



Marquetry pictures can add visual flourish to furniture of all kinds. For this walnut coffee table, Silas Kopf mounted an 18-in. by 46-in. floral picture with background of Australian laurel on a plywood base. Let into the table's top.

Marquetry on Furniture

Double-bevel sawing leaves no gaps

by Silas Kopf

Although we really don't have a long tradition of using a marquetry in American furniture, applying assemblages of colored veneers to add visual interest to a piece is gaining favor. Veneers, sold in hundreds of colors and textures, are quite workable for making rich designs and pictures. The techniques involved, though not simple, are easily learned; the real challenge is in creating patterns complementary to the furniture being decorated.

One of the beauties of marquetry is that it requires very little equipment. Perfectly satisfactory pictures can be made with a good hand-held fretsaw or a knife, although, as I'll explain later in this article, a power scroll saw has advantages. There are several methods for making a marquetry picture. I favor a technique called the double-bevel cut, as it offers both speed and precision when making just one or a few pictures. With relative ease, many pieces of veneer can be fitted together without gaps between the parts. I mount, or press, my marquetry work onto panels, which can then be applied to small boxes and furniture of all sizes. This double-bevel method is applicable to about 95% of the work I do.

Double-bevel cutting is an additive process. You start with two pieces of veneer, one of which will fit into the other, and you build up the picture around them part by part, taping each piece into position until the picture is complete and ready for mounting. One piece is set on top of the piece it will fit into, and the saw, angled to cut a bevel, cuts through both at once. The waste is set aside and the two pieces are

placed together. The gap that is created by the sawblade is taken up by the bevel, so when the piece on top "falls into" the lower one, it will wedge in place with no space or an invisibly small space between, as in figure 1 (p. 62). The angle of the bevel is a function of the thickness of the sawblade and the thickness of the veneer. Using $\frac{1}{28}$ -in. thick veneer and 2/0 jewelers' blades, the gap will be filled if you cut a bevel of around 13° .

Designing and making a picture—I try to make the picture the focus of my work and then design the furniture to best display it. This rules out mounting pictures close to the floor; eye-level application on cabinet doors or on tables seems ideal. Surfaces subjected to a lot of abrasion and wear aren't good locations for marquetry, but tabletops will hold up fine if they are protected with a hard surface finish such as polyurethane. Keep in mind that tabletops are horizontal surfaces that are frequently cluttered, so your efforts may be invisible much of the time.

Using marquetry on furniture calls for relatively large pictures that fit the human scale of pieces being decorated. A tiny, detailed rendering, for instance, goes better on a small box than in a tabletop. Attention should be paid to grain texture and figure as well, since this has a great deal to do with the size and scale of a picture. Marquetry pictures of any size are possible, and with a little planning the throat opening of the saw needn't restrict picture size—you can make

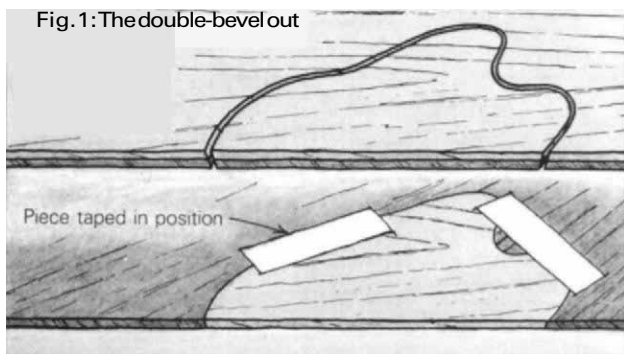
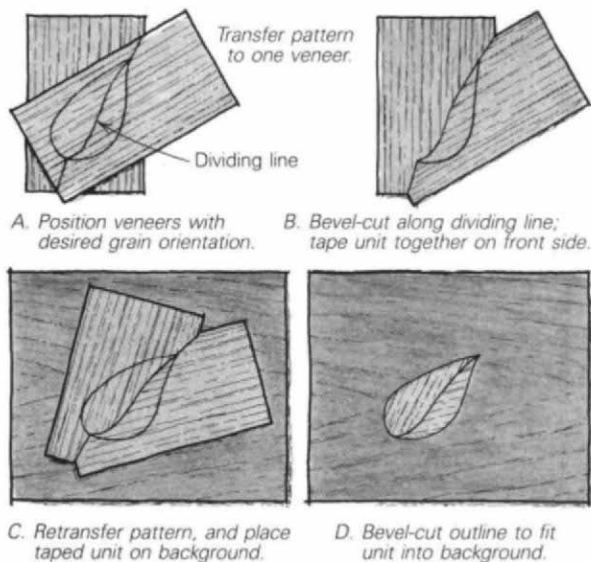


