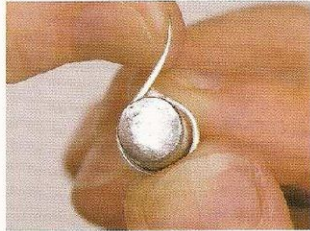
Ear Hooks



1 Cut two $3\frac{1}{4}$ in (8cm) lengths of $\frac{1}{16}$ in (0.8mm) silver wire with end cutters (see technique 2). Hold one of the wires in a pair of insulated tweezers and dip one end in some borax (see technique 11). Heat the tip of the wire until it starts to melt. A bead of molten silver will run up the wire. Change the direction of the flame to encourage the bead to roll evenly. Remove the flame before the bead becomes too big.



2 Repeat with the other wire, then pickle them both (see technique 10). Use a smooth needle file to round the unsoldered end of each wire (see technique 4). Hold the wire against a slot in your peg as you file.



3 Wrap the beaded end tightly around a mandrel to create a circular loop (see technique 3). Use a mandrel that is approximately $\frac{1}{16}$ in (1.7mm) in diameter. Here, we have used a doming punch.

Stone-set brooch

You will need

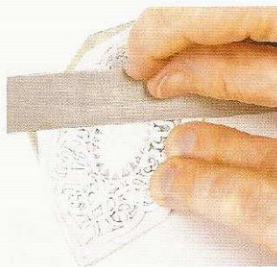
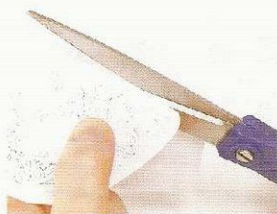
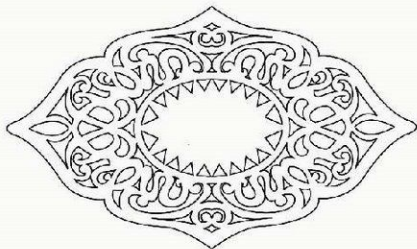
$\frac{3}{8}$ x 2 in (8.5 x 5cm) of
 $\frac{1}{8}$ in (1mm) silver sheet
 $\frac{1}{8}$ x $\frac{1}{4}$ in ($1\frac{1}{2}$ x 1cm) flat-
 back cabochon stone
 21 solid silver balls, each
 made from $\frac{1}{8}$ in (5mm) of
 $\frac{1}{8}$ in (0.8mm) round wire
 (see technique 12)
 Silver bezel strip
 Ready-made silver brooch
 catch, clasp, and pin
 Silver wire for the rivet
 Basic lool kit
 Sandbag or lead cake
 Bossing mallet or very
 large doming punch
 Brass brush and soap
 Rouge powder and denatured alcohol
 Stone-setting tool and
 burnisher
 Vise and riveting hammer

Uses technique flaps
 1, 2, 3, 4, 5, 6, 7,
 8, 9, 10, 11, 12, 15,
 and 20

This bold brooch design is the perfect setting for a stunning amber cabochon stone. The intricate pattern requires a steady hand and patience to achieve a neat finish.

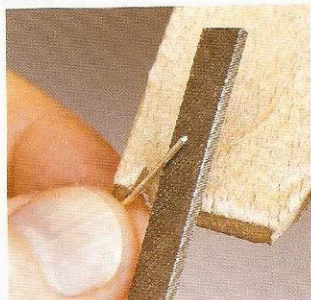
1 Attach the template pattern to the sheet of silver (use method 1, technique 1). As the pattern is complex, it is easiest to photocopy the template and use it instead of a tracing.

2 Cut around the pattern with scissors, leaving a small border around the edge.

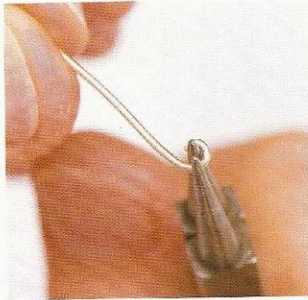


3 Glue the template to the silver sheet, smoothing the paper carefully across the surface of the metal.

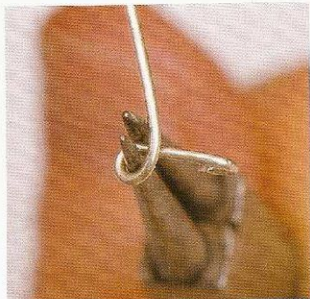
Safety-hook Ear Wires



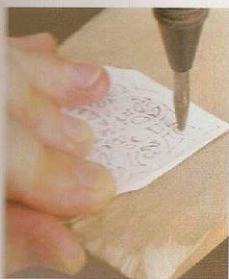
1 Cut two $\frac{2}{4}$ in (6.5cm) lengths of $\frac{1}{8}$ in (0.8mm) wire with end cutters (see technique 2). File the ends with a smooth needle file so they are rounded (see technique 4).



2 Start bending the wire into the correct shape (see technique 8). First, hold one end in a pair of round-nose pliers and make a tiny curl.

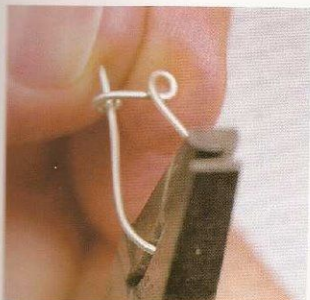


3 Then make a loop about $\frac{1}{2}$ in (5mm) in from the curl by wrapping the long end of the wire around the smallest end of the pliers. The loop should be at right angles to the curl.



4 Mark inside every hole of the design by tapping a center punch with a hammer. Some of the shapes are very small, so take care not to go near the lines of the pattern.

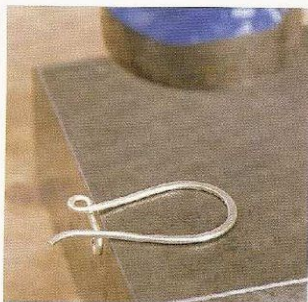
5 Use a fine drill – $\frac{1}{32}$ in (0.8mm) maximum – to drill through the silver on every point where you have made a punched mark (see technique 3).



4 Hold the long end of the wire in a pair of half-round pliers about halfway along, then bend the wire back toward the curled end of the wire. Make sure the rounded face of the pliers is on the inside of the bend. The long end of the wire should sit in the curl made in step 2.



5 Bend the end of the wire back slightly with a pair of half-round pliers. The hook should now open and close with the little curl acting as a safety catch. You may need to open the curl slightly so the wire can slip in and out freely.



6 The final stage is to open each hook and hammer the top curve on a flat plate with a smooth flat-faced hammer. This will make the wire springier, so once it is closed, it will stay firmly in position.

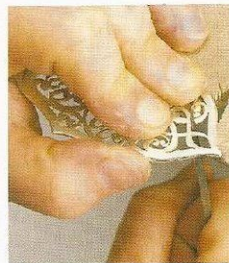
6 Thread a fine saw blade through a hole in the silver, and saw out all the inside patterns as accurately as you can (see technique 2). This is a challenging task, so take your time to follow the pattern carefully and try not to wander over the lines.



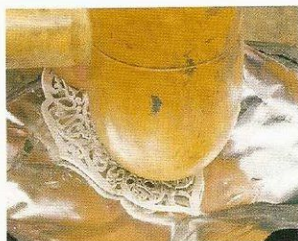
7 Then saw around the outline of the brooch. If you prefer, you can do this before you saw out the internal shapes of the design.



8 Use needle files to neaten the intricate details of the design (see technique 4). You may need to use your saw blade to gain access to the tiny spaces. Remove the template when you are sure you have tidied up the pattern as much as you can, either with nail polish remover or by filing it off (see technique 1).



9 File around the outside edge to clean up the shape, then use a needle file at an angle to chamfer the edge all the way around (see technique 4). Use a flat file on outside curves and a half-round file on inside curves.



10 The next step is to give the brooch a gentle curve. If you do not have a

sandbag or lead cake, you can leave it flat. Anneal the brooch carefully, then pickle (see techniques 7 and 10). Place it face down on the sandbag or lead cake (remember to use some protective foil as a barrier between the silver and the lead). Use a bossing mallet or a very large doming punch to curve the brooch slightly (see techniques 8 and 9). Be careful not to overdo this, as it may disrupt the delicate pattern.

MAKING CLASPS

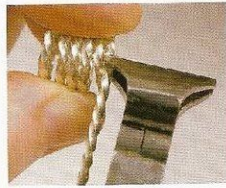
These easy-to-make styles can be used as bracelet clasps and necklace clasps, and will add a touch of originality to your pieces. It is possible to buy readymade clasps, but making your own is much less expensive, and these designs can be adapted by using different shapes, colors, and sizes of wire to match your piece exactly. It is a good idea to polish them before linking them onto a bracelet or necklace, because some materials will be damaged by the polishing process – silks and pearls, for example.

Twisted T-bar Clasp

This is the simplest form of clasp to make. Twisted $\frac{1}{16}$ in (1.5mm) square silver wire has been used here (see technique 16), but it can be made with any shape of wire. It is much easier to make several at a time, so the exact length of wire required is variable. Approximately 12in (30cm) of wire will make about five clasps and five catches. You will also need two closed jump rings to attach the finished clasp to the necklace or bracelet (see technique 17).

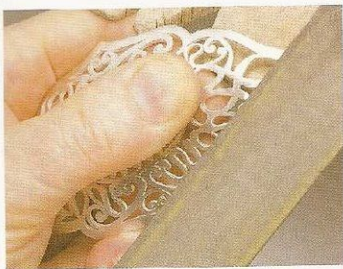


1 The circular catches are made in the same way as jump rings (see technique 17). Wrap half the wire around a mandrel to create a tight coil; a $\frac{3}{16}$ in (1cm) diameter mandrel has been used here. It may be necessary to anneal the wire first if it is too rigid (see technique 7).



2 Cut off the spare wire at the top and bottom of the coil with end cutters or a saw (see technique 2).

11 Emery the surface of the brooch with a buff stick or split pin (see technique 5). Emery the reverse side, or use a round burr or pink point to create an overall texture (see technique 19).



12 Next, make a bezel setting for the stone (see technique 20).



13 If necessary, use a pair of half-round pliers to ease the oval shape so it fits exactly around the stone. It is vital to achieve the right shape before soldering the stone setting to the brooch. Rub the bezel setting on a flat file to flatten the top and bottom edges (see technique 4), then position it in the middle of the brooch.



14 Place the brooch on a wig and paint around the bottom of the bezel with borax. Position pallions of hard solder at even intervals around the inside of the seam. Heat the brooch until the solder flows all around the seam (see technique 11). If there are any gaps, add more solder. Pickle and scrub with a brass brush and soap (see technique 10). File around the seam to remove excess solder, then emery the area around the bezel (see techniques 4 and 5).



3 Hold the coil tightly against a slot in your peg and saw through the wire, either from the bottom up or the top down. Refer to technique 17 (making jump rings) to decide which method to use.



4 Close each ring by holding one side of the opening in a pair of flat pliers and levering the other side toward it with your fingers or another pair of flat pliers. Make sure the gap is tightly closed before attempting to solder.

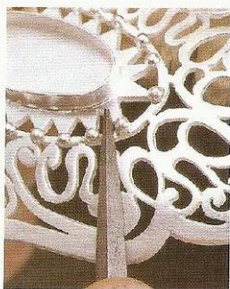


5 Place the closed ring on a soldering block and paint a little borax on the seam (see technique 11). Position one pallion of hard solder over the seam with the tip of the borax brush. Heat the ring evenly so both sides of the seam reach soldering temperature at the same time. Remove the flame when the solder has flowed into the seam.

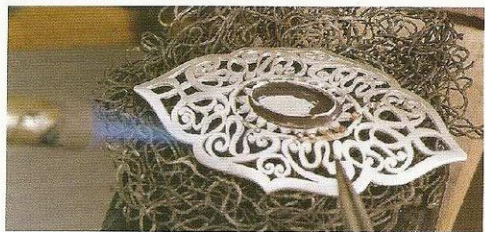


6 Next, hold the ring with the soldered seam uppermost in a pair of spring tweezers. Balance a closed jump ring on top of the twisted wire ring using a pair of angled spring tweezers, making sure they are seam to seam. Solder together. The jump ring will require much less heating than the twisted wire ring. Pickle and rinse (see technique 10).

