water stains without the disadvantages. They are so named because they tend not to raise wood grain. They can be purchased in ready-mixed colors or as a concentrated base color that can be mixed to different shades. These stains have bright, transparent colors and are excellent in sunlight since they do not fade. Another advantage is that they are nonbleeding, especially when lacquer or varnish is used as the top coat. Because it is necessary to apply these stains by spraying, they are used primarily in industrial finishing.

Sealer Stains

Sealer stains, commonly called commercial stains, are really synthetic sealers that can be used both as stains and sealers. They give a "close to the grain" appearance that is partly penetrating and partly surface in nature. Color can be added by mixing in tinting colors from a tube.

Transparent Lacquer Toners

Made from dyes and lacquer, these give a combined staining and sealing effect. However, their staining properties are not especially good. They are sometimes used over another stain or a filler to add color.

To start, mix enough stain for the entire job. Test for color on scrap wood of the kind to be stained. It is better to apply two light coats of stain than one heavy one. It is much easier to darken the wood than it is to lighten it.

Wash Coat

Wash coating (sealing) is done to keep stain from bleeding, to provide a hard surface for applying filler, and to improve the toughness of the finish. Good sealer for many stains is a wash coat of shellac. This is a mixture of seven parts alcohol to one part of four-pound-cut shellac. In furniture production in which lacquer is used as the final finish, *lacquer sealers* are used.

A wash coat must be applied very thin so it doesn't completely fill the pores and prevent the use of fillers. If shellac is used, brush on a light coat and allow it to dry about one hour. If lacquer sealer is sprayed on, it will dry in about one-half hour. Then sand lightly with 6/0 or 7/0 sandpaper. Wipe clean. The surface is then ready for filling.

60 FILLING

Wood fillers are used in the finishing process for two purposes. Fig. 60–1. They fill and level the pores of the wood and add color to the final finish. Fig. 60–2. The filler may be about the same color as the stain; or a lighter filler can be used with a darker stain to achieve a two-toned effect. Fig. 60–3. While application of the filler may seem simple, it can ruin the complete finish if done incorrectly.

Kinds of Fillers

Woods with large pores, such as walnut, mahogany, oak, chestnut, hickory and ash, require a paste filler. These fillers consist of about 75 per cent pigment and 25 per cent liquid. The pigment is primarily ground silica and color; the liquid is usually oil. Paste fillers can be purchased in the natural color and then tinted by adding stains or such pigment

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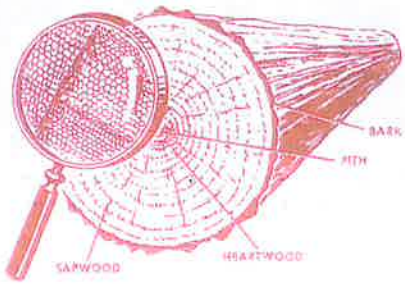
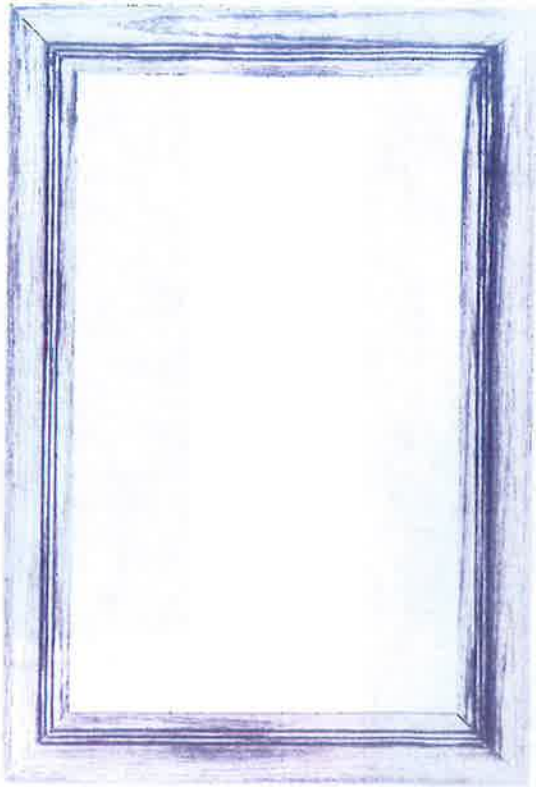
60-1. A paste filler was one step in producing the fine finish on this round mahogany table.



60-2(a). Many hardwoods contain large vessels and are very porous. When this lumber is surfaced, the tubular cells are ruptured, leaving tiny troughs that run lengthwise.

60-2(b). Unfilled pores make a filler necessary for certain hardwoods. This sample is red oak.

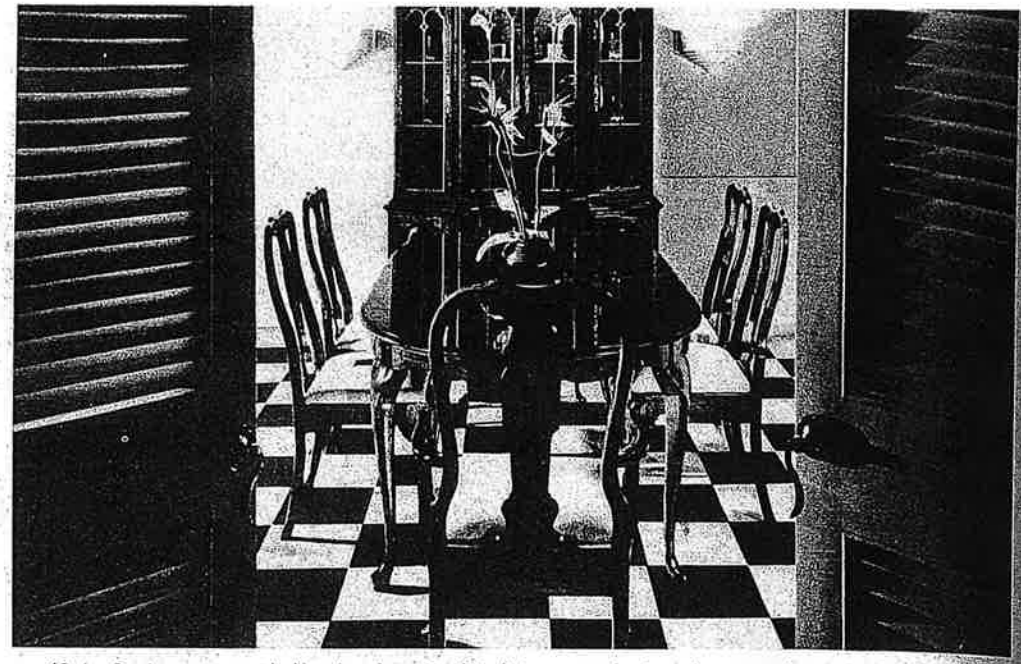


60-3. A pickled finish is one in which the wood filler contrasts sharply with the basic finish of the wood. For example, an ebony-stained wood might be filled with white paste filler. Can you see the results of pickling in this frame?

colors as burnt sienna or raw umber. White and off-white fillers are usually made from titanium oxide mixed with oil and resin. A liquid filler may be used on birch, maple, gum, or cherry. Fig. 60-4. Liquid fillers can be purchased from commercial sources or made by thinning paste filler with turpentine. While no filler is needed for closed-grained woods such as poplar, fir, pine, and basswood, it is a good idea to apply a sealer.