Fig. 1: The double-bevel out

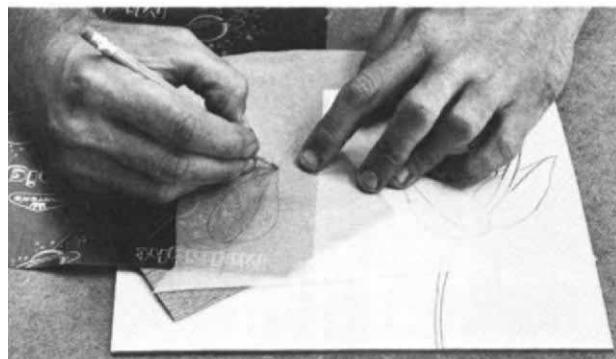
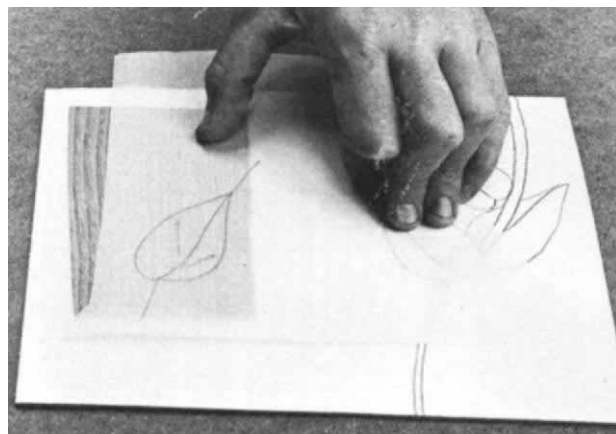


several small pictures in sections and put them together later on the finished piece.

Making the picture itself with the double-bevel technique can best be explained by using a leaf pattern consisting of two pieces of the same kind of veneer joined at the middle in the process shown in figure 2. This leaf "unit" is then placed in a background of another color of veneer. When you double-bevel cut two pieces of veneer, you may find it helpful to put a little rubber cement between the pieces to keep them from slipping during cutting. The rubber cement will have to be cleaned off before pressing, so to avoid that step, you can rely on finger pressure to keep the veneer aligned. Transfer the leaf pattern using the method described in the photos above.

To set the leaf into the picture, place it on the background and then drill a $\frac{1}{16}$ -in. hole through the taped unit and the background. The hole can go anywhere on the outline of the leaf, although it's more practical to drill where another part, such as a stem, can ultimately cover the hole. Insert the sawblade through the hole and saw around the perimeter of the leaf, again on a bevel. After sawing, the leaf should fit into the background with tight joints.

As you build the picture, hold it together with veneer tape applied to what will eventually be the front or exposed part of the picture. The tape will obscure the face side, so you'll have to transfer your patterns to the back as the work progresses. This will make it possible to see the joints and align your tracings with parts that are already in place. You can

