



# **Restoring Hardwood Floors**

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**by Mary Twitchell**

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# Introduction

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For years, people took wooden floors for granted. Then, not so long ago, homeowners became infatuated with resilient flooring such as linoleum; it was cheap, impervious to spills, colorful, and easy to clean. Next, everyone wanted wall-to-wall carpeting; it was comfortable under foot, sound absorbent, easy to maintain, safe, and versatile. Now people are again choosing the natural look of hardwood floors — the subtle grain of oak; the mellowness of maple; the lightness of birch or beech; the dark, somber quality of cherry.

Today it is not unusual to find prospective homeowners hunched over in the corner of a room carefully lifting an edge of the floor covering. And many times they find — to their delight — a hardwood floor beneath.

Sometimes floor coverings were installed to hide defects; frequently they only attest to the fact that tastes change. Wood floors still remain the most versatile covering; they are strong, durable, attractive, and traditional. Even after years of neglect, many hardwood floors can be restored to their original natural beauty — although some are easier to reclaim than others.

# Removing Old Floor Coverings

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First, remove all furniture from the room. Because the refinishing may take from three days to a couple of weeks, store the furniture out of the way.

Removing old floor coverings and refinishing floors create a lot of dirt and sawdust. Take precautions to protect your furnishings as well as the rest of the house. Dirt and sawdust particles are extremely fine and have an amazing ability to travel.

If you cannot remove the curtains, slip them onto coat hangers hung from the curtain rods and enclose them in plastic bags. Remove heat registers. Shut doors to adjoining rooms; open all windows; and tape plastic over hallways, heat register openings, and built-in shelving.

## ***Wall-to-Wall Carpet***

Wall-to-wall carpeting is stretched between tackless strips nailed along the perimeter of the room. The strip, made of plywood, is full of pins which stretch the carpet and hold it tight to the baseboard.

Once you have loosened a corner of the carpet, pull up the carpet along one wall. Then with a helper, walk along parallel walls to release the carpet on three sides. Continue until all carpet is free of the tackless strip.

Because carpeting is heavy and awkward to carry, fold it over in the center of the room and, with a matt knife, cut it in half through the backing fabric. This will allow you to roll up and remove the carpet in two (or more) sections.

Next, remove the felt, sponge rubber, or foam padding. If it is stapled to the floor, remove all the staples. (Any staples left protruding from the floor will rip the sandpaper off the floor sander.) Remove the staples with pliers or slip the flat side of a slotted screwdriver under the staple head and gently lift the staple free.

The tackless strip will be nailed to the floor. Carefully work a prybar under one end of the strip where it has been nailed into the floor. Once the nail loosens, work your way along the strip, gradually prying it up until it can be removed.

Remove the metal threshold strips used to secure the carpeting in doorways in the same manner.

Vacuum the floor thoroughly.

## ***Linoleum or Tile***

If you bend old linoleum over on itself, it will usually snap, making it easy to remove in pieces. Scrape any old adhesive off the floor with a putty knife. Very small bits of stubborn adhesive may be sanded off when the floor is sanded.

Linoleum installed before 1985 that has a white backing could contain asbestos. Dampen the remaining adhesive with water and scrape. Put the linoleum and the adhesive scrapings in plastic bags and seal. Always wear a face mask and protective eyewear when scraping or sanding.

Flooring adhesives are flammable. Using a propane torch or heat gun to loosen linoleum or its adhesive is dangerous. Chemical adhesive solvents are available but not recommended. If you choose to try them, test in an inconspicuous area first.

Vacuum the floor thoroughly.

# Evaluating the Floor

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With the wood exposed, assess the condition of the floor and the amount of work involved. Some floors may require more work than you are willing to undertake. For badly damaged floors, you may want the advice of a professional.

Large cracks between boards can be filled, but when the floor is refinished, the filler may show. In addition, large patches of filler may come loose with time. Deep and multiple grooves, deep burns, or large stains may be impossible to sand away.

If there is extensive patching, if walls have been relocated, if there is evidence of rot, or if replacement boards were added to fill in the holes left when woodstove stacks were removed, refinishing your floors may not be worth the effort. It is important to know that you will have a floor worth showcasing for your time and money.

It may be more practical to paint your floors if they are in poor condition or badly discolored. Porch and deck enamels come in all colors. Apply two or three coats to a floor free of dirt, grease and wax.

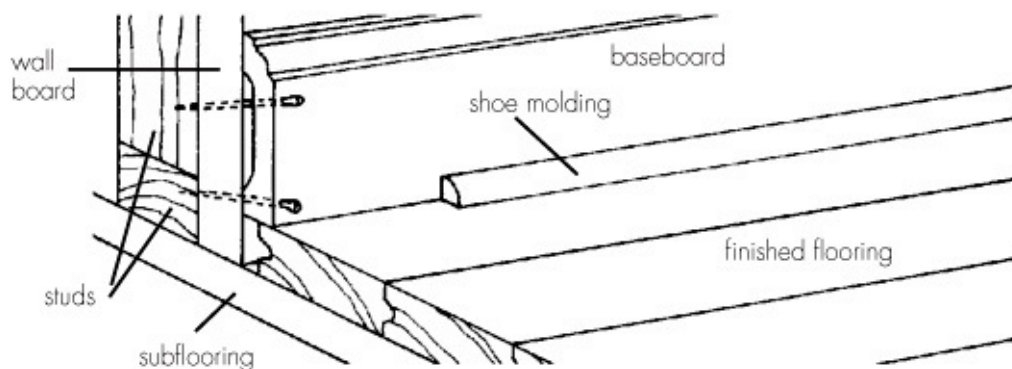
Some tongue-and-groove floors may have been sanded before, in which case there may be too little wood left above the grooves. If there is less than  $\frac{1}{8}$  inch between the top surface of the floor and the groove, further sanding will so weaken the wood that it will splinter along the edges.