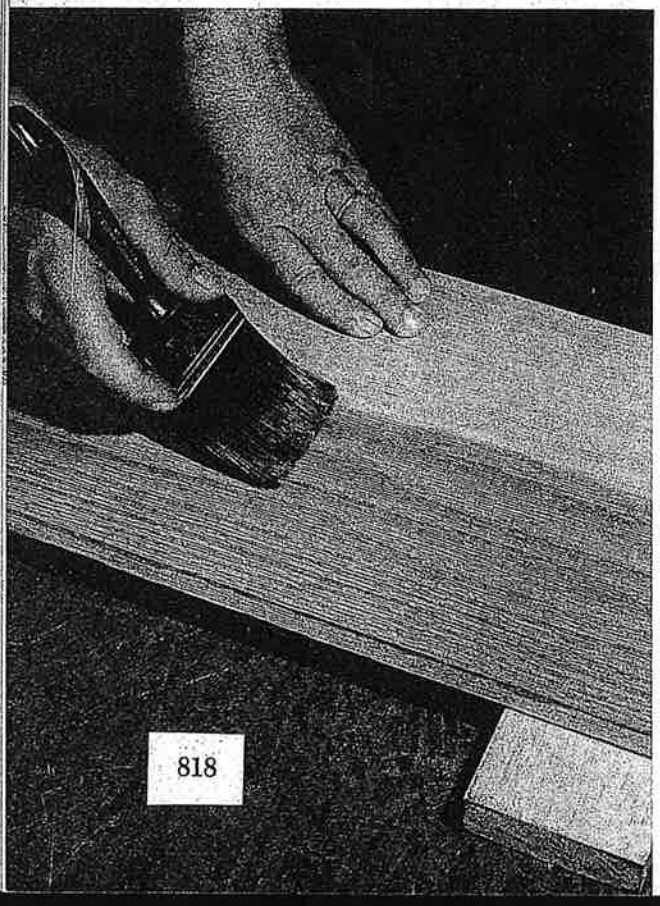
Applying Paste Fillers

Add turpentine, benzene, or naphtha to paste filler until it has the consistency of heavy cream. Mix oil color with a little turpentine and then add this to the filler until you get the color you want. Test on a sample piece that has been stained.

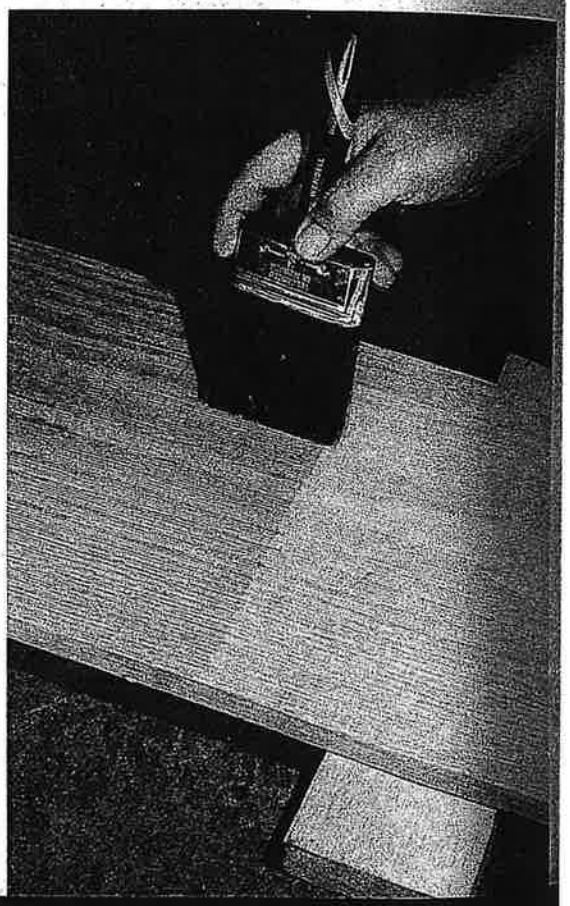


60-4. Semi-porous woods like the cherry in this dining room furniture have vessels so small they may require only liquid filler or none at all.

60-5(a). Applying filler with a brush. Brush first with the grain.



60-5(b). Brush across grain, over the first filler coat. Rub into the pores.



all they may

e first filler coat.

Apply the filler with a stiff brush, rubbing it into the pores. Fig. 60-5. Brush both across and with the grain. In industry, the filler is sprayed on and then brushed into the grain. Rub the filler in with the palm of the hand or with a piece of burlap or a heavy rag. Fig. 60-6. Always add extra filler to end grain.

In applying filler, the idea is to work the paste well into the pores. After it has dried about 30 minutes (until the gloss disappears), rub across the grain with burlap or coarse cloth to remove most of the excess filler. Then, with a fine cloth, wipe very lightly with the grain to make sure the filler is evenly applied. Fig. 60-7. Remember that the filler must be packed firmly into the pores. Otherwise it may come loose after the topcoat has been applied and ruin the finish. However, do not rub too hard as this would remove some of the filler from the pores. To obtain the best results, the cleaning must be done while the excess is still soft. To remove extra filler from sharp corners, use a sharpened wood stick covered with a rag. This job must be carefully done so there is no residue to become hard and dry. Such residue would have to be removed with a rag moistened with turpentine.