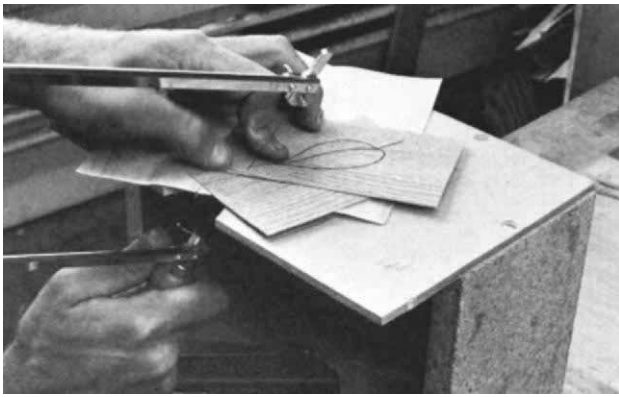


A marquetry picture begins as a drawing transferred to veneer with tracing and carbon paper. In the top photo, Kopf has traced the leaf and positioned it on the veneer for a pleasing grain orientation. Next, to transfer the pattern, he slips carbon paper between the tracing paper and the veneer. He often skips the transfer, preferring to just draw his picture directly on the veneer. This allows more spontaneity—the successful picture relies as heavily on the wood's figure as it does on a preconceived plan.

make more complex patterns by transferring then sawing more and more pieces into the package. It is always the same additive process. Occasionally multi-piece units will be added to one another, a flower for example. The individual petals each have three or four parts, which are made up separately. Then they are all added together to make the more complex flower. Experience will show where to make these divisions. Parts that are structural units, such as petals, a face or a tree, work well as single marquetry units.

The actual cutting can be done by hand or with a power scroll saw. If you do it by hand, use a deep-throat fretsaw and a V-notch bird's-mouth saw table made from scrap. With a little practice, you'll be able to hold the saw at the correct angle while manipulating the work over the bird's mouth. When cutting by hand, you should back the veneer with a waste piece to keep work from being splintered by the downward pressure of the saw. Poplar works well as a waste veneer because it saws easily and is inexpensive.

Sawing with a power scroll saw has several distinct advantages over hand-sawing. First, the bevel is maintained at a constant angle by tilting the table of the saw. Second, both hands are free to steer the wood through the sawblade. Third, the work gets better backup support from the narrow opening in the saw table, so no waste veneer is necessary for most cuts. Finally, the throat opening of the stationary saw is often larger, allowing a bigger picture to be made more conveniently. My saw has a 24-in. throat, versus the 12-in. of a deep-



Power scroll saws ease marquetry cutting, but acceptable work can be done with a fretsaw and a bird's-mouth jig, here made of plywood nailed to a box clamped to the bench. Kopf is cutting a leaf pattern, and he is using a waste sheet of veneer as a backing to keep the saw from splintering the back side of the cut.

throat fretsaw (see *FWW* #27, p. 53, for an article on a marquetry-cutting jigsaw).

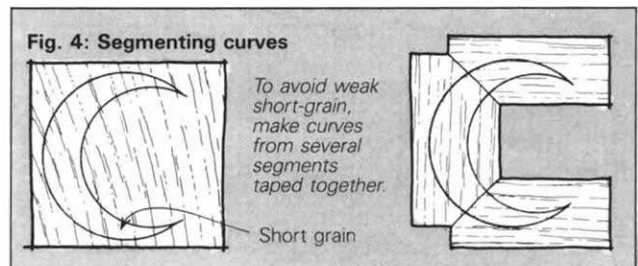
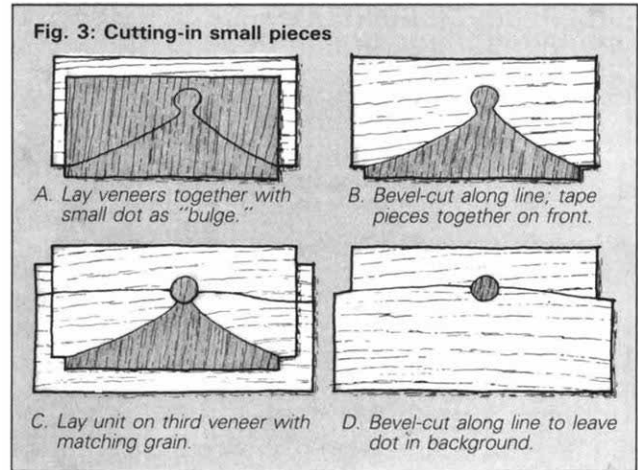
I have removed the hold-down device from my saw so I can better see the saw line. The blade can easily bind in the narrow kerf, so I have to hold my fingers close to the sawblade to keep the veneer from jumping on the upstroke. This sounds dangerous but really isn't, since the saw's short strokes make it unlikely that your fingers could be dragged into the blade. Even if they are, the blade is so fine that it doesn't cause much more than a nick.