Refinishing floors is a dirty, noisy, unpleasant, back-breaking task. You may want to get an estimate from a professional. He/she will quote you a figure based on the number of square feet to be refinished.

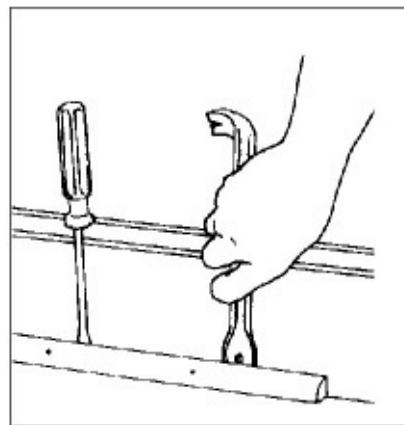
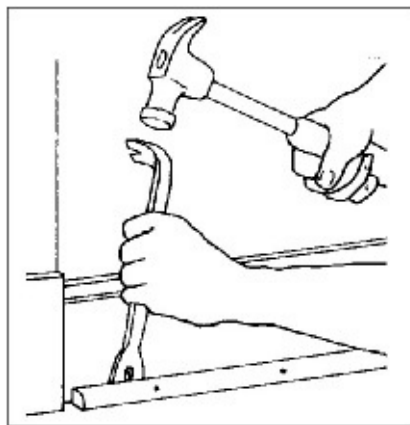
# Preparing the Surface

To prepare the floor for refinishing, remove the shoe molding around the perimeter of the room. Run the blade of a matt knife between the shoe molding and the baseboard. This will separate the paint and make the shoe molding easier to dislodge. If you intend to reuse the molding, pry it off carefully with two prybars or a prybar and a slotted screwdriver. Slowly loosen the molding by working along the edge, applying pressure at each nail location. Once the molding is removed, countersink any exposed nails.

On the unpainted surface, number each piece of molding so that it can be renailed in the same location. With a pair of vise grips, remove the finish nails still attached to the shoe molding. Grasp the nail shank where the nail entered the floor or baseboard with the vise grips and slowly bend the nail to a 45-degree angle. This will pull the nail head through the wood and prevent the molding from splintering. (Splintering invariably occurs when the nails are hammered out rather than pulled through the wood.) The nail holes can later be filled with wood putty.



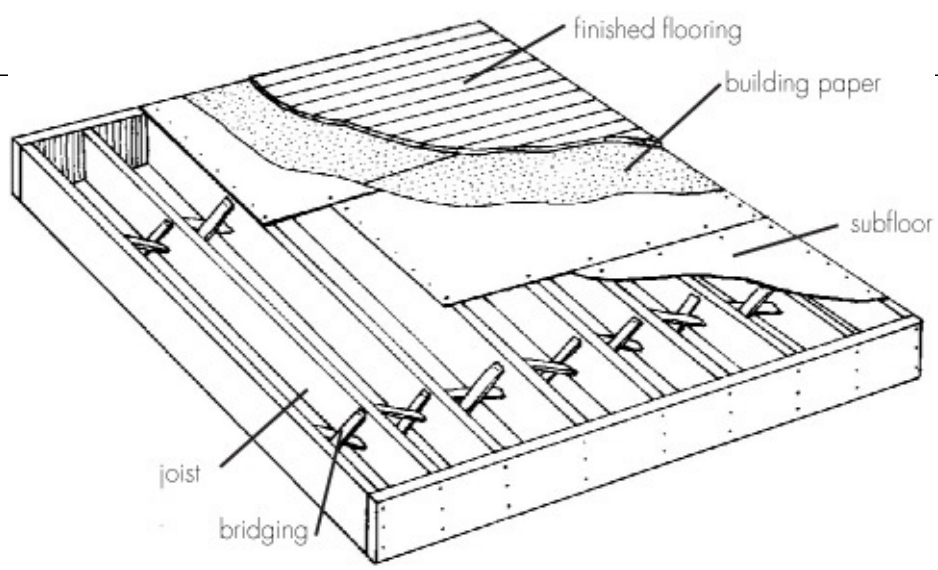
*Cross-section shows flooring with baseboard and shoe molding. Baseboard is nailed into studs behind wallboard.*



*Use a prybar to remove shoe molding. A screwdriver holds the loosened piece away from the baseboard.*

If there is no shoe molding, remove the baseboard. Pry it off carefully, number the boards, and remove the nails.

Next go over the entire floor with a broad spackling knife. Remove grit and debris, and staples or tacks which protrude above the flooring. With a nail set, sink any nail heads to  $\frac{1}{8}$  inch below the floor surface, and fill the holes with wood putty. Nail heads, staples, and tacks will rip the sandpaper when you sand the floor. Working your way around the floor will give you ample opportunity to assess any problems.





# Floor Construction

To understand why certain problems occur in floors, it is necessary to understand something about floor construction. Residential floor construction consists of four elements:

- The floor framing is made up of **joists**. These are usually 2×6s, 2×8s, or 2×10s and are laid edgewise at 16-inch intervals. They are supported by the house foundation at one end and at the other end by a carrying beam located midway between the foundation walls.
- To keep the joists evenly spaced and to increase the rigidity of the frame, **bridging** of 1×2s is nailed in the form of an X between adjacent joists. The bridging also prevents the joists from twisting over time.
- On top of the joists is the **subflooring**. Today subfloor is usually  $\frac{5}{8}$ -inch or  $\frac{3}{4}$ -inch plywood laid so that the joints are staggered. In older homes, 1×6 or 1×8 tongue and groove boards were laid at a 45-degree angle to the joists.
- The **finished floor** is laid on top of the subflooring over building paper. Hardwood floors, usually of oak or maple, are laid perpendicular to the joists.