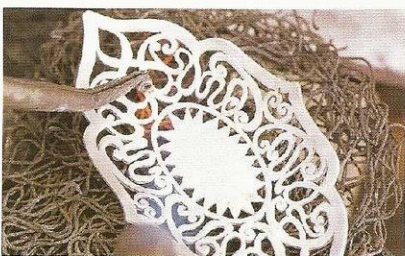
15 The next step is to solder the solid balls around the bezel setting (see technique 11). Paint rouge powder mixed with denatured alcohol around the bezel solder seam and place a tiny amount of borax on the tip of each central ray of the brooch design. Pick up a ball in a pair of tweezers and dip the bottom in borax before placing it in position on the tip of a ray. Repeat with a few balls. Nudge a tiny pallion of medium solder under each ball.



17 File around the balls with a safety-back or three-square file to remove any excess solder (see technique 4). Paint rouge on the balls and the seam around the bezel (see technique 12).



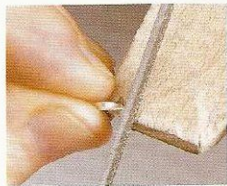
16 Solder the balls in place, heating the brooch more than the balls because it is a much larger area. Use a pair of fine soldering tweezers to keep the balls in position as the solder flows. Pickle (see technique 10). Apply rouge to the balls and repeat the soldering process until all the balls are in place. Pickle again and scrub with a brass brush and soap. This will probably dislodge any balls that have not been properly soldered, but it is better this happens now rather than after you have set the stone. Resolder and pickle any dislodged balls.



18 Turn the brooch over and place it on a wig. Position the catch on the back of the brooch using a pair of spring tweezers, and place one or two pallions of easy solder next to the catch. Solder the catch in place, then do the same with the hinge (see technique 11). Pickle the brooch and scrub the area of the setting with a brass brush and soap to remove any traces of rouge (see technique 10).



7 Next, make the T-bars using the remainder of the twisted wire. Measure and saw each bar so it is 1in (2.5cm) long (see technique 2).



8 Use a flat needle file to file each end of the strips of twisted wire (see technique 4).



9 File each end to remove any sharp edges and to round them slightly. Hold the wire against a small slot in your peg for greater control. Feel the end with your finger to make sure it is smooth.



10 Place the bar on a soldering mat and balance a closed jump ring in the center with a pair of angled spring tweezers. Make sure the seam in the jump ring is in contact with the bar. Solder together with hard solder, then pickle and rinse (see techniques 11 and 10). The two pieces now need to be polished (see technique 6) and assembled.



Filigree brooch

You will need

33in (84cm) of $\frac{1}{16}$ in (1.5mm) round silver wire
 Assorted faceted stones
 1 drilled faceted teardrop and silver wire to hang it
 Silver tube and $\frac{1}{16}$ in (1mm) silver sheet for the stone settings
 Ready-made silver brooch catch, hinge, and pin
 Basic tool kit
 Access to a rolling mill
 Plannishing hammer
 Vise, sandbag, doming punch, and bossing mallet
 Modeling clay
 Carving tool
 Plaster of Paris
 An old toothbrush
 Denatured alcohol
 Assorted steel burrs
 Bristle brush
 Epoxy glue

Uses technique flaps

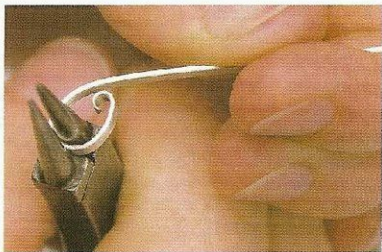
1, 2, 4, 5, 6, 7, 8, 10, 11, and 20

This brooch has a pretty design formed from filigree wire shapes decorated with faceted precious stones. This project uses an unusual method of balancing, which allows you to position complex and multipart designs before soldering.

1 Anneal the long strip of round wire (see technique 7). Roll it through a rolling mill to flatten it slightly, then rub the surface of the wire with emery paper (see technique 5). Cut the wire into two pieces, 9in (23cm) and 24in (60cm) long (see technique 2). Take the shorter length of wire and flatten one end on a flat plate with a plannishing hammer. Anneal the whole piece (see technique 7).



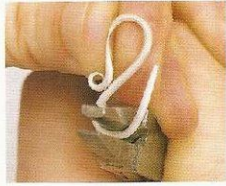
2 Grip the flattened end tightly in a pair of round-nose pliers and lever the long end of the wire around to form a small curl (see technique 8). Hold the pliers a little farther along the wire and bend the longer end around to form a teardrop shape.



4 Anneal the wire before you try to bend it (see technique 7). Heat it until it is dull red and let it cool without quenching. Hold one end of the wire in the tip of a pair of round nose pliers and lever the rest of the wire around with your fingers to form a tight curl (see technique 3).



5 Next, support the wire about $\frac{1}{16}$ in (1cm) away from the curl in a pair of half-round pliers and bend it around to form a loop. Hold the rounded face of the pliers on the inside of the curve to prevent marking the metal.



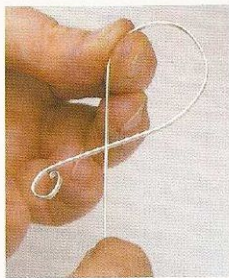
6 Make another loop in the opposite direction to create a symmetrical figure-eight shape, bending the wire around the half-round pliers again with the rounded face on the inside of the curve.



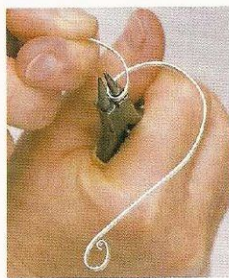
7 Hold the very end of the wire in the pair of pliers and ease the tapered end into a gentle curve.



3 Lever the long end of the wire over the loop and then back again with your fingers to form a large curve. Continue the curve by crossing the long end of the wire over the teardrop end with your fingers.



4 Hold the wire in the round-nose pliers and wrap the long end around the pliers to create the top loop of the heart. Complete the heart shape by using your fingers to bend the wire into a gentle curve back toward the teardrop shape.



8 Lay the clasp on a soldering mat and paint a little borax on the seam between the curl and the loop. Position a pallion of hard solder on the seam and heat it carefully until the solder flows between the two, then pickle (see techniques 11 and 10).



9 Next, slip an open jump ring through both loops of the figure-eight and ease them shut using two pairs of flat pliers (see technique 17). Solder both jump rings shut using hard solder (see technique 11). Make sure the opening in the clasp is not too large or too small. The ring should slide on and off with just a little resistance.

Small Hook Clasp

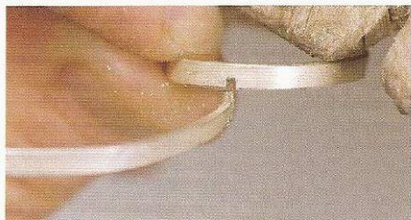


1 This is a more compact style that can be used for both necklaces and bracelets. Cut $1\frac{1}{2}$ in (3.5 cm) of $\frac{3}{16}$ in (1.2 mm) wire, then round both ends using a flat file (see technique 4). Hold the wire against a slot in your peg, turning it a little as you file.

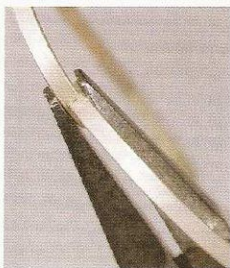


2 Hammer one end of the wire flat on a flat plate using a smooth, flat-faced hammer. This will spread the metal slightly.

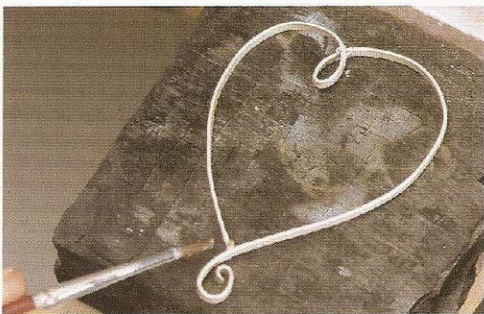
5 Make small adjustments to the overall shape with your fingers. Push the straight end of the wire a little farther across than necessary; when the excess is trimmed off with end cutters, it will spring back and sit snugly against the teardrop loop ready for soldering. File the end of the wire so it makes a strong neat seam when soldered (see technique 4). The heart shape look roughly like this.



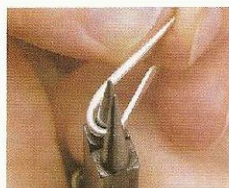
6 Saw a tiny notch on the underside of the uppermost wire where the top loop of the heart overlaps (see technique 2). Saw only halfway through the wire. Do the same on the adjoining edge of the wire underneath.



7 Squeeze the two together with flat pliers. Do not force them; if they do not fit, remove a little more metal with your saw.



8 Solder the notch and the end of the wire that meets the teardrop loop with a pallion of hard solder on each (see technique 11). Pickle the completed heart (see technique 10).



3 Hold the wire about a third of the way along from the hammered end in a pair of round-nose pliers. Bend the wire around the pliers to form a neat loop (see technique 8).



4 Continue shaping the wire by gripping the very tip of the unhammered end in a pair of round-nose pliers and wrapping it tightly into a curl. You may need to anneal the wire to improve its malleability (see technique 7). Heat the wire until it glows dull red, then let it cool without quenching. It may take several attempts.

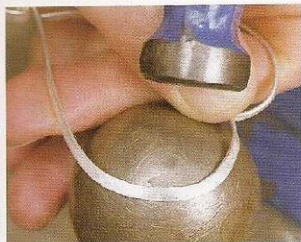


5 When you have formed a tight curl, saw through the very tip so it will sit snugly against the other wire, ready for soldering (see technique 2).

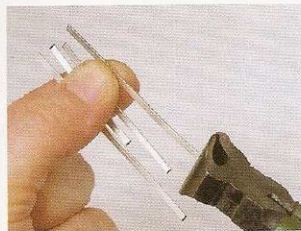


6 Paint a little borax on the seam and place a pallion of hard solder where the curl and the loop touch (see technique 11). Warm the whole clasp evenly until the solder flows through the seam. Pickle and rinse (see technique 10).

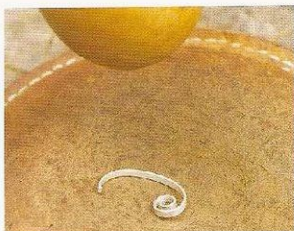
9 Place a large doming punch in a vise and gently tap the rim of the heart with a planishing hammer to spread the metal slightly around the top curves. This will also help to make the heart more rigid.



10 Cut several different lengths of wire from the remaining long strip of flattened wire (see technique 2). Spread the ends in the same way as before (see step 1). Anneal all the cut wires, then pickle them (see techniques 7 and 10).



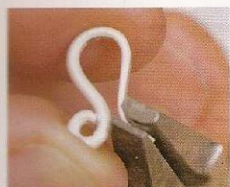
12 When you are happy with your design, place each spiral and curl on a sandbag and tap gently with a bossing mallet to produce a curved shape.



11 Make a variety of spirals and curls using a pair of round-nose pliers (see technique 8). As you make them, place them within the frame of the heart to see how they look. Create your own unique design.



13 Next, make the settings for the stones. These are made from tubing. It is important to use the correct diameter tubing for each stone. The stone should be able to sit in the top of the tube with a little silver still visible around the edge.



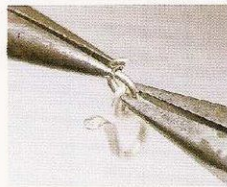
7 Next, bend the hammered end into a slight curve using a pair of half-round pliers. Adjust the opening so the jump ring will just squeeze through with a little resistance. It should not be too loose.



8 Place the clasp on a flat plate and hammer the top curved section on both sides with a smooth, flat-faced hammer. Be careful not to hammer the other end of the clasp.