The most difficult maneuver in the double-bevel cut is the nearly complete turn around to make a pointed part. When you reach that stage in the cut, the veneers are pivoted with the saw running. While pivoting, pull back slightly so there is pressure on the rounded back of the blade and you can hear that it is not cutting. When the pieces are swung around to the proper orientation, continue cutting on the line. This will make the parts pointed and not rounded over, giving the whole picture a crisper look.

Breaking sawblades is a constant and annoying problem for the marquetarian. The choice of sawblades is a compromise between a thin sawkerf and strength. With double-bevel cutting, 2/0 blades work well. Standard jewelers' sawblades have teeth spaced closely together for cutting metal. These cause problems with certain woods, particularly when power-sawing. Resinous woods, such as rosewood, clog the teeth, overheating the blades and causing them to snap. Double-tooth (skip-tooth) blades are better for marquetry because they adequately clear away the sawdust.

When a blade does break in the middle of a perimeter cut, I return to the original drill hole to restart the cut because it is difficult to insert a new blade in the kerf. When you change the blade the unit may move, so realign it and the background veneer. Retracing a cut in the kerf is also difficult; it's best to saw the perimeter in the other direction, tilting the saw table the opposite way so the bevel will match where they meet.

It is difficult to double-bevel small pieces, but one way is to start larger and cut back. For instance, to make a 1/8-in. dot of walnut in a maple background, scribe the walnut as a "bulge," as in figure 3. Double-bevel along this line and place the completed unit on a second sheet of maple, taking care to match the grain. The next cut will bevel the two ma-



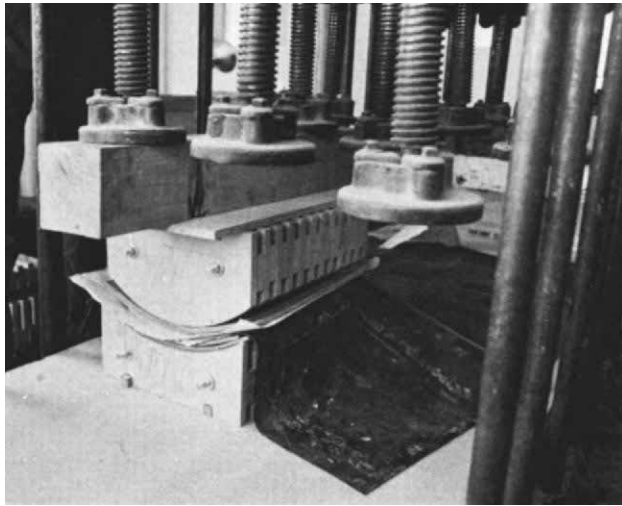
ple veneers together along the grain for an almost invisible joint, while at the same time leaving the dot in place.

Sometimes it's better to knife-in small parts, using the window method. With this method a hole is cut into the background and the piece to be let in is set underneath. You don't need a double bevel here, because the knife takes no kerf. The hole's outline is scribed with a knife, the piece removed and the cut finished. The piece is then ready to be taped in place. In cutting with the knife, only one piece is cut at a time. When you use the window method, the piece to be let in can be slid around until the grain is oriented to best tell the marquetry story.

Selecting veneer—Certain species of wood work beautifully and look good in a marquetry picture. As a general rule the softer or more closely grained the veneer, the easier it is to saw. An open-grained wood, such as oak, takes a little extra care, as it tends to splinter away, particularly in short-grain situations. A single layer of tape covering these spots before the veneer is cut will often hold the wood fibers together. I occasionally rub a little yellow glue on the surface and let it dry before cutting to help hold the wood together. Backing troublesome parts on the power saw with waste veneer also helps. Experience and a few shattered parts will, in time, identify the problem woods. Parts that do shatter can sometimes be salvaged by gluing or taping them together until they go into the picture and are eventually pressed.