## Types of wood flooring

- **Strip flooring**, by far the most common, comes in random lengths and is available in widths of 1½ inches to 2¼ inches and thicknesses of  $\frac{3}{8}$  inch,  $\frac{1}{2}$  inch, or  $\frac{25}{32}$  inch. The lumber has been milled so that there is a tongue along one edge and a groove along the other; the boards are laid in a random pattern of end joints and the strips interlock as they are laid tongue to groove. The interlocking prevents the floor from moving or squeaking. The strips, 2 feet to 16 feet in length, are nailed every 10 to 12 inches through the tongue at a 50-degree angle; the nail heads are countersunk and in the finished floor are invisible because they are covered by the groove of the next board.
- **Plank flooring** also is tongue and groove; the lumber comes in random widths of 3 to 9 inches. Originally the planks were pegged into the subfloor; today the pieces are bored, the screws countersunk, and the holes plugged to simulate the wooden pegs.



*Interlocking pattern of tongue-and-groove flooring.*

- **Block flooring**, which looks like parquet, is made up of short strips of hardwood that have been glued together in a rectangle or square. It is sold in tongue-and-grooved squares of 6×6 inches, 9×9 inches, or 11¼×11¼ inches. Usually the strips are of oak, and are fastened together, then the blocks are glued with the grains at right angles to the surrounding ones.
- **Softwood flooring** (usually southern pine, Douglas fir, redwood, or western hemlock) is less costly to install and less wear resistant than hardwood flooring. Softwoods are easily marred and will show scratches whenever furniture is carelessly moved. They are best used in bedrooms or closets where the traffic is light. Softwood floors can be sanded, but because the wood is less dense than hardwood, they soon become too thin to resand.



# Problems and Solutions

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Before refinishing floors, certain problems should be corrected.

## ***Loose Boards***

Nails may work loose when floor boards shrink or the edges cup. Resecure these boards by predrilling holes with a bit slightly smaller than the diameter of the annular-ring flooring nails. Nail through the warped area into the subflooring below. This forces the high points back into position. Drive the nails in pairs. Angle the nails and drive them in opposite directions for the best grip. Sink the nail heads with a nail set and fill the holes with wood putty matched to the wood of the floor. Space the nails at least  $\frac{1}{2}$  inch in from the edges of the floor board so that you don't crack the wood.



*annular-ring flooring nail*

## ***Cracks***

Small cracks between boards or between butt ends may occur if the wood was insufficiently cured before it was installed. These cracks can be filled with wood filler. Buy filler to match the color of your floor after it has been sanded or stripped. Or you can make your own wood filler by mixing the sawdust produced by sanding your floor with glue. Be sure to clean the cracks with a wire brush before applying the filler. Rub with a fine steel wool when dry.

Deep scratches and gouges can be filled in the same manner although the wood putty may loosen in larger cracks. If the cracks are substantial, it may be necessary to fill them with thin strips of wood cut to fit. Place a strip of wood on top of the crack and hammer it gently into place. Face nail and sand the strip.

## ***Spots and Burns***

Spots of wax, grease, or oil can be removed with turpentine. Surface burns will disappear when the floor is sanded. To get rid of deep burns, the scorched boards will have to be removed. See Replacing Damaged Flooring (pages 16-19).

## *Stains*

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Some stains will be removed when the floor is sanded. If the stains persist even after sanding the floor with three grades of sandpaper (coarse, medium, and fine grit), try removing them with undiluted household bleach, a commercial bleach, or a half-cup of oxalic acid crystals mixed in one quart of water. Be sure to wear gloves and goggles. Apply a small amount of the solution to the center of the stain and let dry. Wait a few minutes after the first application. If necessary, apply more of the solution until the stained area blends in with the rest of the floor. You don't want to lighten the spot too much. When you get the right tone, wash the bleached area with warm water and let dry.

## *Squeaks*

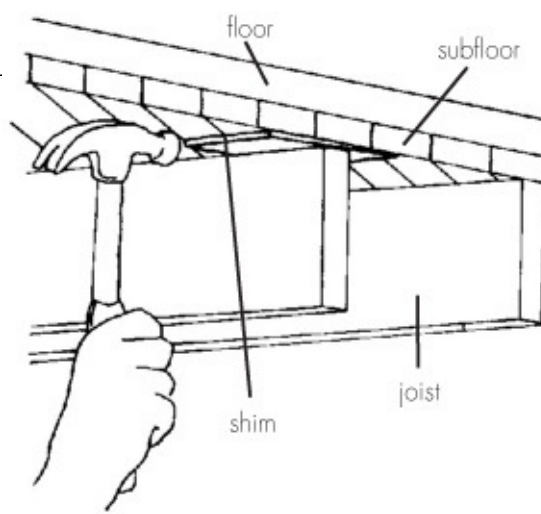
Many old floors squeak and/or sag. Changes in humidity cause various members to shrink or swell at different rates and, although you may think squeaks and sags are proof of the house's vintage, charm, or value, it usually means that something structural is amiss. Potential causes may be that the dimension lumber was undersized; the joists were spaced too far apart; the wood wasn't sufficiently seasoned; the house settled unevenly; the flooring was laid with insufficient nails; or the house is just suffering from old age. In some instances, major reconstruction may be necessary. In other cases, creaks, squeaks, and sags may be relatively easy to eliminate.

Squeaks mean that there is slack in the floor structure. As a result, there is an audible sound whenever adjacent members (flooring, subflooring, joist, beam) rub against one another. This occurs each time the floor is loaded, and then the load removed.