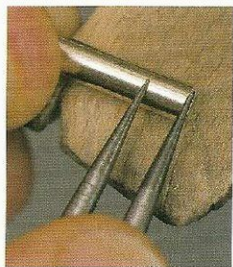


9 Hold the clasp over the edge of the block and hammer the small curl a couple of times to flatten it slightly. Take care that you hammer only the curled end.



10 Attach a jump ring to the small curl and close it using two pairs of flat pliers (see technique 17). Solder the seam of the jump ring (see technique 11). Use another jump ring as the catch. You may want to vary the size and shape of this jump ring to complement the individual piece of jewelry you are making.

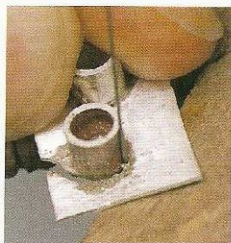
14 Once you have selected the correct diameter tubing for your selection of stones, set your dividers to $\frac{3}{16}$ in (5mm) and mark a section of the tube (see technique 1). Saw through the line (see technique 2). Repeat until you have enough settings. File both edges of the tubes with a flat file (see technique 4).



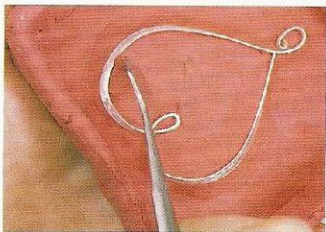
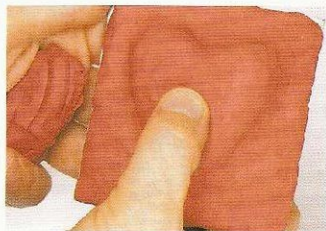
15 Position two of the tubes on the small piece of silver sheet and paint borax around the bottom edge. Position a pallion of hard solder against each tube and solder them on (see technique 11). Pickle (see technique 10).



16 Saw around the tubes and file around the seams with a flat needle file (see techniques 3 and 4).



17 Use a modeling clay that does not harden (available from art supply stores) to create a slightly domed heart shape the same size as the silver heart. Support the back with a piece of metal and build up the shape from the back.



18 When you have roughly the right shape, place the silver heart on the clay and press down lightly. Build up some clay walls around the outside. Use a carving tool to fill in any holes around the inside edge of the heart and to smooth the seam between the silver and the clay so the silver is resting in the clay but not completely embedded in it.

DRAWING DOWN

Although you can buy wire and tube in a variety of shapes and sizes, it is possible, with the aid of a draw plate, to use the material you have and change its shape or reduce its size to suit a specific job. Most jewelry classes have a draw bench that makes the job much easier and allows you to work with much thicker materials. For the jeweler working from home on a limited budget, use a draw plate secured in a strong vise with either a pair of draw tongs or a pair of parallel pliers with serrated jaws. The only limitation on drawing down by hand will be your strength. It is possible to draw down by hand wire or tube that is up to $\frac{1}{4}$ in (3mm) thick.

It is vital to anneal the wire every two or three pulls though the draw plate, or whenever it becomes too hard to pull through the hole (see technique 7). It is easy to overwork wire when drawing down. If the wire starts to flake along the edges, you will need to start again with a fresh piece.

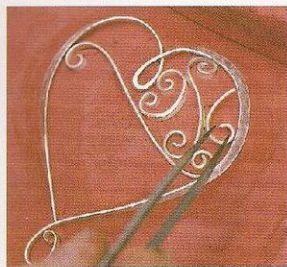
Drawing Down Wire



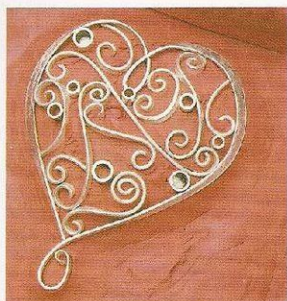
1 Cut the wire you wish to draw down so it is no more than a yard (meter) long. It is impractical and dangerous to use very long lengths. File a taper onto one end, about 1 in (2.5cm) long (see technique 4). Anneal the wire, remembering to coil it first if it is thin (see technique 7). Allow to cool, then pickle (see technique 10). Rinse and dry.

2 Choose the draw plate with the size and shapes of hole required. Draw plates come in an enormous range of hole shapes, but the most useful ones to start with are round and square.

19 Place the filigree pieces into the clay one by one, building up the pattern as you go. The pieces should be half resting in the clay and half exposed. Fill in any holes under the filigree panels using the carving tool and a little more clay.



20 Place the soldered tubes at opposite sides of the heart with the soldered side in the clay. The brooch findings will be attached to these, so place them either from side to side or diagonally rather than from top to bottom. Position the other tubes randomly between the filigree panels, but make sure they are in contact with at least two panels or there will be no soldering points.



21 Mix the plaster of Paris with water to the consistency of heavy cream. Pour the plaster over the heart; it will start to set very quickly, so make sure it covers all areas of the heart before it does.



22 Carefully peel off the modeling clay when the plaster has set, leaving the silver embedded in the plaster.

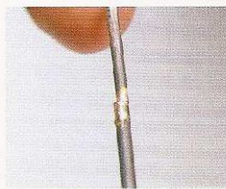


3 Fix the draw plate in a vise so the wider holes are at the back. Start with the hole that is a tiny bit too small for the wire to pass through easily. Lubricate the hole with a little oil. Thread the taper through the hole from the back of the plate so there is just enough showing to grip with the draw tongs or pliers.

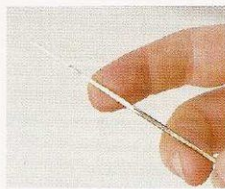


4 Grip the full length of the taper with the draw tongs or pliers. Pull the wire slowly through the hole. Make sure you are standing firmly. Repeat this process using progressively smaller holes until the wire reaches the desired size. Refile the taper each time it snaps off.

Drawing Down Tube

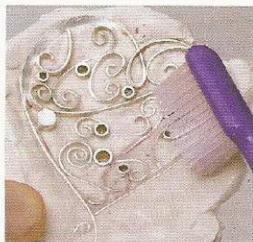


1 First, solder 2–3 in (5–7.5 cm) of rod or wire to one end of the tube (see technique 11). It should be approximately the same width as the tube, but it does not have to be the same metal. Use plenty of solder on the seam.

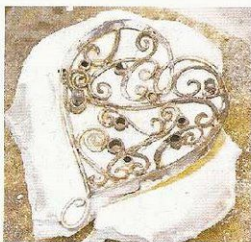
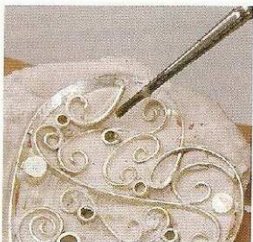


2 File a taper into the rod, using a large flat file across one end, and file the soldered seam so there is a smooth progression between the tube and the rod (see technique 4). Continue as you would when drawing down wire, making sure you anneal the tube regularly. Saw off the tapered end when you have reached the desired thickness.

23 Scrub with a toothbrush and denatured alcohol to remove any greasy residues of the clay. Use a sharp tool to scrape away any plaster that obscures the wires. Let the plaster dry out as much as possible before soldering.



24 Paint borax on each point where the filigree shapes and tube settings touch each other and where they touch the frame of the heart. Position a pallion of hard solder on each seam (see technique 11).



Use a strong flame to heat up the whole piece. The plaster will absorb much of the heat initially, so be prepared for it to take a long time before the wires reach soldering temperature. Make sure all the points where the wires touch are soldered. Finally, solder the catch and hinge onto the tubes with the flat bottoms with easy solder. Leave the plaster to cool. Crumble off the plaster under running water and scrub with a brass brush to remove any bits between the wires. Pickle the filigree brooch (see technique 10).

26 Select steel burs that correspond exactly with the diameter of your stones. Insert a burr into your drill and hold it vertically in the appropriate size tube (the burr will be a little smaller in diameter than the tube). Press the burr down into the tube as it spins. Use a lubricant if you have one, such as oil or burr cutting wax. Push down until you create a ledge that the stone can sit on inside the tube. There should be a tiny amount of silver left around the top edge of each stone that you can push over the stone to hold it in place. Repeat with all the other tubes, then anneal them (see technique 7). Pickle again prior to setting the stones (see technique 10).

TWISTING WIRE

Twisting wire can provide an enormous range of decorative effects. This technique is used extensively for the embellishment and construction of jewelry and is one of the most basic elements of metal fabrication. When twisting several wires together, the best results are achieved by using metals of similar malleability, and by thorough annealing both before and during the process (see technique 7). Uneven annealing will result in an uneven twist. The length of the wire will shorten as it takes up the twist, so allow between 30 and 50 percent extra if the length is important.



These examples of decorative wire twisting show a range of beautiful effects that can be achieved using this relatively simple technique, from a simple single twist using square wire to the more intricate multi-twist using fine wire.

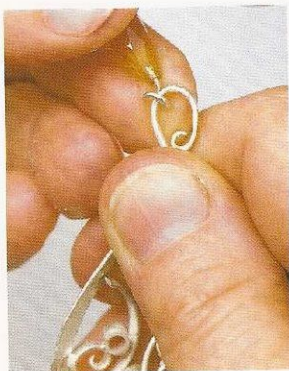
27 Use your setting tool and a burnisher to push the edge of the silver tubes progressively over the stones (see technique 20). When you have set all the stones, polish the brooch with tripoli and rouge (see technique 6). Use a bristle brush to gain access between all the wires.



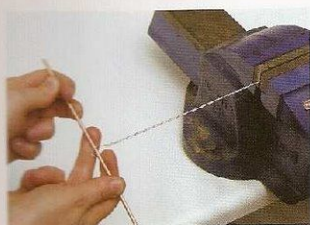
28 Open the hinge slightly and put the pin in place. Squeeze the hinge shut around the pin with pliers to hold it securely in place.



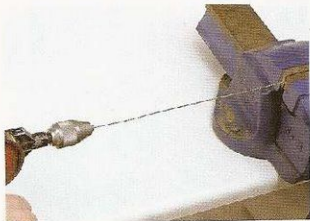
29 Use pliers to bend some wire into a loop to hang the teardrop stone (see technique 8). The wire should be thick enough to fit tightly into the drilled hole in the stone. Dip the end of the wire in a tiny amount of epoxy glue before slipping it into the hole.



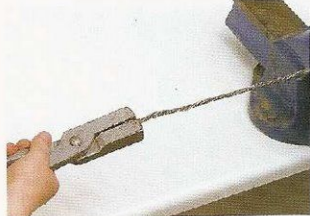
30 Attach the loop to the bottom of the brooch and close it with pliers. Snip off any excess wire with end cutters (see technique 2). Let the glue dry with the stone supported in some clay.



1 First, try a double twist with thin wire to see how easy it is. Anneal a length of thin wire in the metal of your choice (see technique 7). Fold the wire in half and secure the cut ends in a vise. Slip a piece of metal or wood through the loop and use this as a handle to twist the wire in one direction while you pull the wire taut. Continue until you achieve a result you like. Anneal again if the wire becomes hard to manipulate.



2 An alternative method is to use a hand drill to do the hard work for you. Anneal the wire and cut it in two. Secure one end in the jaws of a vise and the other end in the chuck of a hand drill. Then turn the handle of the drill slowly until you achieve an even twist. Again, anneal the wire if it becomes difficult to twist.



3 If you have an awkwardly shaped profile of wire, or several pieces, use draw tongs with serrated jaws to hold the ends firmly together while you twist them.

Flexible chain bracelet

You will need

Enough $\frac{1}{16}$ in (0.9mm) round silver wire to make at least 250 jump rings

A clasp – a small silver hook clasp is used here (see technique 14)

Basic tool kit

$\frac{1}{8}$ in (4mm) diameter round mandrel

An extra pair of needle-nose pliers will be useful

A nail or thumbtack

Some fine wire or string

This bracelet looks impossibly complex, but is actually quite straightforward once you have mastered the first sequence of links. It is vital to make the jump rings the correct size, or the finished result will be either too slack or too rigid.