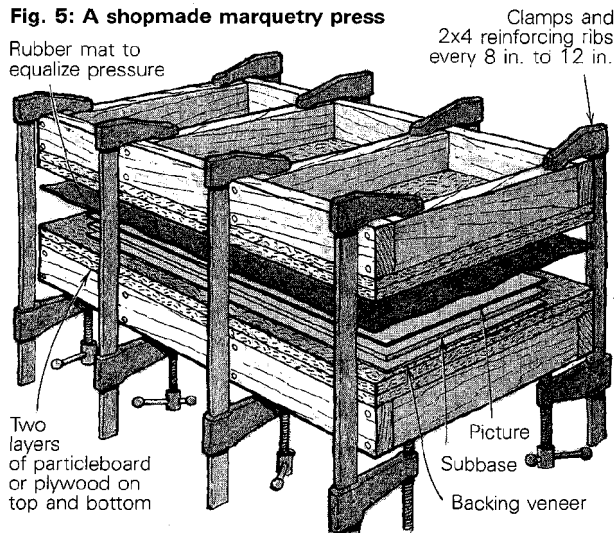
As with all woodworking, you want wherever possible to avoid short grain and its inherent weakness. Thin parts will cut better if the grain is aligned with the long axis. It is often advisable to segment the pieces when forming a thin curve, as with the crescent in figure 4. Tape the segmented pieces together as you go.

At this point a word about veneer tape might be helpful. Every new piece that is cut means the addition of another



Marquetry panels are pressed onto curved tops in this particle-board jig Kopf mounts in his veneer press. The picture is laminated to a subbase of three 1/8-in. lauan plywood sheets. Scrap Masonite and a rubber sheet put between the form and the work spread clamping pressure, and bridge the jig's irregularities.

Fig. 5: A shopmade marquetry press



layer of tape. When there are a number of small pieces in a small area, the thickness of the tape can be a factor when the picture is pressed. The thinnest tape I have found is a 30-gram paper tape manufactured by the Ubro company in West Germany and available from Woodcraft and from Welco Machines, PO Box 18877, Memphis, Tenn. 38118. Even using the thinner tape, the buildup may be so heavy that it's best to remove all the built-up tape and then retape, so that one even layer holds all the little pieces together.

It is important to realize that the colors and contrasts you see when you choose veneer will not necessarily be there in the end. Finishing generally changes the wood color, and it is not always an even change in tone from wood to wood. Time will also alter the picture considerably. Light woods tend to darken and dark woods get lighter, giving the marquetry picture a progressively monochromatic look as time passes. This is why old work often seems faded: it is faded. These color changes are unpredictable, so I usually don't try to compensate for them in my designs.

There are tricks for manipulating color. A traditional way

of attaining a three-dimensional illusion in marquetry is to scorch the wood in hot sand to darken it, simulating a shadow. I have a hot plate with a cast-iron skillet heating sand whenever I'm working on a picture. The depth of the sand is about 1½ in. The deeper the veneer is shoved into the sand, the darker the scorching, because the temperature is hottest at the bottom. This yields a gradation of color that is particularly fitting for shadows. Various woods react differently to the treatment. Soft woods scorch more quickly than harder species. Pointed parts have more surface area exposed to the hot sand and therefore burn faster. Dip the piece in and out until the desired shade is reached. Sand-shaded parts should be slightly darker than you would ultimately like, as there is some surface charring that will be scraped and abraded away after the picture is pressed.