Applying Liquid Fillers

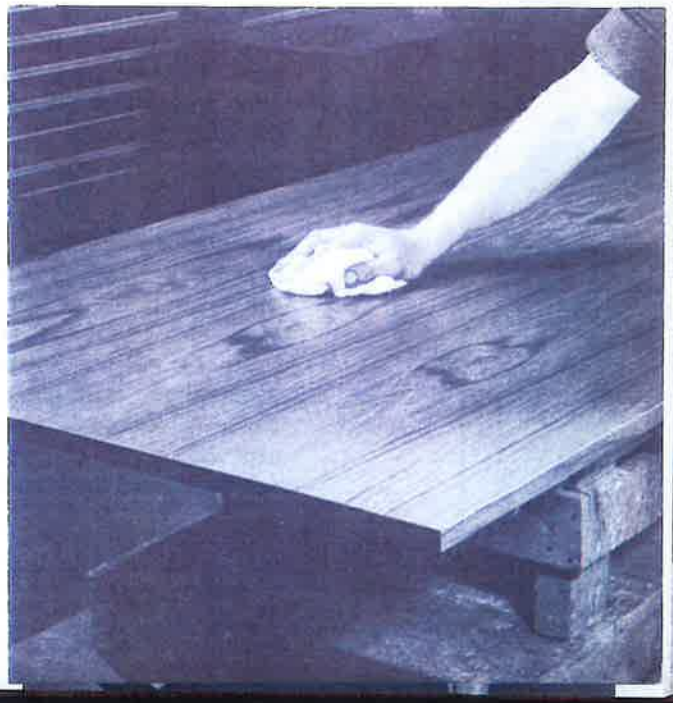
Liquid fillers are sometimes used on woods such as birch, beech, cherry, and redwood. If the filler is made from paste, add turpentine until it is very thin. Apply with a brush and follow the same general process as for a paste filler.

Filling Defects

Several common defects can occur when filler is not applied properly, rubbed in well, and the excess removed. *Pinholing* occurs when air is tamped into an improperly filled pore. After the topcoat has been applied, a bubble of air will show on the surface. *Flow-out* re-

60-6. Rubbing filler into the pores with a heavy cloth.

60-7. Wiping off excess filler with a clean cloth.



sults when a good wash coat has not been applied between the stain and the filler coats. The filler appears to squeeze out of the pores. *Graying* is a condition that often develops after filler has dried for several hours. The surface appears to have a grayish cast. This is usually because the binder has been absorbed by the wood or because the wrong kind of filler has been used. *Bleeding* results when a good sealer coat is not applied over the filler or when the filler is not properly dry before sealing. It is caused by a mixing of the filler and the sealer.

Applying a Sealer

Before the top or finish coats are applied, it is necessary to seal the surface to form a barrier coat over the filler and to provide a good foundation for the topcoats. Even when woods have not been stained and filled (sometimes this is the case with plywood), it is important to have a good sealer on the surface. There are three common kinds of sealers: shellac, lacquer, and synthetic resin. White shellac is an excellent sealer but is not commonly used when lacquer is the finish coat. Shellac sealer is made by mixing one part of four-pound-cut white shellac with seven parts of alcohol. Shellac sealer is applied with a brush. A lacquer sanding sealer is made especially to be sprayed on as an undercoat for a lacquer finish. A penetrating resin sealer is a ready-mixed material commonly used on closed-grained and small-pore woods or on plywood to seal the surface and prevent the wood from absorbing moisture. There are also glazing sealers applied over the filler and before glaze is put on the surface. After a sealer is applied, it should be sanded lightly and then wiped with a tack rag.

DISTRESSING, GLAZING, AND OTHER OVERTONE TREATMENTS

61

There are several overtone treatments that add interest to the finish on a furniture piece or give it an antique appearance. Most of these are done after the filler and sealer are applied and before the final topcoats.

Distressing

French and Italian Provincial furniture is given a distressed treatment to imitate the appearance of age and wear. Fig. 61-1. This can be done either mechanically or with a finishing material. In mechanical distressing, coral rock, a chain, a hammer, and many other items can be used to put small gouges, scratches, and dents in the wood surface. Fig. 61-2. These are frequently filled with black glaze or dark stain to imitate wear marks on a genuine antique.

61-1. The legs and rails of this Italian Provincial dining table of walnut and cherry have been given a distressed finish.

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Color Toning

Color toning requires companion stains and non-penetrating sealers. These have the advantage of requiring only one step for application of stain and sealer. It is necessary to tint a small amount of sealer with stain until the right color (tone) is obtained on a sample. Then mix enough stain and sealer to do the entire job, and apply by brush or spray. After drying and light sanding, a coat of clear finish is added to give the surface luster and durability.

Clear or Colored Lacquer

Lacquer can be sprayed, brushed, or wiped on. Use the type made for the job you are doing. Sand lightly or rub with steel wool between coats.

Light Stain-Glaze

A natural finish which mellows a contrasting wood-grain pattern with effective warm colors is always popular. When using any finish that retains the natural grain pattern, carefully select the plywood for its pattern and appearance Four steps are recommended:

1. Whiten the panel. Use pigmented resin sealer or thin interior white undercoat with turpentine or thinner in a half-and-half proportion. After 10 to 15 minutes, or before it becomes tacky, dry brush or wipe with a dry cloth to permit the grain to show. Sand lightly with fine sandpaper when dry.
2. Seal the wood. Apply thinned white shellac or clear resin sealer. Sand lightly with fine sandpaper when dry. Omit the seal coat for greater color penetration in the next step.
3. Add color. There is almost no limit to the colors and shades you can get. Use a tinted interior undercoat, thinned enamel, pigmented resin sealer, or color in oil. With care, light stains may also be used. Apply thinly and wipe or dry brush to the proper depth of color. Sand lightly with fine sandpaper when dry.
4. Apply one coat of flat varnish or brushing lacquer to provide a wearing surface. For additional richness, rub with fine steel wool when dry.