Uses technique flaps 6, 10, 11, 14, and 17

MAKING JUMP RINGS

The circular wire rings used to provide flexibility, and for linking jewelry pieces together, are known as jump rings. They are used in an inordinate number of ways and are easy to make. It is possible to buy them, but it is much cheaper and more versatile to make your own. They can be used alone to create chain-mail effects and form the basis of most chains.

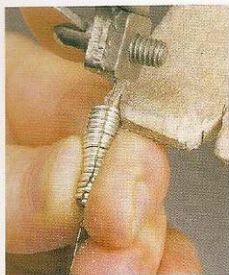
You can make jump rings with any thickness or shape of wire, provided it is malleable enough to be wrapped tightly around a mandrel. Most jump rings are circular, but once you have mastered how to make them, you might like to experiment using different shaped wires and mandrels.

It is a good idea to make jump rings in large quantities and to store them in small compartments, sorted according to size. The technique shown here will provide an average-size jump ring for assembly purposes. You can vary the size for specific projects by using a different thickness of wire or an alternative size mandrel. It is useful to collect items that are suitable for coiling around, such as old nails, broken drill bits, and wooden dowels, so you have a variety of mandrels to work with. If you use anything with a textured surface, the rings will be impossible to remove.

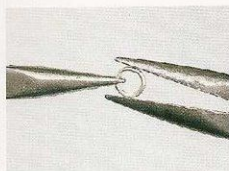


Jump rings form the basis of most chains. These readymade examples show just how varied the possibilities are simply by altering the size, profile, and shape of the jump rings.

1 First, make the jump rings, using the silver wire and the mandrel (see technique 17). Leave them open ready for use. The exact number required will depend on the size of the wrist.



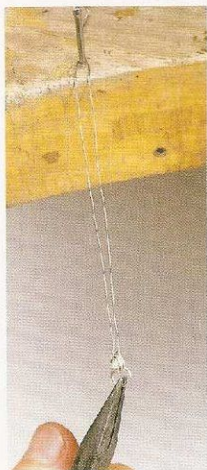
2 Practice supporting a jump ring in one pair of needle-nose pliers while squeezing the ring shut with another pair (see technique 17). Do not use too much pressure or you will leave dents in the jump rings.



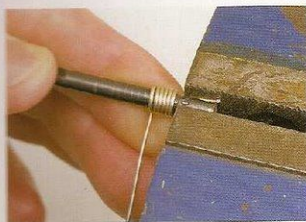
3 When you have mastered the technique, close two of the jump rings and thread a length of fine wire or string through them.



4 Hammer a nail or thumbtack into the edge of your workbench and attach the loop of fine wire or string to this, twisting or knotting the ends so they do not come undone. It will be easier to make the chain hanging from this wire. Slip two jump rings through the two already on the wire and close them.



5 Attach two more jump rings to the last two. You should now have six rings joined in pairs. This forms the basic unit of the chain. Each new unit will consist of the same 2, 2, 2 pattern. For ease of description, we will call the first pair 1 and 2, the second pair 3 and 4, and the third pair 5 and 6, following the order in which they were attached.



1 Use a length of $\frac{1}{16}$ in (0.8mm) wire. The wire does not have to be annealed, provided it will coil smoothly. Unannealed wire will make a ring that is less likely to come open if it is to be used unsoldered. Select an old drill bit or nail to act as a mandrel. It should be approximately $\frac{1}{16}$ in (2.5mm) wide. Secure the end of the wire against the mandrel in a vise. Wrap the wire around the mandrel, keeping it taut to produce a tight coil.

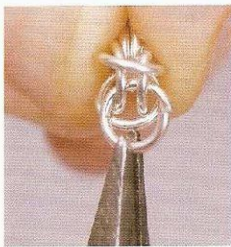


2 Cut the end of the wire with end cutters (see technique 2), and remove the coil by winding it backward from the mandrel.



3 An alternative method is to use a hand drill. Secure the hand drill horizontally in a vise, then secure the mandrel and the end of the wire in the chuck. Turn the handle of the drill a couple of times to make sure it is secure. Holding the trailing end of the wire at right angles to the mandrel and keeping it taut, turn the handle steadily. Hold your finger close to the coil to feed the wire through.

6 Now comes the tricky bit! Take rings 5 and 6 and pull them apart. Flip them back and hold them steady

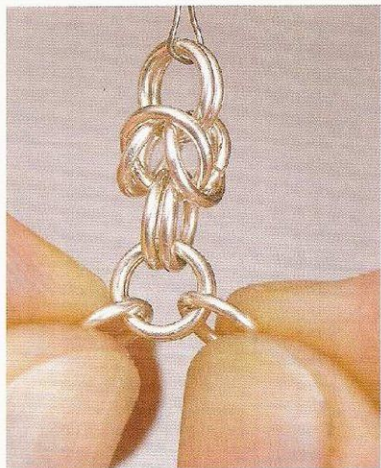


7 Open the gap between 3 and 4, revealing the flipped-back 5 and 6. Now attach two more jump rings to rings 5 and 6 through this gap. Do this one at a time, making sure they are snugly closed. The rings that you have just attached will become 1 and 2 of the next sequence of six rings.



8 Add two more jump rings (3 and 4). Continue by adding another two (5 and 6). The chain should now look like this (left).

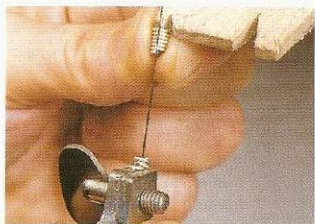
9 Repeat the sequence again, pulling apart the bottom two rings as before, then flipping them back and repeating steps 7 and 8, adding six more jump rings in pairs ('right'). Repeat the above steps until the bracelet reaches the desired length.



4 To cut the rings from the coil, insert a 2/0 blade into your saw frame (see technique 2). Hold the coil very tightly against your peg. Either saw a line down from the top of the coil or work your way up from the bottom.



5 You can collect several rings at a time between your fingertips, which should be kept tightly squeezed together. This is a quick method, but it takes a lot of practice.

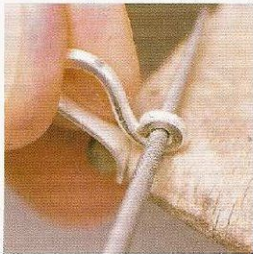


6 Alternatively, when cutting the rings from the bottom up, let the rings drop to the bottom of the blade and remove them by undoing one of the nuts when you have finished sawing.

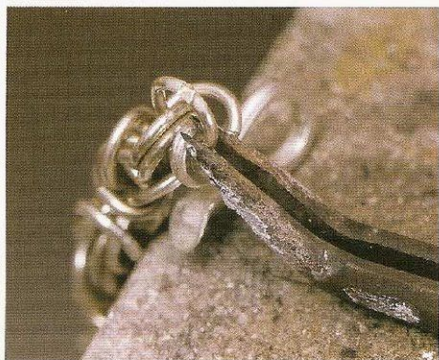
10 Close two jump rings and solder them together one on top of the other (see techniques 17 and 21). This will form the catch. Link the soldered rings onto one end of the bracelet using two jump rings. Close the rings.



11 Use a round needle file to open up the loop of the clasp. It needs to be wide enough to allow two jump rings to fit through it.



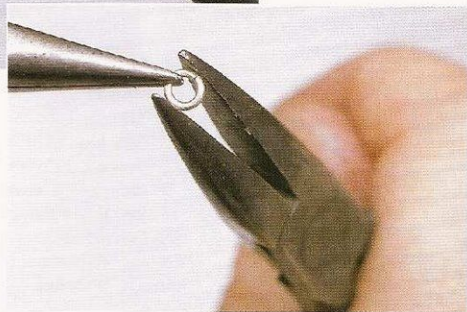
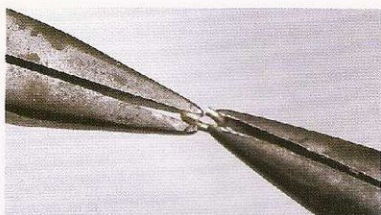
12 Link the clasp onto the other end of the bracelet with two jump rings, then close them tightly (see technique 17).



13 Use spring tweezers to hold the last pair of jump rings one at a time away from the rest of the bracelet. Make sure the seam is uppermost. This helps you to isolate the seam so you do not risk melting any of the rings nearby when you solder it. Paint a little borax on the seam and a tiny pallion of solder (see technique 11). Solder the ring shut. Do the same with the other ring, then pickle the whole bracelet (see technique 10). Finally, polish the bracelet with tripoli and rouge (see technique 6).

Opening and Closing Jump Rings

Always open and close jump rings sidewise. This makes sure there is minimal distortion of their shape. An opened jump ring looks rather like a squashed S shape. Support the ring in a pair of flat needle-nose pliers. Use another pair to open the gap sidewise, just enough to thread what you want through, without letting go of the supporting pliers (see above right). It is very easy to mangle jump rings by overenthusiastic handling and by gripping them too tightly. Close jump rings by moving one side back against the other. Spring fit the two edges together by pushing one side toward the other a little farther than necessary; it will spring back to form a tightly closed seam. Always close jump rings tightly prior to soldering by squeezing the seam closed with a pair of pliers to achieve a neat, professional look (see below right).



A symphony of bangles

You will need

21in (53cm) of $\frac{1}{8}$ in (4mm) square silver wire (for the square and triangular bangles)

12in (30cm) of $\frac{1}{8}$ in (6mm) wide, $\frac{1}{8}$ in (4mm) deep half-round brass or copper wire (for the round bangle)

Basic tool kit

Bangle mandrel or other suitably shaped mandrel for binding wire around

Binding wire

Riveting hammer and ball-ended hammer for texturing (optional)

Dressmaking pins

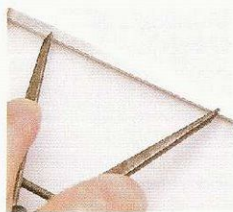
These complementary bangles can be worn together or separately. Each one features a different surface finish to highlight the contrasts between them. You can experiment with other textures featured in the techniques section if preferred.

The Square Bangle

1 Make sure the length of square wire is straight by tapping it gently on a block of wood or your workbench with a hide or wooden mallet. Keep turning the wire around as you hammer. You may need to anneal it (see technique 7).



2 Make sure the end is perfectly square by marking across it using a square and scribe (see technique 1). Mark around all four sides to provide you with a cutting line. Saw through the wire on the waste side of the line, using a coarse blade (see technique 2). File up to the line using a flat hand file so the end is completely flat and square (see technique 4).



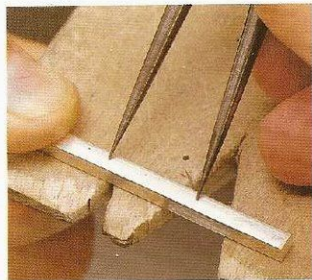
3 Set your dividers to $\frac{2}{4}$ in (6.5cm) and mark four sections from the square end (see technique 1). Saw off the excess wire on the waste side of the fourth mark (see technique 2).

Uses technique flaps
1, 2, 4, 5, 6, 7, 8,
10, 11, 18, and 19

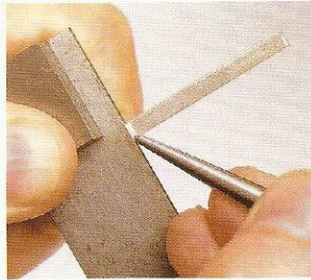
MITERING

Mitering is used when you want to create a sharp-angled bend in either sheet, rod, or bar. Metal does not fold into a crisp angle without removing some of the material from the inside of the bend with a file. It is possible to create very precise corners with this technique, but it requires extremely accurate filing for successful results. However, it is enormously satisfying once mastered. Mitered bends must be soldered to prevent them from opening.

Mitering Rod and Bar



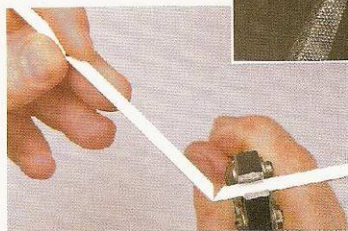
1 Carefully mark where you want the bend to be. Use a pair of dividers to mark the positions if several are to be regularly spaced along a piece of metal (see technique 1).