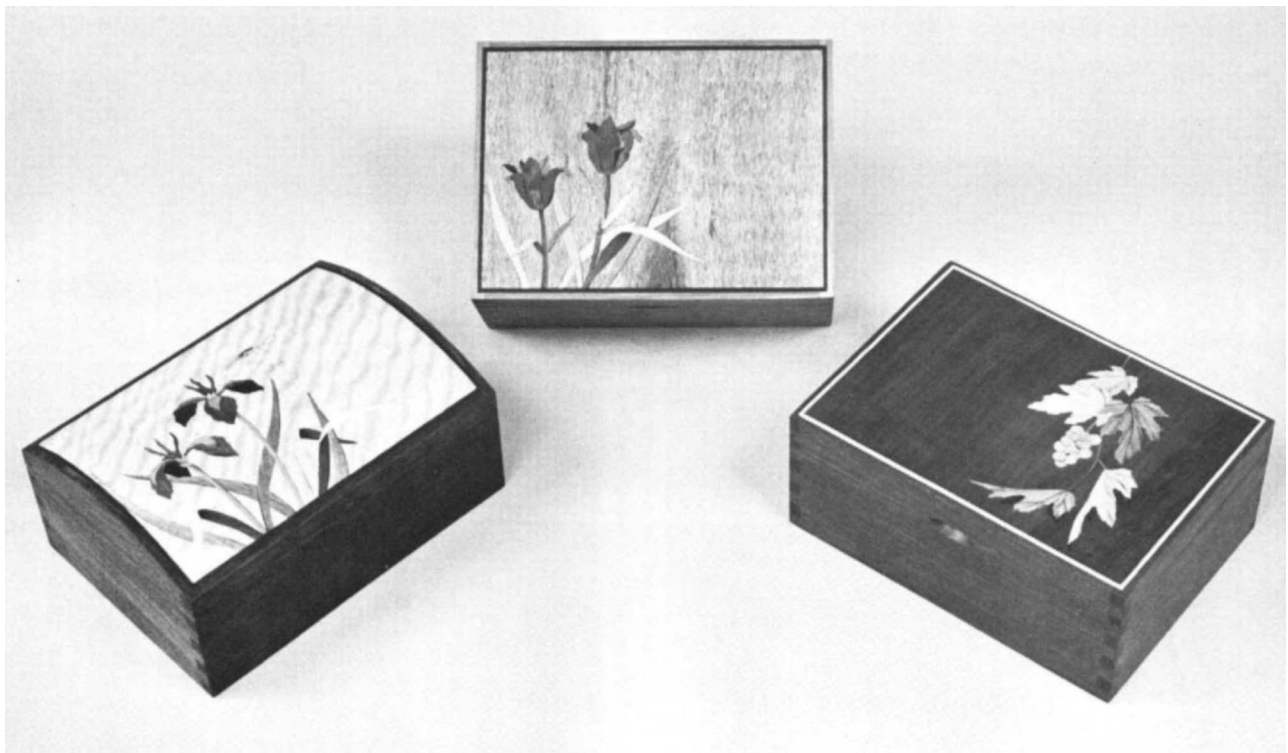
Instead of plunging the piece of veneer into the sand, it is sometimes easier to scoop the hottest sand from the bottom of the frying pan and run the wood through it. I use an old gouge for a scoop. By pulling a curved piece, such as the crescent in figure 4, through the hot sand in the scoop I can char the veneer evenly. In the skillet, the thin ends would burn before the center of the arc became dark enough. You can also stain marquetry parts before or after they are assembled, and dyed veneers of various colors and species are sold by marquetry suppliers.

Mounting or pressing—After the parts have been cut, the picture should be checked over to see if all the parts are present and accounted for. Any missing pieces can be knife-cut in. The finished picture can then be mounted to the panel or subbase that will hold it together after the tape is removed. This panel can become a decorative element in a piece of furniture or it can be put in a frame for display. In any case, a marquetry picture should have solid wood around its edges to protect the veneer from damage.

I prefer lauan plywood as a subbase. It's cheap and available and usually free of voids. I apply many of my marquetry pictures to small boxes with curved tops. For these, I use three layers of 1/8-in. plywood laid up in a curved form (see *FWW* #6, p. 35, for an explanation of this method). Other types and thicknesses of plywood and particleboard work fine as marquetry bases, but solid wood panels should be avoided. They move too much during seasonal moisture changes, and this can pop loose small veneer pieces or cause serious cracks. Subbases should get a backing veneer on the side opposite the picture to keep the panel balanced and prevent warping.