FURNITURE RESTORATION 64

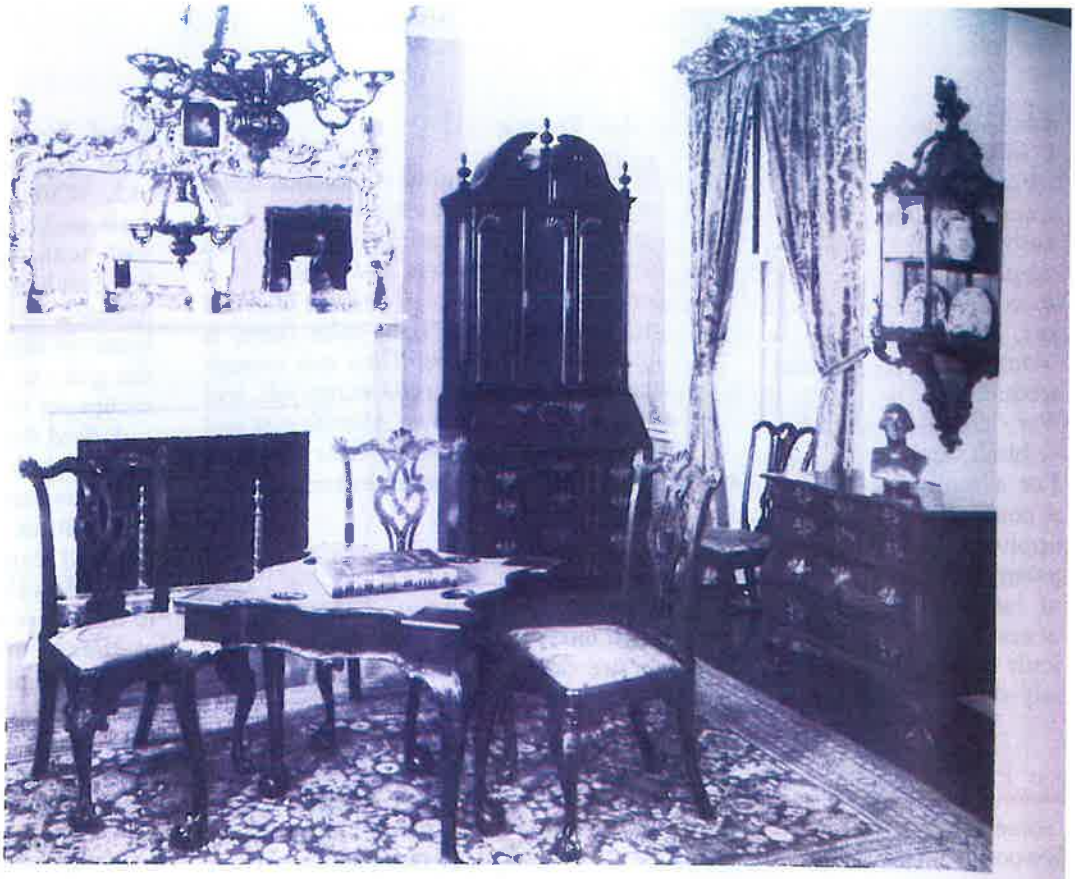
Time and usage take their toll. Even the finest pieces of furniture gradually become old and worn. However, furniture pieces can be restored to their original condition and beauty if these three steps are followed:

- Remove the old finish.
- Make all necessary repairs with patience and care.
- Apply a new finish.

After the first two steps are completed, the process of applying a new finish is the same as described in Units 56 through 62. Fig. 64-1.

To decide whether restoration is worthwhile, consider the following:

- Is the piece well designed with pleasing lines and proportions?
- What kind of wood is in the furniture? When old pieces have been painted or



64-1. This beautiful Colonial furniture has been restored to museum quality.

covered with many coats of finish, it is difficult to determine whether the wood is cheap or a quality wood such as walnut. Sometimes a piece is built of several different kinds of wood; this will restrict the kind of finish that can be applied. It is a good idea to scrape several small sections on the underside of the piece to identify the wood or woods used.

- Are any parts badly damaged or missing? If so, can they be duplicated without undue expense? For example, a turned leg may be so badly damaged that it can't be repaired. In that case, you need the equipment and material to duplicate it.
- Is the construction sturdy? Check for loose joints or other signs that the furniture is coming apart. Remove drawers to check their construction and condition. For casegoods, such as a chest or cabinet, remove the back to check the construction.
- Has the furniture been damaged by previous repairing with screws, nails, or repair plates? If so, can these be removed and the necessary repairs made?

Cleaning Old Wood Furniture

Some old wood furniture pieces have transparent finishes that need only to be cleaned to restore them. This can be done if the finish is smooth but not if it is alligatored. (The term *alligatored* means that the finish is cracked into large segments resembling the hide of an alligator.) A shop-mixed furniture cleaner and conditioner will clean the wood and restore the

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SAFETY

"BE PREPARED"—Keep safety uppermost in your mind when handling refinishing materials. All have some danger associated with them.

Personal Safety

- Wear approved safety eye protection.
- Cover your clothing with a suitable apron or smock.
- Wear a respirator when using very toxic materials.
- Wear rubber gloves to minimize chances of skin irritation or rash. Wear clothing with long sleeves tightly buttoned. If any refinishing material gets on your skin, wash if off immediately.
- Wash your hands thoroughly after using refinishing materials.
- Keep all refinishing materials out of the reach of children. These materials are very harmful if swallowed.

Material Safety

- Before using any material, carefully read the instructions on the label. Follow directions exactly.
- Keep all refinishing materials away from smoke, fire, sparks, and heat.
- Close all containers tightly after use.
- Whenever possible, store unused materials in their original containers.
- Make sure containers are clearly marked so that you and anyone else will know what's in them.
- Store refinishing materials in a fireproof cabinet.
- Keep all used rags in a fireproof container until they can be disposed of properly.

Finishing Room Safety

- Ideally, refinishing should be done in a separate, well-ventilated room designed especially for finishing. The room should have a large exhaust fan. If such a room is not available, work outdoors or in a well-ventilated area away from sources of heat or flame.
- Make sure the correct types of fire extinguishers are available. (See Unit 4.)
- Keep the area clean and free of spills.
- Store brushes and other utensils in approved containers.
- Never leave opened materials unattended.
- Never use tools or machines that can cause sparks or fire.
- Never light matches or other devices such as a blowtorch in the area.

natural grain and color. It will also disguise scratches and retard checking.

Fill a one-quart glass jar with 1 cup of turpentine and three cups of boiled linseed oil. Mix and cover tightly. This mixture can be stored indefinitely. On shellac finishes, use this mixture sparingly. To find out whether the finish is shellac, dip a cloth in denatured alcohol and wipe it on an area of the piece that won't show. The finish will soften and come off if it is shellac.

Before using the cleaner/conditioner, cover the work area with a drop cloth and several layers of paper. Assemble the following:

- Cleaner/conditioner.
- Cup or small can.
- Saucer or small pie tin.
- Metal can with lid in which to put discarded mixture.
- Several pieces of clean cloth.
- Steel or brass wool of grades 000 (3/0) and 0000 (4/0) to be used with paste wax.

Brass wool is preferred because it will not stain the wood if a small piece sticks in a pore, as may happen with steel wool.

• Old toothbrush.