2 Mark firmly across the rod using a scribe and a square. This will ensure that the marked line is at right angles to the longer edge of the metal (see technique 1).



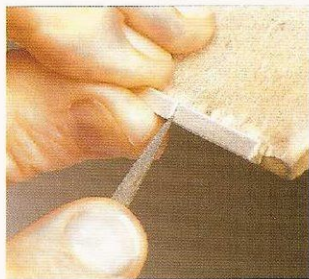
4 File grooves across the three marked lines for the mitered corners (see technique 18). Start by marking each line with a saw blade, then progress to filing with a triangle and then a square file. File each angle until you can see a faint line appear on the other side. File each end of the wire at a 45° angle; the two angled ends will make another mitered corner when the wire is bent into a square shape.



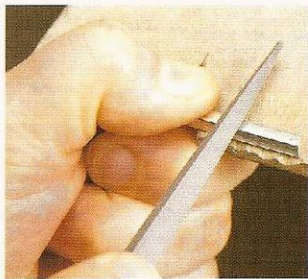
5 Anneal the area around each filed angle and pickle (see techniques 7 and 10). Support the wire in a pair of flat parallel pliers. Gently lever the wire around to form the first miter (see technique 18). Use a square to check that it is a right angle. Repeat with the other two filed angles. The open ends of the wire should slightly overlap one another.



3 Rub across the marked line with saw blade to create a deep groove (see technique 2). Hold your finger over the blade to prevent it from wandering off the line.

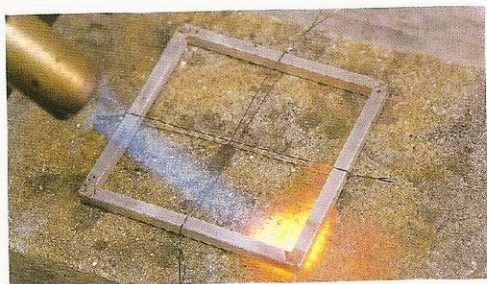
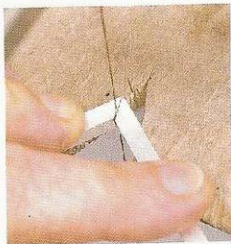


4 Now start filing the miters (see technique 4). First, use a three-square file to open up the groove a little. File extremely carefully, keeping the top edge flat under your index finger. Do not rock the file or use broad, sweeping strokes. The object is to file a neat V-shaped groove with both sides at exactly the same angle.



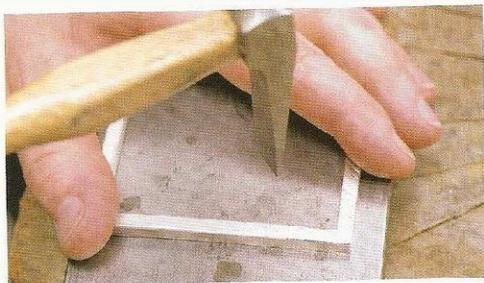
5 Once the groove is established, use a square file held so the square angle runs along the bottom of the groove. Again, use controlled strokes and turn the metal to prevent one side from being filed more than the other.

6 If one of the angles does not form a perfect right angle, use a fine blade to saw into the corner to remove a tiny amount of metal (see technique 18). File the open ends of the wire with a flat file until they fit together perfectly (see technique 4).

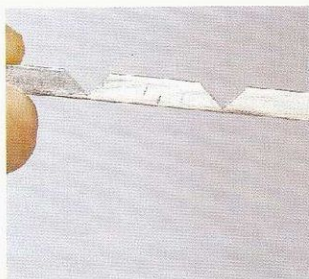


7 Use lengths of binding wire to keep the square frame together, ready for soldering. Stick feeding is a good way to solder these corners, because it allows you to apply just the right amount to fill them without repeated applications of pallions (see technique 11). If you prefer, however, use the basic method of applying large pallions of hard solder to the seam before heating. It is unnecessary to use graded solders since the seams are far enough away from each other not to present a problem. Pickle the bangle (see technique 10).

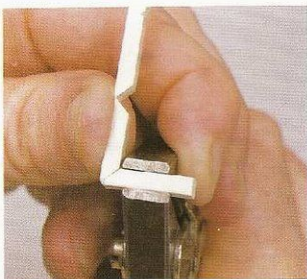
8 File off any excess solder from the seams with a flat hand file (see technique 4). File the inside edges with a safety-back file, reaching right into the corners. Emery the whole bangle with flat buff sticks (see technique 5). They are perfect for a job like this because they will prevent you from rounding the edges. It is unnecessary to emery the surface perfectly smooth as the textured finish will cover up minute imperfections.



9 Use the sharp end of a riveting hammer to create a cross-hatch pattern on the outside faces of the bangle (see technique 19). Polish to bring up the shine (see technique 6).



6 File until the groove is at least two-thirds of the way through the strip of metal and you can see the faint ghost of a line on the reverse side. Be careful at this stage, as the grooved section is quite fragile.



7 Anneal the filed groove (see technique 7), then hold one side steady in a pair of parallel pliers and gently lever the other side around with your fingers. Use a square to check that it is a perfect right angle.



8 Solder the seam shut when you are sure it is the correct angle (see technique 11). You may have to file away more metal to achieve a precise right angle.

The Round Bangle

1 First, anneal the wire (see technique 7). Bend it around a bangle mandrel until it is approximately the right size (see technique 8). Use the extra length to provide leverage since the wire is quite thick; the surplus can be sawn off later when you have the size and shape you want. Use a hide mallet to tap the metal into a roughly circular shape.



4 File the seam with a flat file, using broad strokes around the edge to remove excess solder (see technique 4). Use a half-round file on the inside of the bangle. Make sure the bangle is round by tapping it around a mandrel with a hide mallet. If it becomes too hard to shape, anneal it (see technique 7).

2 Saw through the wire where the ends overlap (see technique 2). Lever them back together with your hands to create a tight seam. Press the bangle against your peg and saw through the gap a couple of times. This will close the gap a little more. Spring fit the seam by pushing the two ends a little past one another; they will then spring back a fraction, creating a tight seam.

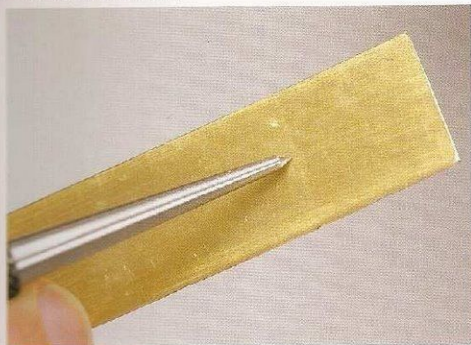


5 Emery the surface of the bangle to remove any deep scratches (see technique 5). Tap all over the surface with a ball-ended hammer to create a dimpled texture (see technique 19). Polish the bangle or leave it 'mat' if you prefer (see technique 6).

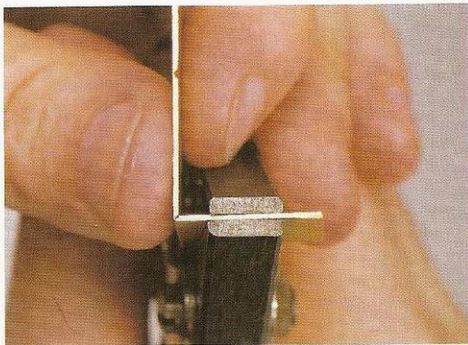
3 Open the gap and paint borax on the inside of the seam. Either stick feed the seam with hard solder, or apply a couple of pallions of hard solder if you prefer (see technique 11). Heat the area around the seam only. Pickle (see technique 10).



Mitering Sheet Metal



1 This follows the same procedure as for rod or bar, but it requires more control. Mark and file the groove in the same way. Continue until you are three-quarters of the way through the metal and you can see a faint line on the reverse side of the sheet.



2 Anneal the grooved area of the metal (see technique 7). Hold the sheet in a pair of flat pliers and gently fold the metal around until it forms a perfect right angle. Check the angle with a square before soldering, either by stick feeding or by positioning pallions along the seam (see technique 11).

The Triangular Bangle

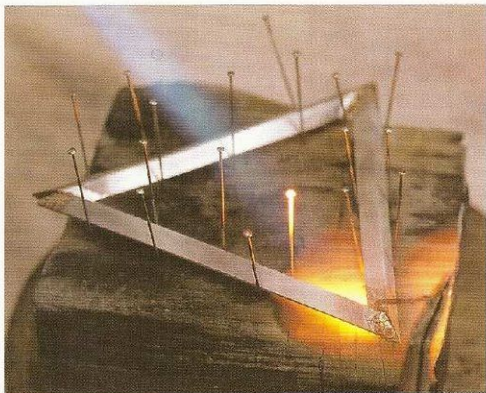
1 Square off one end of the remaining square wire in the way as before (see step 2 of the square bangle). Set your dividers to $3\frac{1}{2}$ in (9cm) and mark this length from the squared end around all four sides. Saw through the wire on the waste side of the line (see technique 2). Cut two more pieces in the same way. File the ends with a flat hand file until you have three pieces that are exactly the same length (see technique 4). This is important or you will be unable to make an equilateral triangle.



2 File both ends of each strip of wire at an acute angle with a coarse flat hand file. Hold the wire against a slot in your peg. It will create an elongated diamond shape. Note that, unlike the square bangle, the edges do not sit flat but are slightly rotated. Continue to file the ends until they each make neat-fitting 60° angles.



3 Balance the three pieces ready for soldering. This is a challenging task, so be patient. Here, we have used a charcoal block and dressmaking pins inserted around the wires to hold them in the correct position. Paint borax on the seams, then stick feed hard solder into the corners until there are no gaps (see technique 11). Leave the bangle to cool and then pickle (see technique 10).



DECORATIVE FINISHES

The final look of a piece of jewelry will depend largely on the surface treatment you decide to use. Metals need not have a highly polished surface to look beautiful. Sometimes a soft matt finish is more appropriate, or you could choose a finish to complement the color of stones or to reflect the warmth of organic materials, such as pearls and wood. Experimentation is the only way to learn what will look good, so the following finishes are just a few suggestions of alternatives to polishing that you can experiment with.

Unlike polishing, some of these techniques do not take place as the final stage of a job. Often the texturing of a piece will occur early in its fabrication, so some consideration should be applied to the suitability of the chosen surface. Pieces should be filed free from scratches and emeryed to a smooth surface before you apply the textured finish (see techniques 4 and 5).

Matt Finishes

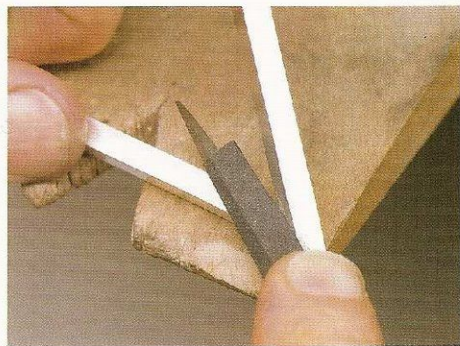
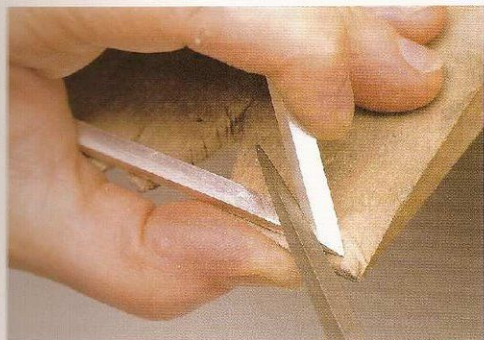
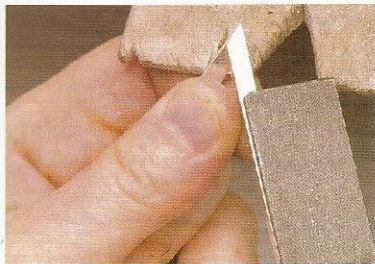


1 Rub the metal with a glass brush dipped in a mixture of pumice powder and detergent. Keep the piece wet by regular rinsing. It will develop a semi-matt sheen. Try to use the brush so the strokes go in the same direction. Take care not to touch the end of the brush, as particles of glass fiber can cause considerable discomfort under the skin.