The squeak may result from a loose board rubbing against a nail or another floorboard; from the finish flooring which has warped and pulled loose from the subflooring; from the subflooring which has warped or pulled loose from the joists; from the joists which have warped, shrunk, or pulled loose from a beam; or from nails which have pulled loose somewhere within the floor structure. To determine the cure, you have to determine which structural members are involved.

**Squeaks between Joists and Subfloor.** To locate the squeak, have someone walk on the floor while you listen from the basement below. If the squeak is above a joist (they usually are), the subfloor will move when weighted; once the load is removed, the subfloor will spring back into place. This occurs because too few nails were used to anchor the subfloor to the joists or because the joists have shrunk or twisted as the wood seasoned.

To prevent the subfloor from moving, fill the gap between subfloor and joist with a wooden shim shingle of the proper width. Dip the tapered shim in wood glue. Tap the shingle until it is snug; the glue will hold it in place. Do not force the shingle or you risk loosening the subfloor further which will separate the floor boards above.



*Tap wood shim between subfloor and joist to alleviate squeaking.*

Another way to eliminate friction between a joist and the subfloor is to screw a 2×2-inch cleat flush with the top of the joist and directly under the squeak. (Use cleats on both sides of a joist if there are a number of loose floor boards.) Screw through the cleat into the subfloor to pull it down tight with the joist. You may need to have someone stand on the floor above to force down the subfloor.

Be sure the screws aren't so long as to penetrate the top surface of your hardwood flooring.

If there is a finished ceiling below the squeak, you will have no access to the joists, in which case you will have to face nail through the finished floor and subfloor into the joist below.

Joists are usually laid on 16-inch centers, and can be located by using a small block of wood and a hammer. Tap the block as you move it along the finished flooring. When the tapping sounds dull, there is probably a joist below.

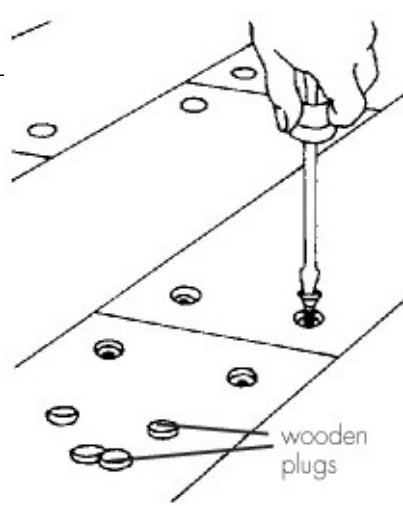
Predrill the holes in the finished floor. Angle them toward each other for greater holding power; then countersink the nail heads and fill with wood putty. Mound the wood putty slightly; then sand when dry.

If the nails don't hold, use wood screws. Predrill a hole at the center of the squeak. As you drill, pay attention to the resistance you experience. If the bit passes through the floor and subfloor after which there is no resistance, your squeak is between joists; however if the bit hits resistance after the subfloor, your squeak is over a joist. In this case, use longer screws to pull the flooring and subfloor tight to the joist.

Since the screws should be countersunk, you will have to drill two holes. The pilot hole is drilled first. The diameter of the drill bit should be slightly smaller than that of the screw shank. For the countersink holes, use a bit the diameter of the screw head.

A screw digger, which performs both processes simultaneously (countersinks and counterbores), makes this process even quicker.

Fill the screw holes with wood putty or wooden plugs. Plug cutters can be used with the drill to obtain discs of the same wood as the floor. Place glue in the hole and on the plug, then tap the plug into place.



Countersink screw heads and cover with wooden plugs.

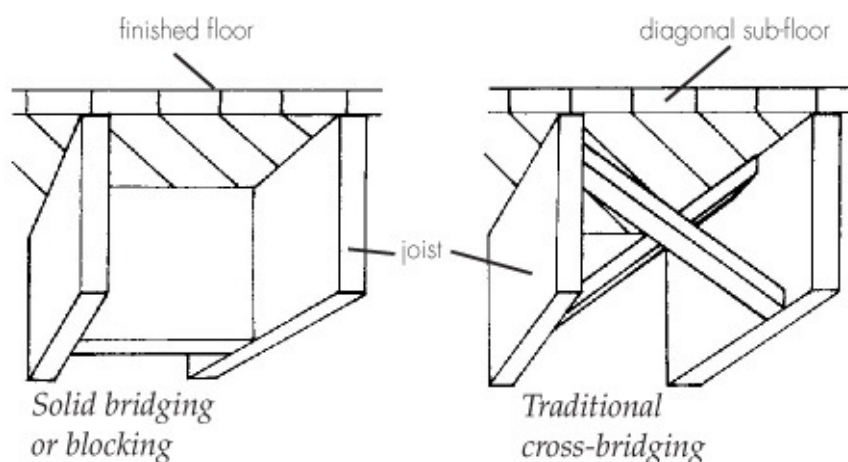
Weakened or twisted joists can be strengthened by adding bridging. In older homes bridging was made of 1x3s nailed crisscross in a diagonal position between adjacent joists. Today solid bridging, or blocking, of 2x6s or 2x8s, is used and end nailed between the joists every 8 feet. Cut the blocking to fit between the joists. Toenail into the subfloor before end-nailing into the joists. The bridging will hold the joists in a vertical position and increase the floor's rigidity.

Where the subflooring moves up and down between joists, push the solid bridging up against the subfloor and end nail it to the joists.

Sometimes bridging is present but isn't snug; pull out the loose nails and drive in longer ones.

**Squeaks between Subfloor and Finished Floor.** Whenever there is a gap between the subfloor and the finished floor, buckling has usually occurred and will cause the floor to squeak. Floor boards which have lifted may be very visible; some are harder to see.