Heat a small amount of water and pour it into a cup or small can placed on a saucer or small pie tin. Shake the cleaner/conditioner. Pour enough of it into the cup to just cover the surface of the water. *Do not mix.*

To apply, dip a clean cloth in the oily layer that is floating on the surface. Rub the solution into a small area at a time. Keep excess moisture away from the joints to prevent the glue from softening. Cover the total surface with the mixture. Use a toothbrush on carving and grooves. Next, dip 3/0 steel or brass wool into the oil layer and rub lightly with the grain. On a shellac finish, the steel or brass wool should be dry.

After cleaning furniture that is dried out, apply a greaseless furniture cream containing beeswax. This will replace the natural oils. You can also apply a paste wax with 4/0 steel or brass wool. On furniture that is not dried out, apply a greaseless, emulsified furniture cream polish or a lemon-oil polish.

Removing Old Finish or Paint

If the finish or paint is in poor condition or if you want to change the appearance of the furniture, you will have to remove the old finish or paint.

Testing for Type of Finish

Almost all furniture built before the Victorian era has a shellac finish. During and following the Victorian era, many different kinds of varnish were used as the standard finish. When furniture began to be mass-produced, lacquer became the standard finish. Polyurethane has come into use only during recent years. Thus over 90 percent of furniture that needs refinishing will have either a shellac or lacquer finish. The other 10 percent will have a varnish, oil, or paint finish. To determine finish type, try the following tests on inconspicuous areas of the furniture piece.

• The finish is *shellac* if denatured alcohol or shellac solvent will soften and remove it. (Shellac solvent is a commercial product made from 99 per cent anhydrous ethyl alcohol. It is superior to common denatured alcohol.) Wrap a finger with clean cloth and dip it in the alcohol or shellac solvent. Rub the surface to see if the finish will dissolve.

• It is *lacquer* if it is crystal hard and chips easily. Lacquer thinner will soften and remove this finish. Wrap a finger with clean cloth and dip it in the lacquer thinner. A scuffed surface begins to smooth out if it is lacquer.

• It is *varnish* if turpentine or mineral spirits will not soften it. Varnish will not redissolve in any solvent once it is dry. Only paint remover will destroy it. Varnish can be tested with a sharp-pointed instrument. The finish can be penetrated but will not crack.

Selecting a Finish or Paint Remover

Figure 64-2 lists the ingredients commonly used in finish and paint removers. Since so many different chemical combinations are found in various brands of removers, it is difficult to select one just by looking at the container. Most industrial grade removers are a combination of methylene chloride, methanol, and/or xylol. Some of the removers are water-soluble and others are not. Weight and price help indicate quality. The high-quality removers will be heavier than the cheaper brands and often contain benzol plus wax. Many quality products come in gel form with methyl cellulose as a thickener. Some types of removers are recommended for transparent finishes such as shellac and lacquer. Other types are recommended for paint and varnish. A paint

64–2. Ingredients in Finish and Paint Removers

There is actually no such product as a finish or paint *remover*. These materials only soften the finish. The old finish is actually removed by such methods as scraping with a putty knife, using a stiff brush, or rubbing with steel wool and/or rags. Some of the common solvents used in finish and paint removers include:

Acetone—an organic solvent used primarily in lacquer thinners.

Benzol—a coal tar product that is a very powerful solvent but quite toxic.

Isopropyl alcohol—a colorless liquid between ethyl and butyl alcohol in properties. It is used as a thinner in lacquers.

Methanol—a methyl alcohol (chemical term for wood alcohol).

Methylene chloride—a nonflammable liquid used in quality solvents.

Mineral spirits—a petroleum naphtha. *Naphtha* is a loose term for hydrocarbons made from the lighter fractions of petroleum and coal tar.

Toluene—a solvent made from the distillation of coal tar.

Xylol (xylene)—another coal tar distillate.

store used by professional painters is the best source of information on finish and paint removers.

Here are the simplest finish and paint removers:

- For *shellac* use a mixture of three parts standard alcohol (Formula Special No. 1 denatured alcohol, which contains ethyl alcohol and wood alcohol) and one part lacquer thinner.
- For *lacquer* use three parts lacquer thinner and one part denatured alcohol.
- For *varnish* use a good quality paint and varnish remover.
- For *paint* and *enamel*—same as for varnish.

Removing Varnish, Paint, and Enamel Finishes

Whenever you use removers, be sure to wear protective clothing and work in a well-ventilated area. See the Safety block in this chapter for detailed information.

1. On a large piece of furniture such as a desk, chest, or piano, remove parts designed to be taken off, such as doors and drawers. In this way, much of the work can be done with pieces in a horizontal position, minimizing drips and runs.

2. Apply the remover generously. Fig. 64-3(a). One of the most common errors is using too little remover, so the solvent fails to reach every last bit of finish. On a vertical surface (such as the side of a piano), start at the top, letting the remover run down. Continue to apply the remover until the bottom is reached. Use a dabbing rather than a stroking motion and avoid stroking back and forth over the same area as you would for painting. Check the surface for missed spots. Immediately wipe off any remover that drips on parts that have already been cleaned.

3. Let the remover bubble thoroughly. To determine if the job is completed, wipe the surface with a gloved finger. If you can see the natural wood, the finish has been dissolved and is ready to be removed.

4. On wide surfaces lift off the remover and old finish (sludge) with a putty knife. Fig. 64-3(b). Never let the remover dry on the pieces. As the surface is cleaned, place the sludge in a waste container. For grooves and carvings, use an old toothbrush, steel or brass wool, or a skewer to clean away the remover. For legs and rungs, wrap steel or brass wool around twine and dip in the remover. A stiff

64-3(a). Apply remover as heavily as possible.

64-3(b). Using a putty knife to remove the old finish.

brush can also be used for irregular surfaces. Work from the bottom up on large vertical surfaces.

5. When necessary, apply another coat of the remover. When bubbling stops, brush on a third coat over the second coat. While the third coat is still wet, scrub the remover into the wood with 1/0 or 2/0 steel or brass wool. Use considerable pressure and work *with* the grain. On veneer, use 3/0 steel or brass wool, rubbing gently with the grain.

6. Wipe off the remover with pieces of clean newspaper or clean, coarse rags.

7. If the remover is water-soluble, the last residue can be removed by scrubbing the surface with 2/0 or 3/0 steel or brass wool dipped in water. Keep washing and scrubbing until no more stain comes out of the wood. Then dry the piece with a clean, soft rag. Allow it to stand for a day or two, until the wood is completely dry.

8. For removers that are *not* water-soluble, scrub the surface with 2/0 or 3/0 steel or brass wool dipped in alcohol or mineral spirits. Then wipe the surface with a coarse cloth dipped in alcohol. Clean the entire piece until the wood no longer looks light, powdery, or smoky and does not feel slimy. Allow the surface to dry.