2 Use a brass brush and a little soap and water to achieve a more subtle matt effect. Brass brushes can also be attached to powered drills and polishing motors, but still need to be used with a soap lubricant.

4 File the outside edges with a flat hand file, keeping your strokes controlled and flat so you do not change the profile of the wire (see technique 4). Round the tips of the corners just a little so they are not sharp to the touch.



5 File the inside angles with a safety-back file. This allows you to work right into the corners to keep them crisp and accurate.

6 Emery the outside edges with a flat buff stick and the inside edges with emery paper wrapped around a safety-back needle file (see technique 5). When you have removed all marks, polish the bangle with tripoli and rouge for a lustrous shine (see technique 6).

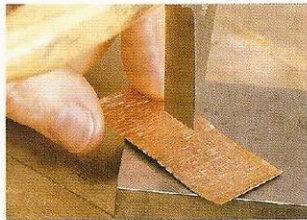
Hammered and Scratched Effects



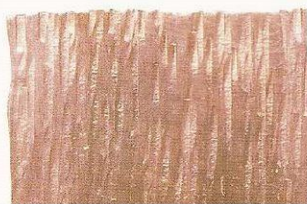
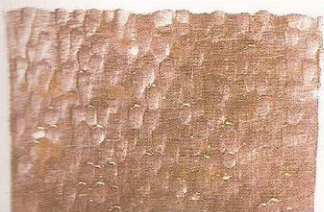
1 Place the metal on a flat plate and hammer lightly all over the surface with a ball-end hammer to create a dimpled look.



2 Place the metal on a flat plate and use the straight edge of a riveting hammer to create a bark-like texture.



3 Place the metal on a flat plate and use the straight edge of a riveting hammer first in one direction, then turn the metal 90° and work across the original lines.



Stone-set bracelet

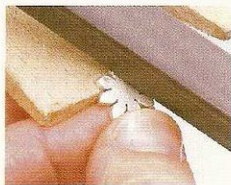
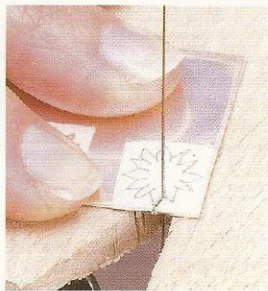
You will need

- 9 round flat-back cabochon stones, $\frac{1}{8}$ in (5mm) in diameter
- $4\frac{1}{2}$ x $\frac{1}{2}$ in (12 x 2cm) of $\frac{1}{16}$ in (1.5mm) silver sheet
- $4\frac{1}{2}$ x $\frac{1}{2}$ in (12 x 2cm) of $\frac{1}{32}$ in (1mm) silver sheet
- 18 closed and 12 open jump rings made from $\frac{1}{8}$ in (1mm) round silver wire (see technique 17)
- A catch and clasp – a small hook clasp is used here with a catch made from twisted wire (see techniques 14 and 16)
- Basic tool kit
- Bristle brush
- Stone-setting tool
- Burnisher

Uses technique flaps 1, 2, 4, 5, 6, 10, 11, 14, 16, 17, and 20

This pretty bracelet uses a sunflower motif as a mount for different-colored cabochon stones. Clear stones are preferable, since they allow the textured center of the sunflower settings to show through.

1 Transfer the round-petaled sunflower shape onto the thicker silver sheet, and the spiky-petaled sunflower design onto the thinner sheet (use method 1, technique 1). You will need nine of each size. If your stones are larger or smaller than those used here, adjust the size of the sunflowers accordingly.



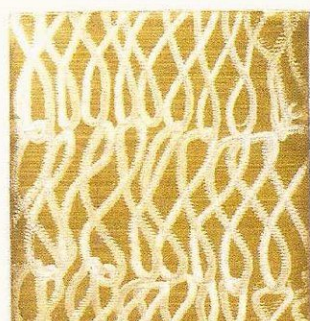
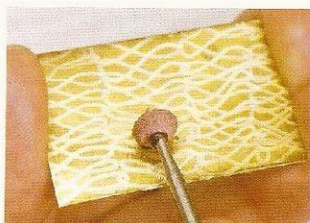
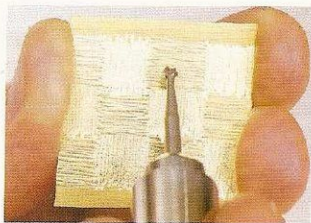
2 Carefully saw around each flower shape, taking care to saw on the waste side of the line (see technique 2).

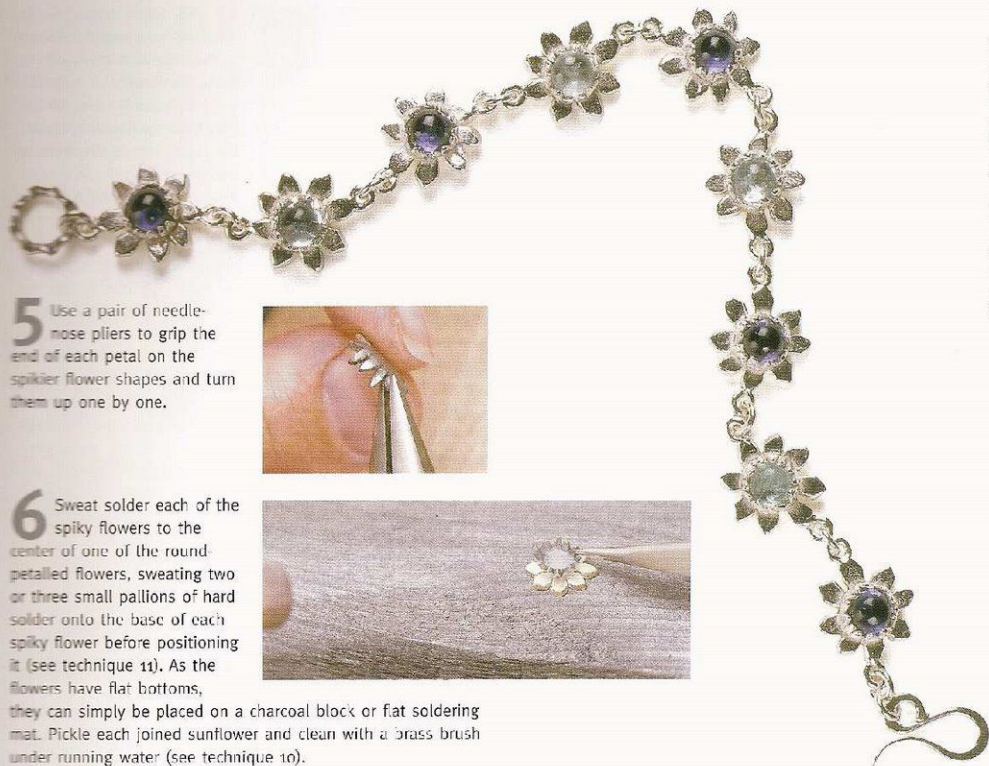
3 File the sides of the sunflowers to neaten the outline, then file the edges at an angle to round them slightly (see technique 4).

4 Emery the surface of each flower, both back and front, until they are smooth and free of marks (see technique 5).

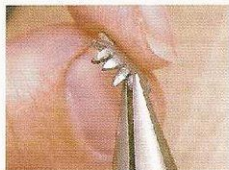


4 Burrs and pink points can be attached to an electric polishing motor or drill and used very effectively across the surface of metal. A steel burr will leave a more defined pattern than a pink point. Build a pattern by using repeated movements, such as straight lines, checks, circles, and figure-eights. They are useful for texturing the reverse side of hollow forms, such as brooches.





5 Use a pair of needle-nose pliers to grip the end of each petal on the spikier flower shapes and turn them up one by one.



6 Sweat solder each of the spiky flowers to the center of one of the round petalled flowers, sweating two or three small pallions of hard solder onto the base of each spiky flower before positioning it (see technique 11). As the flowers have flat bottoms,



they can simply be placed on a charcoal block or flat soldering mat. Pickle each joined sunflower and clean with a brass brush under running water (see technique 10).

Oxidizing

This term refers to the discoloration of metals when they are exposed to heat and chemicals in the atmosphere. Jewelers use special chemical preparations to achieve controlled coloring effects, the most commonly used being a sulfur solution for turning silver into a grayish-black color. The possibilities for chemical coloring are too varied to go into in detail here, and are not usually suitable for home use. It is advisable to find a product that can either be used safely at home or to gain access to chemical extraction facilities at a local college. Always follow the manufacturer's directions carefully. Oxidized pieces can be lightly polished to highlight the raised areas or left as they are.



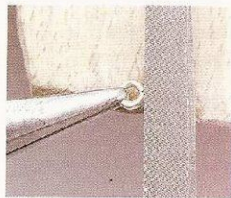
Plating

Gold and silver plating is a specialist process whereby a very thin layer of pure gold or silver is deposited on the surface of base or precious metals to change their final color. It is therefore possible to make something cheaply in one metal, then make it look like gold! It is not advisable to attempt this technique at home. Simply take your finished piece to a professional plater.

Plating will not cover scratches or other imperfections. In fact, it will highlight any faults, so be careful to achieve a good finish and remove any polishing residues. It is also possible to plate areas selectively by painting a varnish onto the areas you do not want to plate. The varnish simply peels off afterwards.



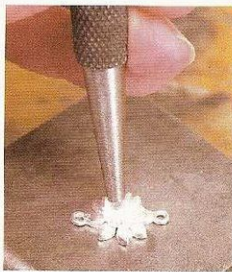
7 Next, hold a closed jump ring in a pair of flat pliers and file a flat edge on the side where the seam is (see technique 4).



8 File two small flat edges on each of the sunflowers, on opposite petals. This is where the jump rings will be soldered.



9 Place the flowers on a charcoal block and position the closed jump rings so that the flat sides of the rings and flowers are touching. Paint a little borax onto each seam, followed by a pallion of medium solder (see technique 11). Heat the flowers and rings; the flowers need to be heated more than the rings since the rings need very little heat to reach soldering temperature. You may need to nudge the rings toward the flowers as the solder melts with some tweezers. Pickle and clean all the flowers (see technique 10).



10 Use a center punch to create the texture in the base of each flower. Place the flowers on a steel block and tap the end of the punch with a hammer. Move the punch across the center of the flower until the indentations cover the base.



11 Link the flowers together using the open jump rings, taking care to close the rings tightly together. Use two pairs of flat pliers to do this (see technique 17).

Reticulation

This surface treatment looks a little like the surface of the moon, soft and sparkly with an organic feel. It works best on silver, gold, copper, and brass. Reticulation involves heating the metal until it becomes almost molten – a higher temperature than soldering, but a little lower than melting temperature – and then quickly quenching it in cold water so the metal contracts unevenly, causing the surface layer to ripple. Reticulation is hard to control, and it takes a lot of practice to learn the difference between just the surface melting and total meltdown! A word of caution: Do not attempt to reticulate a piece once it has been constructed. This will end in certain disaster, as the solder will run and the seams will collapse. Only use reticulation on sheet metal before cutting out, or on pieces that have no solder seams.



1 Use metal between $\frac{1}{4}$ and $\frac{1}{2}$ in (0.5–1mm) thick. Thinner metal will melt into holes and thicker metal will take longer to heat. Paint borax all over the surface (see technique 11), then heat the metal on a charcoal block with a strong flame. Heat the whole surface until it glows bright red. Then, with a more pointed flame, move the heat slowly across the metal until it starts to shimmer. Be careful not to linger too long in one spot or you will melt holes.



2 Quench the metal in cold water, then pickle (see technique 10). Clean with a glass brush and pumice powder to bring out the sheen (see matt finishes, page 102). The metal may be left like this or polished. The process can be repeated to build up the texture.