The buckling may occur because the flooring material wasn't adequately cured before it was installed. Ideally, flooring should be stored for three days in the room where it will be laid. This gives the boards sufficient time to adjust to the house humidity. In new construction, flooring should be delivered after the doors and windows have been installed, and all masonry, drywall, and plastering have been completed. The flooring should then cure for three weeks in post-construction moisture conditions. This usually means closing up the house and turning on the heat to decrease the excessive humidity caused by masonry and drywall work.



Seasonal expansion and contraction across the grain is normal for wood. To allow for this,  $\frac{3}{4}$ -inch gaps are left around the perimeter of the room between the floor and the wall. Floors laid without this gap tend to buckle.

If sufficient space has not been left, remove  $\frac{3}{4}$  inch from the first and last floor boards. Shoe molding is added to hide this gap.

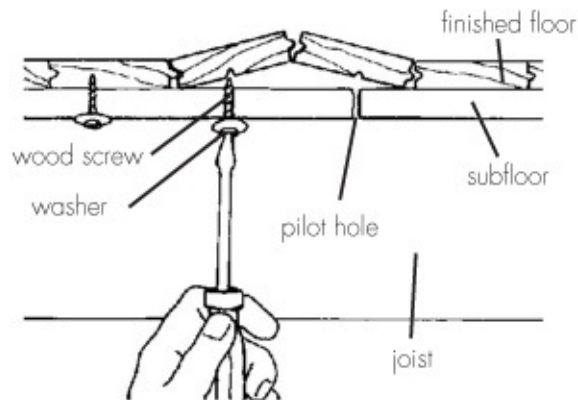
Boards will also buckle if they have been exposed to excessive water (from watering plants or a leaky roof or absorbing water from a moist basement below).

If the floor is accessible from the cellar, buckled flooring can be flattened by drilling pilot holes through the subfloor and part way into the finished floor. The screw should not penetrate further than  $\frac{1}{4}$  inch from the top surface of the finished floor. Therefore it is important to choose the right screw length. This is determined by combining the thickness of the two flooring elements. If, for example, the subflooring is  $\frac{5}{8}$ -inch plywood and the hardwood flooring is  $\frac{3}{4}$  inch, screws of 1 inch to  $1\frac{1}{8}$  inches in length are appropriate. Choose a drill bit slightly larger than the screw shank for drilling through the subfloor, and a drill bit slightly smaller than the screw shank for drilling into the finished floor. To prevent the screw head from penetrating the subfloor, slip a washer over the screw.

Before drilling into the finished flooring, mark the depth of the hole on the drill bit with electric or masking tape. If you use washers, adjust the length for the added width of the washer. Then screw into both of the offending boards.

## Sags

Sagging usually occurs in older homes and is most common on the first floor; if sagging occurs on the second floor, an entire ceiling or floor may have to be torn out to get at the joists. Sags result in sloped floors, sticking doors and windows, cracks in the ceiling and/or walls, roof leaks, and leaky plumbing. If the first floor bows, it will affect all the floors above.



*Flatten buckled flooring by pulling down with screws from beneath the subfloor.*

Sagging may be caused by lumber which warped as it dried, undersized joists, or joists spaced too far apart. If this is the case, the floor will flex whenever weight is applied. The bowing will cause abutting floor boards to squeak as their top edges rub together, which in turn will work the flooring nails loose. The sagging will increase over time, especially if excessively heavy objects (such as pianos or refrigerators) are placed on an already weakened part of the floor.

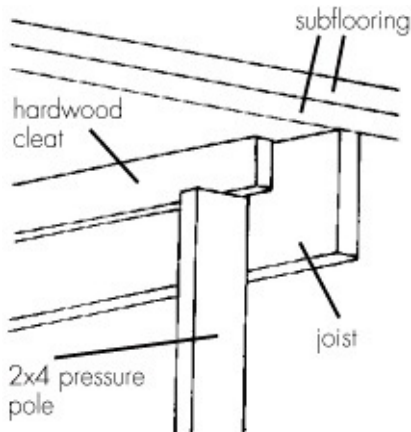
The sagging may, however, indicate more severe structural problems beyond the floor itself. The center structural support posts may have settled, the foundation may be crumbling under the ends of the joists or under a carrying beam, or the foundation walls may be settling unevenly.

If the sagging occurs on the first floor and the joists are accessible from below, the situation can sometimes be remedied with reinforcements.

To determine the extent of the sag, move furniture from the sagging portion of the room. If there is a rug, roll it back. Stretch a string taut across the floor at right angles to the joists. Tack each end of the string to the floor at opposite sides of the room. Mark the spot in the floor where the sag is the greatest.

Stretch the string at a 90-degree angle between the other two walls and check for the low spot. Corrective measures should be taken where these low spots intersect.

Have a helper rap on the center of the sag while you try to locate the offending member(s) in the cellar. Once located, try to determine the extent to which the joist has been weakened; you may have to strengthen only a portion of the joist, or the entire load-bearing member may need to be replaced.



*Use a pressure pole to support the hardwood cleat until it is nailed into place.*

**Bridging.** Loose diagonal bridging allows the joists to move. Check for loose nails and re nail. If necessary, add further bridging. Cut to the proper joist spacing and end nail through adjoining joists into blocking.

If there is no bridging, prefabricated steel bridging is available. It requires no nails. Near the top of one joist, hammer in the pronged end. Near the bottom of the adjacent joist, hammer in the L-shaped clawed end. Alternate the crisscross bridging pattern and continue from joist to joist as needed.