9. To remove any reddish stain from mahogany or birch, apply full-strength household bleach. Oxalic acid can be used to bleach out stains in other woods.

10. Once the surface is completely dry, sand lightly in preparation for refinishing.

Other Methods of Removing Old Finishes

There are several other ways of removing the old finish, but none of these is satisfactory for fine furniture. These include:

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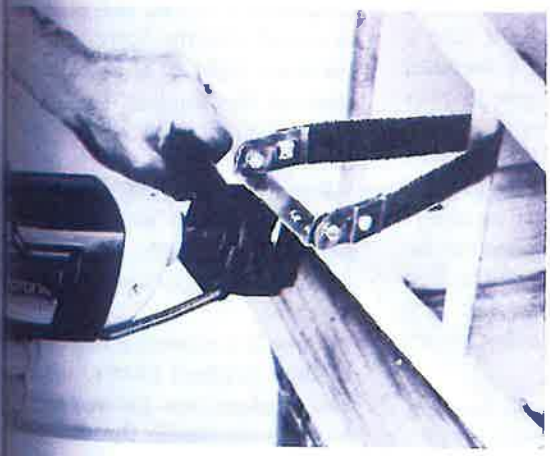
. These include:

• An electric heat gun stripper. This device can be used to soften the finish; a scraper is used to remove the residue. However, the heat gun can burn the wood surface and damage veneers if not used with great care.

• Lye and heated water. A combination of about three quarts of water and several cans of lye (an ingredient found in many drain cleaners) is applied with a rope mop to remove the finish. However, the mixture will darken wood if left on too long, and it will eat holes in clothing, skin, and almost anything else with which it comes in contact. Because the lye is so caustic, this procedure is not recommended.

• Scraping. A hand-held wood scraper can be used to remove the finish, but this is a long and tedious method. It is the only successful way of removing the milk paint sometimes used on pieces built during Colonial times. The penetrating paint was made of red pigment (iron oxide) and skim milk or buttermilk. Regular paint removers will not touch this finish because the paint penetrates deeply into the pores of the wood. It leaves a stain that is very difficult to remove.

64-4. A sanding attachment can be installed on an electric drill for sanding off old finish.



• A power sander with abrasive paper or cloth that will not become clogged can be used, but this is another slow process. Fig. 64-4.

Commercial Stripping

Commercial stripping is the easiest way to remove an old finish, although it is expensive. There are various types of stripping services listed in the telephone directory under "Furniture Stripping." It is important to find out about the company's methods since some types of stripping are not suitable for fine furniture. Here are the three basic commercial stripping methods:

• The *flow tank* method uses industrial strength removers (primarily methylene chloride and methanol). The piece is placed in a large, flat, open tank and the solvent is fed through a tube to a nylon brush. The operator scrubs the piece with the brush as the old finish is washed away. The sludge is trapped in a filtered container and the remover is recycled. This is a rather slow but effective process.

• In *vat stripping* the piece is dipped in solvent (usually heated) and then removed. The least desirable type of solvent is a lye soak or alkaline solution that burns away the finish in seconds. This has the disadvantages of darkening the wood, loosening the glue joints and, if left too long, burning the wood. The pieces must be immediately washed off with water. Another vat stripping method uses a specially formulated petro solvent remover at room temperature. The piece is dipped in this solution and then removed. It must be immediately washed off and then allowed to dry.

• *Dry cleaning* is a method using a large front-loading machine similar to a washing machine. Several pieces are placed on a rotating table in this very large machine. The door is closed and a patented chemical solution (primarily xylol) is sprayed on the pieces from all directions as the table

rotates. No heat or water is used. Most finishes—such as lacquer, shellac, and varnish—are "washed off" by the force of the sprays. Painted and enamel finishes are loosened. The pieces are removed from the enclosure and placed in a flow tank where the remaining finish or paint is brushed off. This is the safest and best method for fine furniture, including pieces with veneer, laminate, and inlays. There is no damage to glue joints and no raising of the grain. However, it is quite an expensive process.

Furniture Repairs*

Most repairs just involve using glue, since furniture generally comes apart at the joints. Of course, glue can also be employed to mend splits, repair veneer, patch surfaces, and strengthen legs and drawers, among other repairs. Most of the repairs can best be done by employing a ready-to-use adhesive such as liquid hide glue.

Gluing Techniques

For best results with any furniture regluing job, keep the following basic tips in mind:

- It is difficult if not impossible to reglue dirty joints or those filled with old glue. Therefore dismantle the piece and clean it. Carefully try to pull apart the loose joints by hand. On tighter joints, use a hammer or mallet, employing a wooden block or thick, folded newspaper to protect the furniture. Joints in very good condition should not be touched.
- All old paint, wax, dust, oil, grease, glue, etc., must be scraped away or otherwise removed from all surfaces to be glued. Warm vinegar will generally soften most stubborn glue (Fig. 64-5), but it is important to allow the wood to dry before continuing. Be careful not to remove any wood from the joints.
- The end grain of the joint is one spot where all the glue need not be removed, since most joints are commonly built with clearance between the end of the dowel, or round, and the bottom of the hole. This insures a tight fit at the shoulder. Simply remove the thickest lumps of glue from the end grain with a knife or other sharp tool.
- Roughen or slash the surfaces to be glued to form a "tooth" for more holding power. Plane, sand, or scrape uneven surfaces to form perfect, well-fitting contact surfaces.
- Since it is essential to return worn parts to their original places, dismantle, clean, and replace one piece at a time. If you have to dismantle the entire piece, mark

64-5. Use cotton swabs to apply the warm vinegar to joints.

*(This section adapted courtesy of Dr. Robert S. Miller and Franklin Chemical Industries)

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the ends of each part and the holes from which they were removed to insure accurate reassembly. Fig. 64-6.

• Dipping the parts to be glued in warm water and letting them dry completely will open the wood pores and allow the glue to enter more freely. Warming the parts on top of a radiator or in the sunshine are other ways to open wood pores.

• After the parts are clean and dry, test fit them together before gluing. With a tight fit, you are ready to glue. If the joints are a little loose, follow one of the joint tightening methods outlined later in this unit.

• After checking to be sure you are getting the proper parts in the right places, apply glue to both joint surfaces and assemble. Apply pressure with clamps, protecting the finish from scratches. (See Unit 40.) Waxed paper under the wood pieces or pads will catch any glue forced out by the pressure. Since glue will not stick to waxed paper, cleanup is easy.