12 Next, solder the jump rings shut to provide extra strength (see technique 11). Stretch the bracelet out on a mat or charcoal block, and maneuver each ring so the seam is uppermost. Paint a tiny amount of borax onto each seam and position a small pallion of easy solder on top. Solder the rings shut one by one with a small, controlled needle flame. Attach the catch and clasp at each end of the bracelet with jump rings (use more than one at each end if you need to make the bracelet a little longer). Solder these rings shut in the same way. Pickle the assembled bracelet and clean (see technique 10).



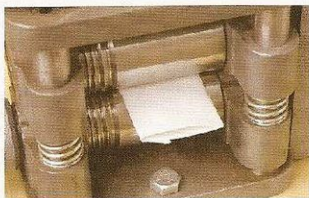
13 Polish the bracelet before setting the stones (see technique 6). Use a bristle brush to access all the details. Make sure you remove all traces of polish before setting the stones.

14 Set the stones one at a time (see technique 20). Here, the petals are levered over the stones instead of a bezel. Hold the bracelet firmly and push the petals in with a setting tool. Alternatively, secure each flower in setter's cement on a wooden block while setting the stones. Finally, when all the petals are folded over, use a burnisher to bring up the shine on the petal tips.

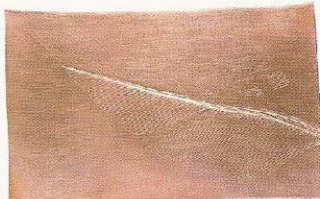


Roller Printing

If you have access to rolling mills, you will be able to create stunning patterned effects using a process known as roller printing. Almost anything with an interesting surface texture can be sandwiched between two pieces of metal and squeezed through the flat rollers of a rolling mill. The pattern will become embossed onto the surface of the metal. The most successful results can be achieved with surprisingly ordinary items, such as sandpaper, lace, feathers, string, and paper stencils. It does not always follow that the harder the object, the better the print. Use well-annealed metal (see technique 7); copper, silver, gold, and brass are the most suitable. Do not roll steel items through the mill because they will damage the rollers.



Anneal two pieces of metal that are the same size (see technique 7). They must be no wider than the rollers. Pickle and dry them (see technique 10). Sandwich your chosen pattern between the two sheets of metal. Wrap all three layers in a piece of paper to keep them securely together. Adjust the tightness of the mill so it is tight, but not impossible to turn the handle. Roll the packet through once and remove the paper. The metal sheets should now have a richly textured surface.



Twisted-wire bangle

You will need

30in (75cm) of $\frac{1}{16}$ in (2mm)
round silver wire
 $\frac{1}{4}$ in (4cm) square of $\frac{1}{16}$ in
(1mm) silver sheet

Basic tool kit

Vise

Draw tongs or large pair of
pliers with serrated jaws

Bangle mandrel or large
round object to wrap the
wire around

Sliding caliper (optional)

Doming block and
doming punches

An extra soldering block
will be useful

This bangle uses wire twisting and doming as its principal techniques. It can be adapted by using different combinations of wire instead of the ones shown here.



Uses technique flaps

1, 2, 3, 4, 5, 6, 7, 8,
9, 10, 11, 16, and 19

STONE SETTING

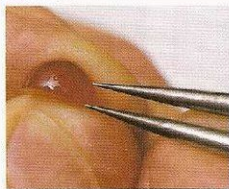
STONE SETTING

The easiest way to set stones is to use a process known as rub-over or bezel settings. This technique is most commonly used with cabochon stones that have a flat back, but it can also be adapted for use with faceted stones. You can use this technique to make stud earrings from any beautiful stones you can find.

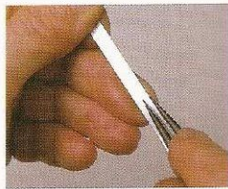
The most important consideration is to use very thin silver – it should be no more than $\frac{1}{16}$ in (0.5mm) thick – to go around the stone. It is possible to buy a special bezel strip made from silver with a higher ratio of pure silver than usual, making it much softer and easier to push over the stone. If you can't find bezel strip, use any thin silver sheet and remember to anneal it thoroughly before you set the stone (see technique 7).

The setting tool used here is simply a short length of brass rod that has been filed flat at one end and polished to remove any sharp edges. It is then pushed into a ball handle that makes it comfortable to hold.

Making the Bezel

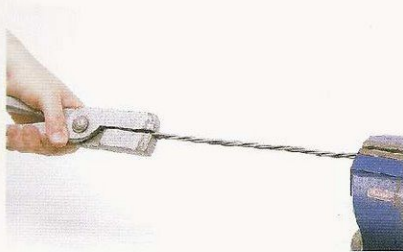


1 Measure the depth of the stone from the base to just above the point where it starts to curve inward. This measurement gives the depth of the bezel, so it is important to measure accurately. The best way is to use a pair of dividers.

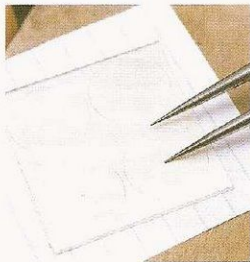


2 Transfer the measurement onto a strip of thin silver or a bezel strip. Run the dividers along the strip and cut along the marked line with snips (see techniques 1 and 2).

1 Saw the wire into three equal lengths (see technique 2). Anneal each piece (see technique 7), then secure them at one end in a vise. Grip the other ends in a pair of draw tongs and twist the wire evenly in one direction (see technique 16). You will need to anneal it several times before the twist achieves the desired tautness.

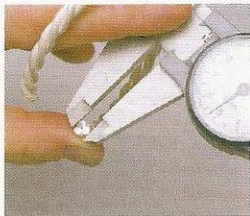


2 When the wire is twisted sufficiently, anneal it again (see technique 7). Bend it around a bangle mandrel, overlapping the ends slightly (see technique 8). Tap it with a mallet to make sure it is perfectly round.

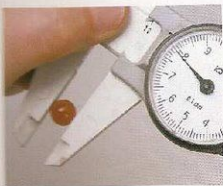


4 Next, set your dividers to a radius of $\frac{1}{8}$ in (8mm) and draw four circles on the silver sheet (see technique 1).

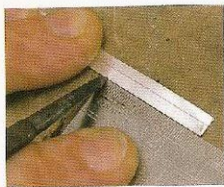
3 Saw off the ends of the twisted wire to remove the section that has been in the vise and to adjust the overall length to fit your wrist (see technique 2).



5 Measure the width of the twisted wire with a sliding caliper or your dividers. The width will vary according to how tight you have twisted the wire and the type of wire you have used.



3 Next, measure the diameter of the stone. Use a sliding caliper or a pair of dividers and a ruler. Multiply this measurement by 3.142 to figure out the circumference of the stone. This is the required length of bezel strip.



4 Mark the measurement with a scribe and cut with snips or a saw, allowing a tiny amount extra for filing (see techniques 1, 2, and 4).

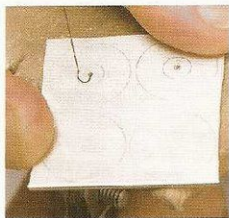


5 Alternatively, cut the bezel strip to the correct depth with snips, then wrap it tightly around the stone and cut where it overlaps (see technique 2).

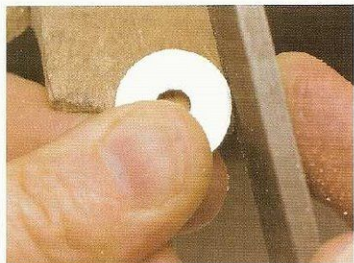


6 Adjust the seam until it fits snugly; solder it shut with a portion of hard solder, then pickle (see techniques 11 and 10). Make the ring perfectly round by tapping it around a mandrel or gently manipulate it into the correct shape with a pair of half-round pliers.

6 Halve this measurement, set your dividers to this figure, and draw a small circle centrally inside two of the large circles (see technique 1). Drill a small hole in the center of the two small circles (see technique 3). Saw out the inside circles, taking care not to wander over the line (see technique 2).



7 Saw around the four large circles, taking care to remain on the outside of the scribed line (see technique 2). File around the outside edges of the circles, up to the scribed line, with a flat hand file (see technique 4). Support the circles against a slot in your peg while you do this.



8 Check the twisted wire will fit tightly into the sawn-out holes in two of the circles. Open up the holes if necessary with a round file (see technique 4). Anneal all four circles, then dome them in a doming block with a large punch (see techniques 7 and 9).



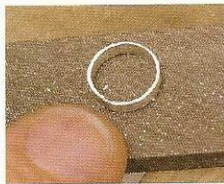
9 The circles should be domed until they form a softly rounded shape when they are put together. Follow the directions for making a hollow bead in technique 9, but there is no need to drill a hole through the center of the bead.

10 Remove any excess solder with a flat file, taking care to maintain a crisp line around the center (see technique 4). Emery both domes carefully (see technique 5).

Setting the Stone



1 Check that the bezel is the correct size. It should be a tight fit around the stone. If it is too small, you can stretch it by squeezing it in a pair of half-round pliers as you move them around the bezel.



2 Rub the bezel on a flat file to even out the top and bottom edges (see technique 4).



3 Solder the bezel onto your jewelry piece as instructed in the project directions. To make a pair of simple stud earrings, solder the bezel onto a $\frac{1}{8}$ in (1mm) base plate with three or four pallions of medium solder (see technique 11).



4 Saw away the excess metal from around the bezel, then file the edges with a flat file (see techniques 2 and 4). Solder on the ear posts with easy solder. You will be unable to solder anything once the stones are in position. Pickle the setting and make sure it is clear and dry (see technique 20). Place the stone in the setting.

11 Slot one end of the twisted wire into a hole in one of the domes. Balance the bangle in a pair of spring tweezers so the dome is supported on the soldering block. Paint plenty of borax around the seam between the wire and the dome (see technique 11).



13 Position the remaining dome on the other end of the twisted wire. The easiest way to balance it is to hold the bangle upright between two soldering blocks. The unsoldered dome should sit firmly on top of one of the blocks. Solder this dome the same way as before, then pickle (see techniques 11 and 10).

12 Solder the dome and wire together using the stick-feed method, since the seam is likely to take a lot of solder (see technique 12). You do not need to heat the whole bangle, but it will need a lot of heat aimed at the section of the wire that joins the dome. If you do not feel confident with stick feeding, place pallions of easy solder around the seam and be ready to apply more as they melt. There may still be tiny gaps, but as long as the dome is firmly soldered in position, this will not matter. Pickle the whole bangle (see technique 10).



14 Finally, file off any excess solder from the outside of the domes with a flat needle file and emery to smooth away any scratches or file marks (see techniques 4 and 5). Polish the bangle or apply a matt finish (see techniques 6 and 19). Polishing large bangles on a polishing motor requires caution, because it is easy to catch the bangle on the buff.



5 Hold the setting firmly against the peg or in a ring clamp. Grip the setting tool in the palm of your hand and place the polished end against the top edge of the setting. Use a rocking motion, lifting your elbow rather than moving your hand, to push the top edge of the silver over the stone. Do this at the 12, 6, 3, and 9 o'clock positions, in that order.



6 Continue the sequence by pushing the bezel progressively over the stone, working on opposite sides as you go. You will need to exert more pressure on the tool as you progress.



7 When the bezel has been pushed completely over the stone, use a flat needle file to remove any bumps from around the top edge of the setting (see technique 4).