**Hardwood Cleats.** If only a small portion of a joist has been weakened by twisting, warping, checking, or cracking, cut a piece of hardwood longer than the defective section of the joist and force it tightly against the subfloor. To apply pressure, cut a 2x4 slightly longer than the distance from the floor to the undersurface of the piece of hardwood. Wedge it in until the hardwood is tight against the subfloor. Then nail or screw the cleat into the adjoining joist, and remove the pressure-pole.

**Crossbeams.** If sagging occurs only when weight is applied from above or if the permanent dip in the floor is slight, it may be possible to eliminate squeaking by adding a new carrying beam beneath the midspan of the sag.

A crossbeam will add rigidity to the floor by reducing the distance spanned by the joists. In order to install a crossbeam, however, the floor must be lifted either by an adjustable jack post or by a house jack. Since any jacking can cause considerable structural damage, you should seek outside assessment and advice before attempting it on your own.

Frequently a bow in the floor is the result of many years of stress, in which case attempting to level the floor may not be advisable. Extreme and constant pressure from below may dislodge the



joists, causing damage to framing members, walls, ceilings, and floors above.

**New Joist.** Sometimes squeaks are the result of a weakened joist. The joist may have warped, cracked, rotted, or be infested with termites, leaving the floor above it unsupported.

To strengthen the joist, a new one has to be added. Again, the floor will have to be lifted, risking further structural damage, and you should consult a professional.

*Permanent Sagging.* In the worst case scenario, the sagging is permanent because the floor can't support its own weight, or the joists were undersized, or they were spaced too far apart. Attempting to remove the sagging under these conditions may crack the walls and plaster throughout the house. In these instances, the floor framing may be reinforced by adding new joists adjacent to the existing ones. This will not level the floor, but will prevent further sagging.

One way to do this is to scribe new joists to make exact copies of the existing ones. Apply construction adhesive to the top of the new joists where they come in contact with the floor above, and wood glue along the faces that will touch the existing joists. Rest both ends of the new joists on top of the sill. Tap into place, and bolt or nail the two together with 16d nails.

*Second Floor.* Sagging may occur on a second floor if, for example, an attic was converted into additional living space. Since the attic wasn't originally designed to carry this additional load, it begins to bow with age.

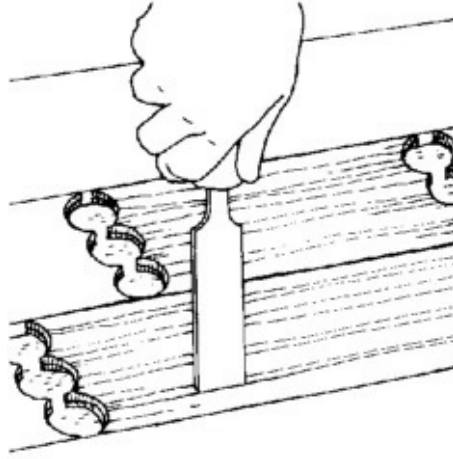
If a second floor sags, the first floor sags as well. You must level the first floor before trying to level the second floor. To reach the joists of the second floor, however, you will have to remove the ceiling on the first floor. Obviously, this involves a major renovation and you may wish to consult a professional for evaluation and advice.

# Replacing Damaged Flooring

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There is no easy way to remove damaged flooring because of the interlocking of tongue and groove. However, it is worth the effort if the hardwood floor is in good condition except for a small section which has warped, cupped, or splintered and needs to be replaced.

Mark off the area to be removed with a rafter square. The lines should be perpendicular to the edge of the flooring. Cut where the wood is again sound and try to stagger the butt ends of the boards by at least 6 inches.



*Use a chisel to remove damaged floor boards.*

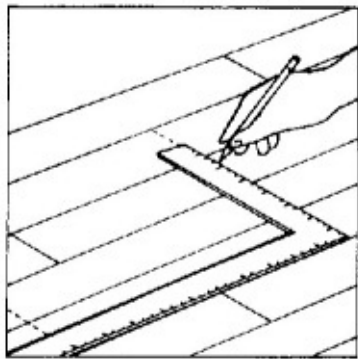
With a drill and ½-inch bit, bore a series of overlapping holes at either end of the area to be removed; the holes should follow the lines which you have drawn across the grain of each floor board. Drill only through the finished flooring, not the subfloor.

Begin in the center of the damaged area. With an electric circular saw set to the depth of the flooring, saw down the center of the board. Or use a 1-inch chisel to split the board down the middle along the grain. Pry the piece loose. Work toward the tongue, then toward the groove, dislodging pieces until the first section of flooring has been removed.

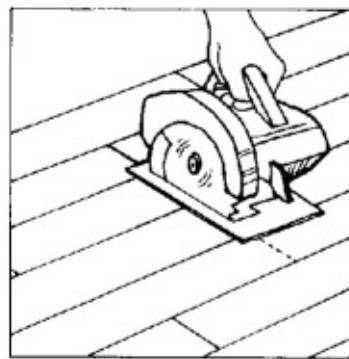
Continue until all the damaged boards have been pried loose. With a hammer and chisel, square up the jagged ends left by the bored holes. Use a sharp chisel to get as clean an edge as possible.

You may want to bevel the ends around the damaged area at a 45-degree angle. If so, then also bevel the ends of the replacement boards so that they will fit snugly.

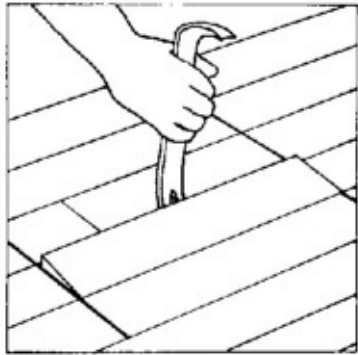
A simpler method is to mark off a square or rectangular area with the rafter square (illus. 1, below). Ensure that the edges are drawn along wood which is sound. Make a pocket cut with the circular saw using an old blade because you may encounter nails (illus. 2). Slip a pry bar between the boards (illus. 3, page 18). Work it back and forth until one of the boards lifts; the others will pry out easily. Remove any remaining nails in the subfloor.