64-6. Use a mallet to dismantle furniture pieces without damage.

• After gluing and clamping, wipe up the glue which is still soft. Use a smooth chisel-edged stick to clean around the joints and tight places, and rub the rest of the piece down with a clean, damp cloth. If the piece must be moved to another position before the glue has set, wind a piece of string around the joint several times and knot it to prevent the new glue from running out of the joint. Remove the string before the glue hardens completely. Later, any hardened excess glue can be carefully removed with a knife without damage to the surface.

• Pieces with many glued joints should be placed on a flat surface and tested for alignment before the glue completely hardens because this is the only time adjustments can be made.

• Allow plenty of time for the glue to dry, being sure to take into account any cavities in the joint which may have made it necessary to apply a thicker coat of glue than normal. The glue must be completely dry before the clamps are removed. Any glue remaining on the surface will produce spots beneath a clear finish, so now is the time to check for and remove it.

While it is a good idea to dismantle a furniture piece before regluing, some antiques, especially some rung-type chairs and furniture held together by wooden pins or wedges, should never be completely taken apart. There is a good reason for this. Before glue was commonly used in furniture construction, chair rungs were made out of dry wood with a bulb on each end. These were tightly fitted into the holes of green (unseasoned) legs. As the green legs seasoned and shrank, they formed a tight joint with the rungs. With age and wear these joints can become loose, but they cannot be dismantled without damage.

Loose joints of this type can be reglued in several ways without dismantling them. One good method is to work the glue well

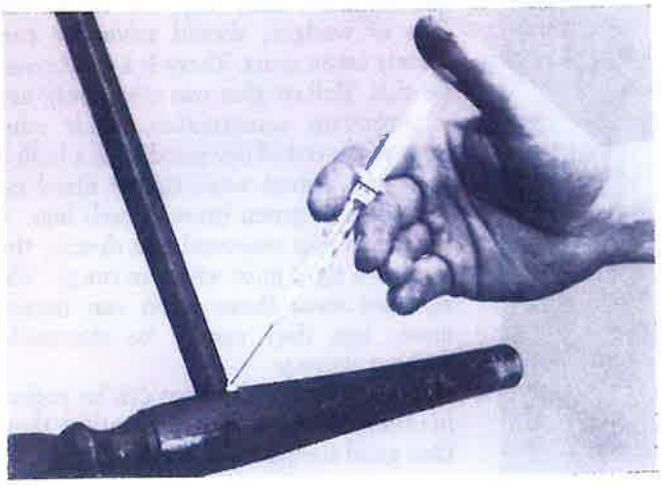
64-7(a). A small oil can filled with glue can be used to pump glue into joints.

into the loose joint using a toothpick. Try to position the piece so that the glue can flow freely down into the joint.

By drilling a 1/16" hole at an angle to or alongside loose joints, glue can be forced into them with a small oil can, plastic squeeze bottle, or a glue injector. Fig. 64-7. Inject glue into the joint until a squeeze-out appears. Then clamp it fast, wipe clean, and let dry.

Mending Split or Broken Parts

Parts which are split or cracked, but not broken into individual pieces, should be repaired without being separated if at all possible. Most cracks in wood furniture may be glued and clamped, the result being a permanent repair. First, any dirt, old glue, and paint must be removed from the crack with a narrow-bladed knife, pin, or thin tool. Dragging an old hacksaw blade through a straight crack is a very good way to clean it. Turn the saw teeth down and pointing toward yourself. Blow out the loose material.



64-7(b). A glue injector is a syringe designed for applying glue to small spaces.

Cracks near an edge should be widened by gently driving in several soft wood wedges, one at a time. When the crack is wide enough, insert the glue, remove the wedges, and clamp tightly. Cover the area with waxed paper and place flat sticks under the clamp jaws to protect the wood surface. Fill the hole with stick shellac, wood putty, or dough the same color as the wood finish. Then smooth off the rough spots with a knife or fine abrasive paper.

Cracks farther away from an edge should be thoroughly cleaned and then tested to see if they can be brought together. Use a strong bar clamp with blocks of wood beneath the jaws for surface protection to see if this can be done. If the crack can be drawn together, apply glue and then clamp.

Most repairs of broken furniture can be separated into two general categories: supported and unsupported. Broken parts in unsupported repair are simply glued together, and you must rely on the

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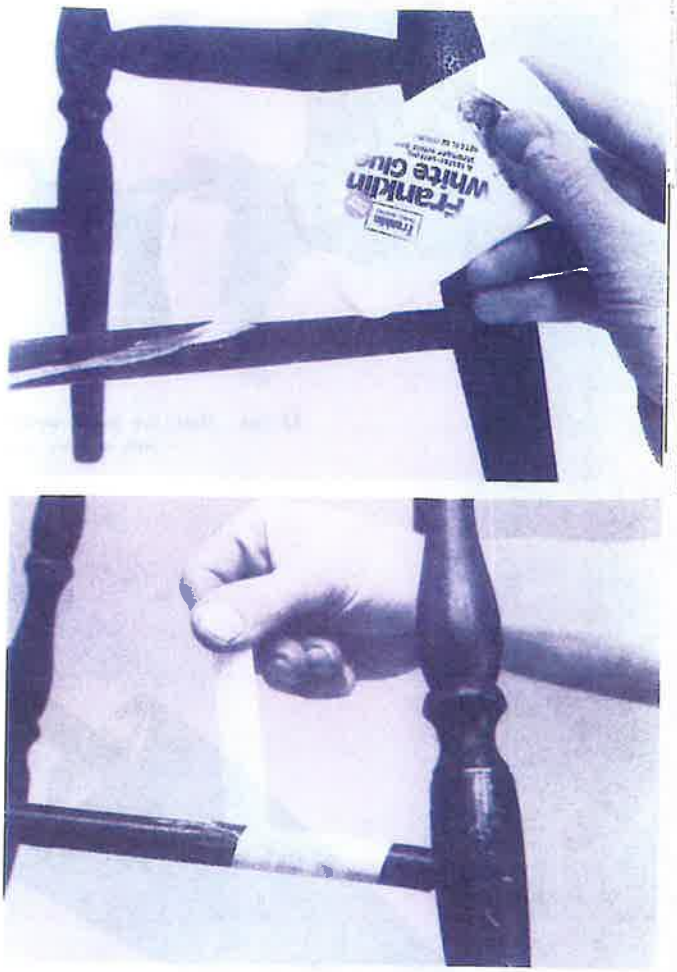
strength of the glue and wood to make a satisfactory mend. For supported repairs, dowels or other types of supporting devices are used to strengthen the repaired parts. Use common sense when deciding whether to glue or use a dowel in the repair. Remember that the more gluing surface there is between the two parts, the stronger the glue joint will be. Small, flat surfaces fastened together by glue make the weakest joints and need structural support. On the other hand, if the crack in a split chair rung runs nearly the entire length of the part, a very large surface for gluing exists and an unsupported repair will usually be successful.