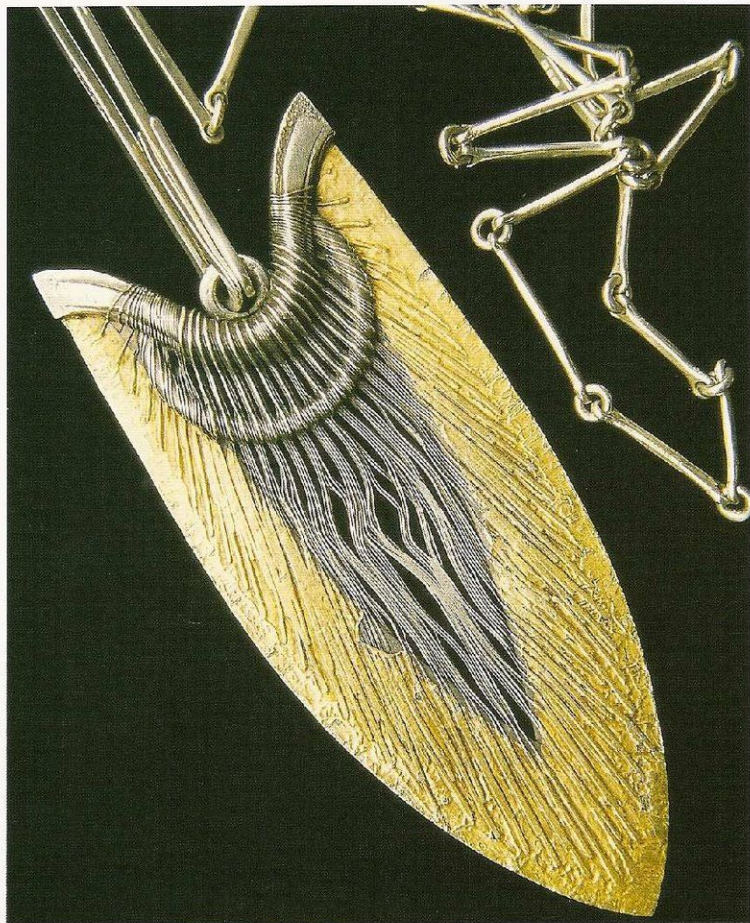


8 Use a burnisher with a little lubricant to rub the bezel until it is smooth and then give it a final polish around the edges.



GALLERY

Looking at the work of other jewelers can give us a better understanding of what can be achieved. Examination of the artists' esthetic sense, and the techniques employed, provides the stimulus to develop a personal vision and approach to this exciting craft.



◀ **Wally Gilbert**
Blade pendant

This pendant has been painstakingly constructed from ultrafine silver and gold wires. The wires have been fused together – a specialist process that requires no solder – and the central area has been oxidized to produce a soft, aged look. The chain is both elegant and simply fabricated. Silver wires have been beaded and flattened at each end, then drilled and linked together with jump rings.



▲ **Catherine Mannheim**
Three necklaces

The top and bottom necklaces are made from silver and gold tubing set with aquamarine and sapphires. The beaded necklace in the center is made from frosted rock crystal and handmade silver and gold beads. All of the necklaces feature a muted, silky surface texture that enhances their tactile quality.

► **Wally Gilbert**
Gyroscope necklace

The circular panel of this necklace has been attached to the chain with tiny pins, which allow it to spin on its axis like a gyroscope. It was made using a refined technique that involves weaving and fusing very fine wire to create the appearance of an exquisite lace fabric.



◀ **Heinz Brummel**
Red lips, red nails

The bold geometric shapes and dense primary colors imbue this pendant with a playful, kinetic quality. It was fabricated using simple techniques, but is beautifully executed.



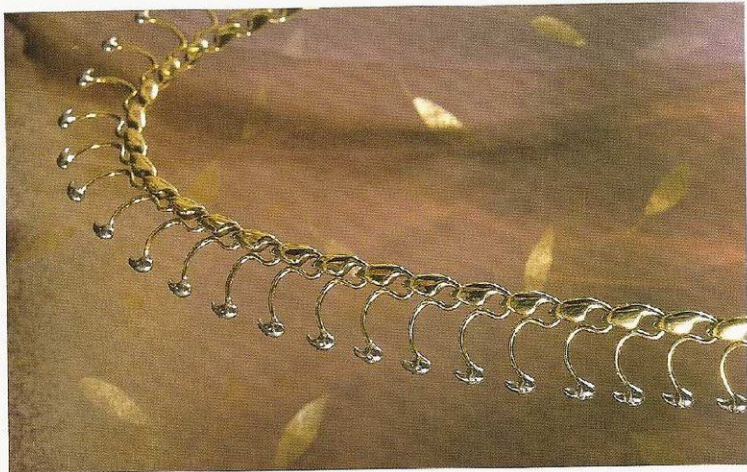
▼ **Nina Bukvic-Hobson**
Forest

This unusual pendant was inspired by the tangled patterns of tree branches in winter. It is made from fine beaded wires that have been melted and fused together. The piece was oxidized to achieve the dense, matt color.



► **Brett Payne**
Flamingo necklace

This gold and platinum necklace was constructed from beautifully carved and cast components that effortlessly combine function and ornamentation. The connecting mechanisms were designed to be integral to each unit, creating a necklace that is both fluid and luxurious.





▲ Claire Robinson

Hair pins

This collection of richly colored and textured hair pins are set with semiprecious stones and freshwater pearls. Photoetching and gold leafing provide ornamentation to the pieces.

▼ **Madeline Coles**

Snow queen

Inspired by fairytales and medieval ornamentation, this ring is constructed from five radiating layers of silver. Tiny solid silver balls provide additional decoration.



▼ **John Richardson**

*Bombé, cocktail,
and cardinal rings*

These flamboyant rings combine vividly colored enamel with stunning gemstones. The rings are cast in silver and gold.





◀ **Kim Hall**

Two rings

These mechanically inspired rings are made from silver and gold, with solid steel and gold balls set into the satin-finish band.

▶ **Nina Bukvic-Hobson**

Pearl rings

These rings are formed from fine silver and stainless steel wires interspersed with freshwater pearls. They were fabricated using a combination of crocheting and sewing techniques to build up the dense, nest-like shape.



▶ **Madeline Coles**

Fretwork ring

This extravagant creation in silver employed fine sawing techniques to achieve the intricate fretwork effect. Twisted wire and solid silver balls provide additional embellishment to this ornate piece.



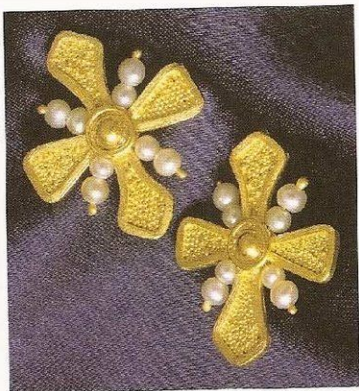


◀◀ Whitney Abrams

Gold earrings

The ancient technique of granulation was used to achieve the lustrous surface texture on these exquisite earrings. The earrings on the far left

are set with irregular bicolored tourmalines with a detachable drop suspended from each. The cross earrings (near left) are enhanced with sprays of cultured pearls.



► Madeline Coles

Wax-carved earrings

The shape of these four-sided earrings was first carved in wax and then cast in silver. The tiny gold balls were soldered on individually to achieve an effect similar to granulation.

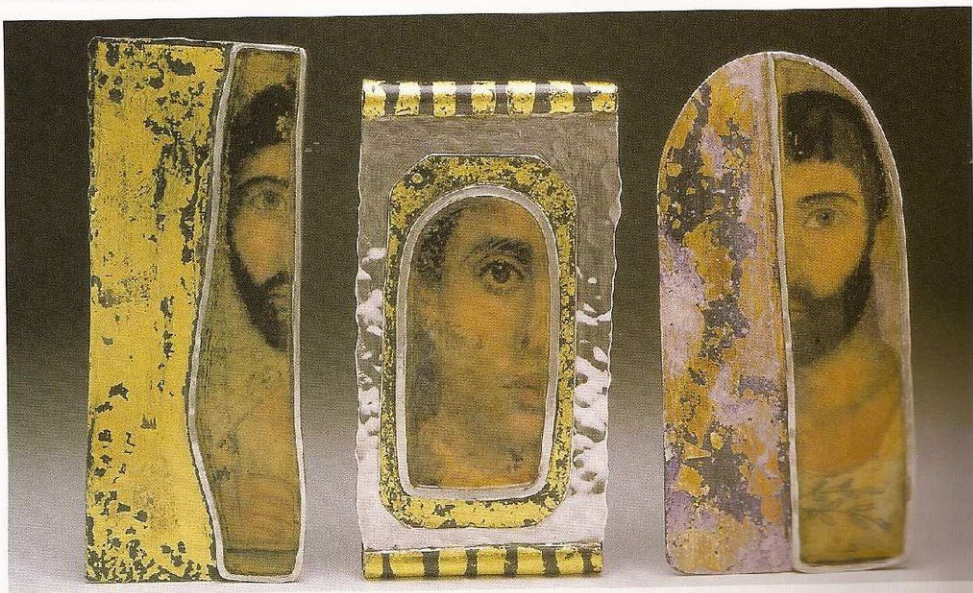
▶ **Catherine Mannheim**
Earrings

These elegant earrings are made from softly textured silver and gold. The hollow central sections were created using the technique of doming and are suspended from stylish silver ear hooks with flattened jump rings.



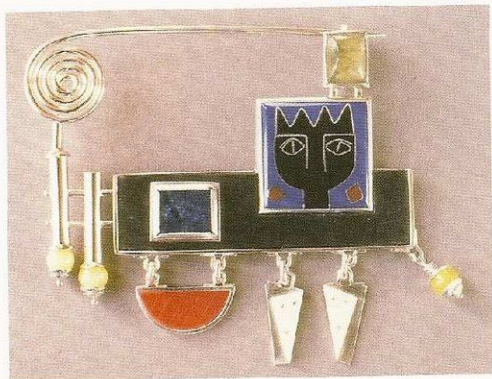
▼ **Claire Robinson**
Ancient faces brooch and pendants

These evocative pieces were inspired by an exhibition of Roman portraits and combine textured silver and gold with collage and resin. The selective application of oxidized silver and gold leaf gives the pieces a look of aged splendor.



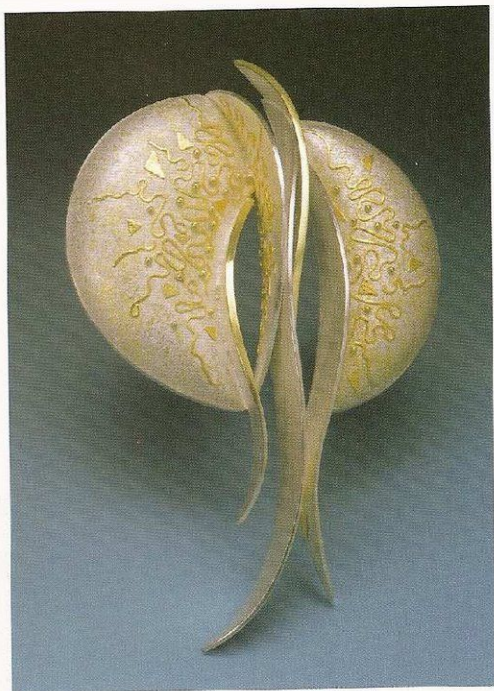
▼ **Heinz Brummel**
Prince and boatman

This brooch combines simple geometric shapes with intense color and found objects, such as wood and stones. The brooch's whimsical nature belies its clever design. Note how the coiled and tapered pin is harmoniously integrated into the design, fulfilling both functional and decorative roles.



▶ **Pat McNally**
Landscape I

This award-winning brooch was conceived to echo the undulating hills of the North Yorkshire moors in England. The piece explores the potential of surface texture and pattern, combining a rich, embroidered surface quality with a strong use of form and color.



▶ **Sharon McSwiney**
Aboriginal brooch

This copper and brass brooch was inspired by aboriginal dot paintings. It uses the techniques of doming, chemical coloring, etching, and stamping.





◀ Sharon McSwiney
Sun brooches

These light-hearted and exuberant brooches are made from sawn motifs in copper and brass and embellished with silver wire, punching, and etching. They have been chemically colored to accentuate the linear decoration, creating a more three-dimensional effect.

▶ Sonia Cheadle
Bangles

These minimalist bangles are made from square silver wire. Each bangle is decorated with a simple band of gold that has been set with diamonds.



◀ Rae Duncan
Belt buckle and belt

This unusual belt buckle is made from silver and gold with a banded agate central stone. The piece is constructed from fluid, tapered wires and hollow, domed forms. The belt itself was designed to echo the organic shapes of the buckle.

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