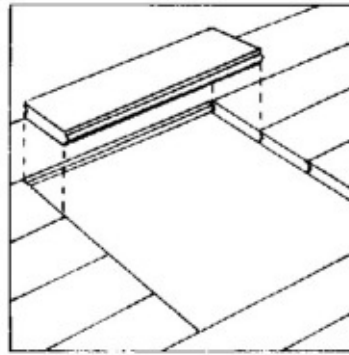
1. Mark damaged area with a rafter square.



2. Make a pocket cut with a circular saw



3. Loosen boards with a pry bar.



4. Cut replacement boards to fit.

Although this method is much easier, the patch will be more visible because the butt ends of the boards are no longer staggered.

If you don't know what kind of hardwood your floor is, take a sample to the lumberyard where they will match it.

Check that all nail heads are countersunk and that the boards of the original floor lie flat against the subfloor. If any of the boards are loose, blind nail them whenever possible; otherwise face nail them to the subfloor.

To lay the new boards, start from the existing course which has its tongue exposed. Check that the board is firmly nailed to the subfloor. If not, use annular ring-shank flooring nails to blind nail at a 50-degree angle through the tongue and into the subfloor. Countersink the nails so that the nail heads won't prevent the grooved edge of the next board from fitting over the tongue.

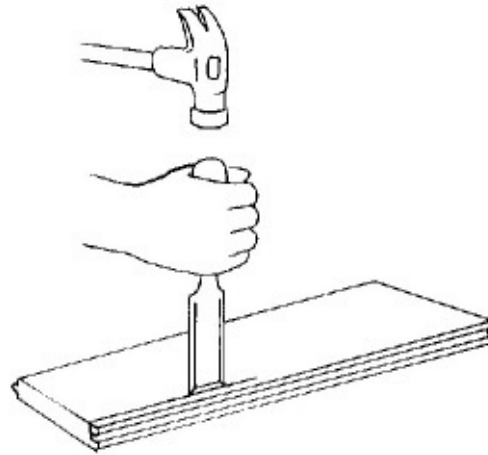
Cut the first piece of new flooring to length. It should fit snugly. Then remove and lay a bead of construction adhesive on the subfloor where the flooring will go. Insert the replacement piece. Fit a scrap piece of flooring tongue-in-groove with the replacement piece. Tap this with a hammer until the replacement board fits tightly against the original flooring. Blind nail through the tongue into the subfloor. Continue by fitting the groove of each new piece into the tongue of the adjacent board.

If the repairs are done in winter, there may be gaps between the existing boards; heat from the furnace will have dried the boards, causing them to shrink across the grain. In this case, use shims (such as metal washers) to maintain the same spacing as the original floor.

The configuration of your patch may mean that a replacement board(s) will need to be inserted in pieces because of the interlocking of tongue with groove.

Some boards, including the last one, will have to be inserted from above. Cut the board to

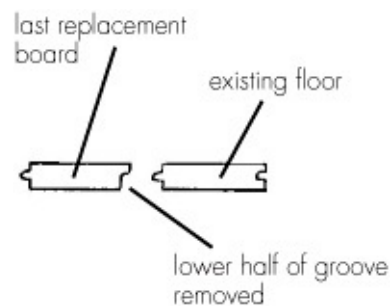
length. Then turn it over and chisel off the lower half of the groove. Or with a circular saw, remove the bottom lip of the groove. Fit the tongue of this board into the groove of the adjacent floor board and using a wood block, gently tap it until the replacement board slips into place.



*Turn last replacement board over, chisel off lower half of groove.*

This last piece of flooring will have to be face nailed. Pre-drill the holes every 12 inches with a bit slightly smaller than the flooring nails. There should be two holes at each end of the board and along the edges for longer boards. Countersink the nail heads and cover with a wood putty to match the flooring.

Take extra care with these boards when you sand the floor. Replacement boards will be higher than the existing floor, especially if the floor has been sanded before. Replacement patches will need extra sanding to bring them flush with the rest of the floor.



# Exposing the Raw Surface

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Once the repairs are completed, it is time to prepare for sanding or stripping your floor of its old finish and applying a new one.

## ***Sanding***

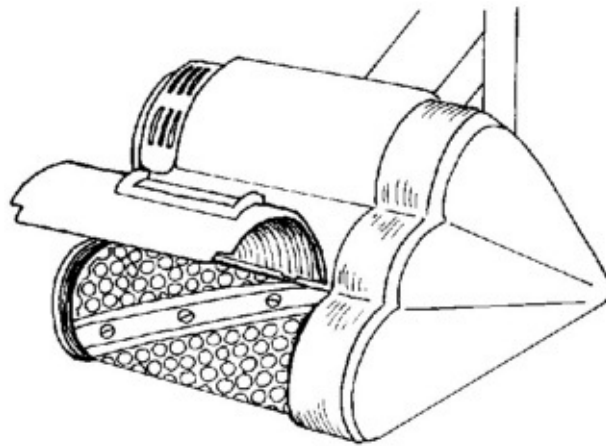
The floor should be clean, all nail heads countersunk, shoe molding removed, windows opened for ventilation, adjoining doors closed, curtains removed or protected in plastic bags, hallways sealed off with plastic, and floor registers removed. If there are radiators in the room, remove them. Many, however, are too difficult to disconnect and can be worked around.

To refinish your floors, you will need an upright drum sander for the open spaces and an edger (or disc sander) for cutting in along the baseboards. These are available at tool rental centers, which will also supply you with ample sandpaper (coarse, medium, and fine grit). There is usually no charge for the unused sandpaper that you return.