Pressing the picture onto the surface is essentially like any other veneering operation. The key in marquetry is to equalize the pressure over the entire surface. With the slight differences in thicknesses of veneers and the buildup of veneer tape in concentrated areas, the potential for uneven pressure is ever present. A veneer press is the best way to ensure even pressure. But it's a bulky and expensive piece of equipment for the occasional maker of marquetry panels. Not owning one needn't stop you from trying marquetry. Thick pieces of particleboard and quick-action clamps can make a suitable press (figure 5). To spread the pressure evenly, I use a hard rubber mat 1/16 in. thick between the picture and the press. The mat, which I bought at a rubber supply house, is similar to tire inner-tube rubber.

A variety of adhesives can be used, but I generally choose urea-formaldehyde glue. It has several advantages: it spreads



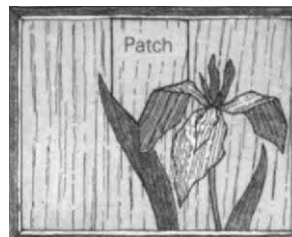
Kopf applies his marquetry to furniture, but small jewelry boxes are a more frequent showcase for his art. After the picture has been mounted and let into the tops of these boxes, Kopf trims the joint between frame and picture with a contrasting wood.

easily, allows a long open time, and also fills gaps by curing to a neutral tan color (of course *you* won't have any gaps to worry about). I don't use contact cements at all because they seem to be unreliable for veneer work.

The marquetry picture should be oriented with the grain direction of the majority of its pieces running at 90° to the grain of the subbase. Run the grain of the backing veneer in the same direction as the picture. Spread glue evenly on the subbase, picture and backing veneer, and then press or clamp it up and let the assembly cure in the press for 12 hours.

The pressed picture emerges from the press covered with veneer tape and isn't much to look at. I remove most of the tape with a hand scraper, working with the grain as much as possible. Then I finish the job with sandpaper. Sometimes it's safer to forgo the scraper and sand the tape off, as pieces that are cross-grain to one another have a way of being torn out by the scraper. I use a hard cork block with 80-grit paper for the initial sanding. The flat block keeps the softer woods from abrading away faster than their harder neighbors, thus keeping the picture from becoming wavy. Because the felt bottom of an orbital sander is particularly prone to leaving a wavy surface, use one only for a final cleanup of cross-grain scratches, using 220-grit paper.

There are two repair problems that will probably occur at some time or other in your marquetry experience. The first is a "blister" in the veneer caused by improper adhesion. The blister is evidenced by a hollow sound when you rub your finger over the work. If an individual marquetry piece has not adhered, raise it with a knife, inject glue under the wood and reclamp, using cauls to localize the pressure over the repair. If the problem is in the middle of a larger expanse of background, slice the blister open along the grain with a knife, again inject glue beneath it and then reclamp the piece.



The second problem you may encounter is scraping or sanding through the veneer. The repair is made by inlaying a patch into the marquetry panel. Let's assume you have gone through at a particular spot. Select a piece of veneer, preferably from the same flitch, which has grain characteristics similar to the piece being replaced. The borders of the inlay patch should parallel the grain of the background and run from marquetry pieces inside the picture to the picture's outer edge, as above. This leaves you with a patch without end-grain butt joints, and it should be less visible. Make a tracing of the area to be recut and use the tracing as a pattern to mark and cut the patch. Bevel the cut so the piece will wedge into the panel when clamped. Set the patch on the panel and scribe around it with a knife. Use a router to cut the panel to the depth of veneer thickness, coming within about $\frac{1}{16}$ in. or $\frac{1}{8}$ in. of the knife line. Use a chisel to remove the rest of the waste material, occasionally checking the patch for a good fit. Glue and clamp, and hopefully your picture will be like new. This method can also be used to inlay veneer into a solid piece of wood, such as a tabletop. If you do inlay, try to avoid cross-grain constructions that will later loosen during seasonal movement. □

Silas Kopf does marquetry and makes furniture in Northampton, Mass. For more on this subject, see FWW #1, p. 33; #5, p. 38; #9, p. 70; #16, p. 67; and #25, p. 90. The Marquetry Society of America, PO Box 224, Lindenhurst, N.Y. 11757, publishes a monthly newsletter with technical information on the craft.