Consider the amount of stress the part will undergo during normal use before deciding on the type of repair. For example, the arms of a dining room chair take plenty of stress, and dowelling is a good idea whenever possible. But, where stress is less, a simple gluing may be appropriate. Broken rungs frequently can be repaired just by filling the break with glue, pressing the parts together, and clamping. Fig. 64-8.

Save all the pieces of a broken part because you will need them when you glue the part back together. If some of the pieces are missing, fill the void with glue or insert bits of wood or wood putty.

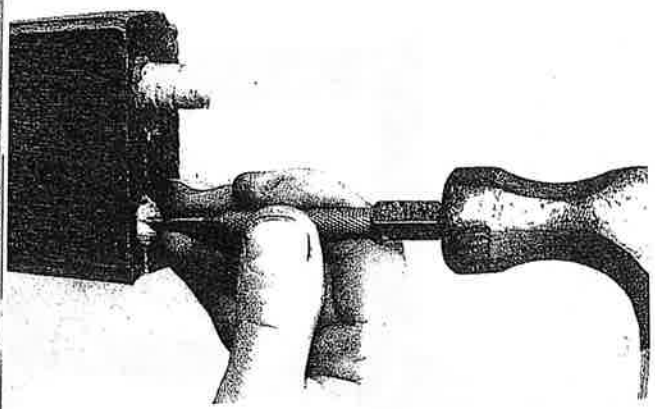
Dowel Pin Repairs

Dowel pins holding furniture pieces together sometimes snap, leaving one or both ends in the holes. To make most dowel pin repairs, you must first bore the dowel out of the hole. Fig. 64-9. Use a drill with straight-shank bits slightly smaller than the diameter of the dowel. Drill only to the depth of the dowel, since it is quite possible to bore a hole too deep or even drill through to the other side. Since boring through the hardwood dowel is tougher than boring through the soft wood of furniture, it is possible to tell by feel when to stop. Force out what remains

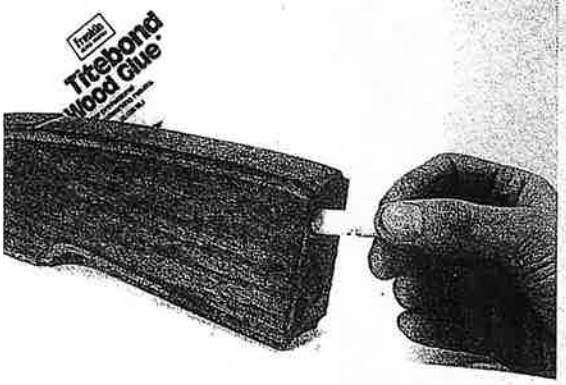


64-8. A broken chair rung can be repaired by filling the break with glue, pressing the parts together, and binding the run with a tight wrap of masking tape.

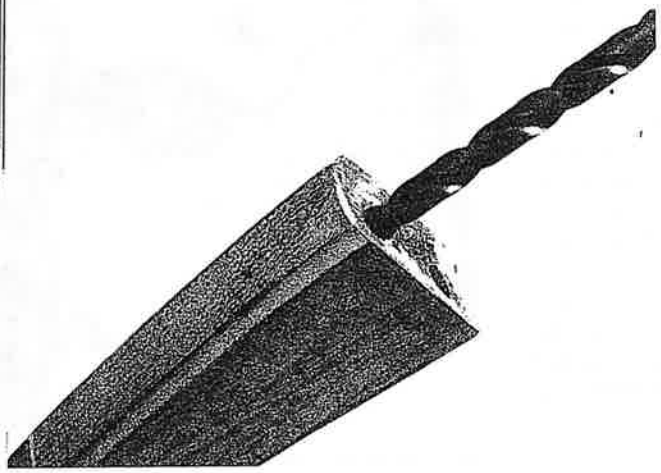
of the dowel with a small chisel or knife, being careful not to enlarge the hole. Flush the remaining glue with vinegar before selecting a new dowel which fits the hole snugly. Spiral- or straight-grooved dowels are the best because they allow excess air or glue to escape after the dowels are inserted. If the parts of the joint fail to come close together, the dowel may be too long. If this is the case, cut a piece off one end, round the cut with a



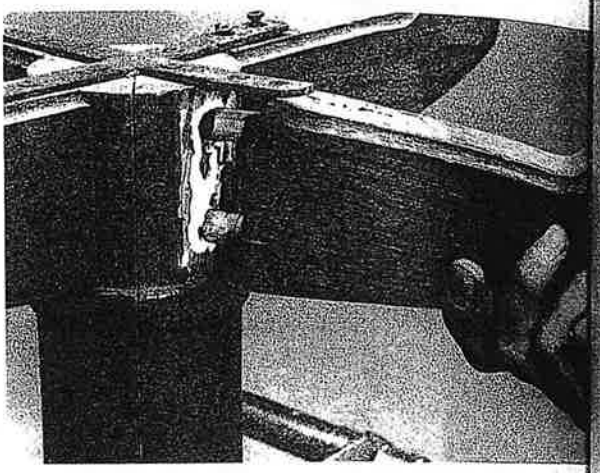
64-9(a). Mark the exact center of the old dowel with a sharp punch.



64-10(a). Squeeze some glue into the dowel hole and insert the new dowel.



64-9(b). Drill out the old dowel, in both pieces if necessary.



64-10(b). Apply a thin coat of adhesive around the dowel and fit the pieces together.

knife or abrasive paper, and then follow the directions for gluing. Fig. 64-10.

◦ *Mending Split Legs with Caster Inserts*

Loose casters can cause furniture legs to split. You can avoid trouble by tightening the casters with new plastic inserts and new caster assemblies. Rebore the hole into which the caster is inserted with a drill the same size as the hole, to make it clean and smooth. Fig. 64-11. Select a dowel the same size as the hole you have just drilled, coat it with adhesive, and slip it into place. Fig. 64-12. Cut off the dowel flush with the surface after the glue has dried and redrill the caster insert hole, making sure it is the same diameter as the shaft of the caster. A wobbly leg can cause the caster to split it when weight is applied. As an added precaution, be sure all legs are firmly secured to the piece of furniture.