Before leaving the rental store, be sure the sanders are in working order. You don't want to be lifting the drum sander any more than is absolutely necessary. Also ask the clerk to show you how to mount sandpaper on both machines. It is quite easy, but machines do differ.

Other tools you may need include a hammer, chisel, paint scraper, and a hand-held finish sander.

**The Drum Sander.** Drum sanders are very heavy, very noisy, and create a mini dust bowl even though they are fitted with dust bags. You will want ear protectors and a respirator.



*Install sandpaper over drum according to instructions.*

Before connecting the drum sander to a power source, tilt back the sander and drum cover in order to mount the coarse sandpaper. One edge will slip into the drum's slot. Then wrap the paper around the cylinder by rotating the drum until the other edge of the sandpaper can be fitted into the same slot. Tighten the sandpaper by turning the nuts in opposite directions at each end of the drum. Wrenches to tighten these clamp nuts come with the sander. On some sanders, a key is supplied for tightening the drum.



*Wear face mask and ear protectors when using sander.*

The drum sander plugs into a three-pronged outlet. You may need a grounding adapter if you have only two-pronged receptacles. If you and a helper are using both the drum sander and the edger simultaneously, and if they are plugged into the same circuit, you may blow a fuse or trip the circuit breaker. Should this happen, plug the sander and edger into different circuits.

Begin in one corner of the room. Position the sander to go in the direction of the grain. Before turning it on, rock the sander back, then turn it on and let the motor rev up. Slowly bring the drum into contact with the floor. The sander will pull you forward; hold it in check so that you move at a slow, steady pace throughout the process.

As you reach the other side of the room, tilt the sander back from the floor. Move the electric cord so that when you walk backwards, you won't trip on it. Then as you retrace your steps, lower the drum and pass over what you have already sanded. At the beginning and end of each pass, be sure to rock the sander back. Remember, if you lower the sander too quickly or raise it too slowly, the sandpaper will gouge the floor.

Also keep the drum sander in constant motion; otherwise the sandpaper will dig troughs that will be very visible once the floor is sealed.

As you move to an unsanded area, overlap the previous pass by two or three inches. Make as many passes as necessary to expose the bare wood. If you are making no progress with the coarse sandpaper because the floor is badly cupped, try making diagonal passes.

Continue until the entire floor is done. You won't get closer to the baseboards than 6 inches. This border must be done with the edger.

When you want to stop sanding, turn off the machine but keep the drum tilted away from the floor until the belt stops turning.

For parquet floors, use only a fine grade of sandpaper; the coarser grades are too abrasive.

Since the grain of parquet floors runs in two directions, it is difficult to avoid cross-grain scratching. With the drum sander, make one pass at 45 degrees, then a second at right angles to the first. Use a medium-fine sandpaper for the diagonal passes, then a very fine grade for along the room's length.

**The Edger.** Since sanders are rented by the day, it makes sense to have a helper follow you with the disc sander (or edger). Edgers are used to sand edges, corners, doorways, closets, around radiators, and other places which you cannot reach with the drum sander.

To fit the disc sander with sandpaper, turn the machine upside down. With the wrench supplied, loosen the lock nut. Remove the bolt and washer. Center the new sanding disc on the sander, insert the bolt and washer on the disc and tighten.

Grasp the edger firmly with two hands before turning it on. Move the edger in a semi-circular pattern. The edger will be sanding across the grain, and the circular action of the sandpaper will tend to leave ring marks on the floor. Therefore don't press down on the machine or let the machine linger; the swirl marks will show once the floor is sealed.



*An edger gets close to corners and around radiators.*

Continue the process with both the edger and the drum sander using a medium, and then a fine grit sandpaper.

Empty the dust bags as necessary. The dust is very combustible and should be disposed of carefully.

Hard-to-get areas will have to be done by hand. A paint scraper should remove most of the old finish; sometimes it is necessary to use the back side of the chisel blade for especially stubborn areas. Chisel away from yourself, and scrape towards yourself. When using the scraper, apply pressure to the blade with your free hand and scrape with the grain. Wear protective eyewear.

Collars around radiators and plumbing fixtures can be removed for easier access.

Sand all hard-to-get areas with a hand-held sandpaper block or with an electric hand sander.

Vacuum the floor thoroughly with the brush attachment. Then wipe it down with a tack cloth (a rag moistened with turpentine) to pick up all the dust.

The floor is now ready to be stained, varnished, shellacked, or urethaned.

## ***Stripping***

You have no option except to strip floors which are too thin to be resanded. Regular household

ammonia and steel wool work best although the fumes are intense and may irritate your eyes and sinuses. ~~Be sure to open all the windows; you may even want to use an electric fan set to vent out.~~

Wear gloves when using the ammonia. Pour a cupful directly on the floor and let it stand for a few minutes. Then rub the ammonia with the grain. Once the old finish begins to dissolve, wipe off the residue with rags.

After you have finished, let the floor dry for a few days.

If the first application of ammonia doesn't completely dissolve the old finish, you may have to repeat the process.

Stains can be bleached out of the wood with laundry bleach. In a bucket mix one part of bleach to ten parts of water. Apply with a mop. Soak the entire floor. Wait five minutes, then neutralize with white vinegar or ammonia. Mop dry. If there is fuzz from the wood fibers, scrub the floor with steel wool. Let dry, then vacuum.

There are also wood bleaches on the market that come in two-part solutions. Apply the first solution liberally, or scrub it in with steel wool. Wait the required length of time before applying the second solution. Let them work overnight before neutralizing with bleach. Wait 24 hours before sanding the surfaces to remove the wood grain fuzz.



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