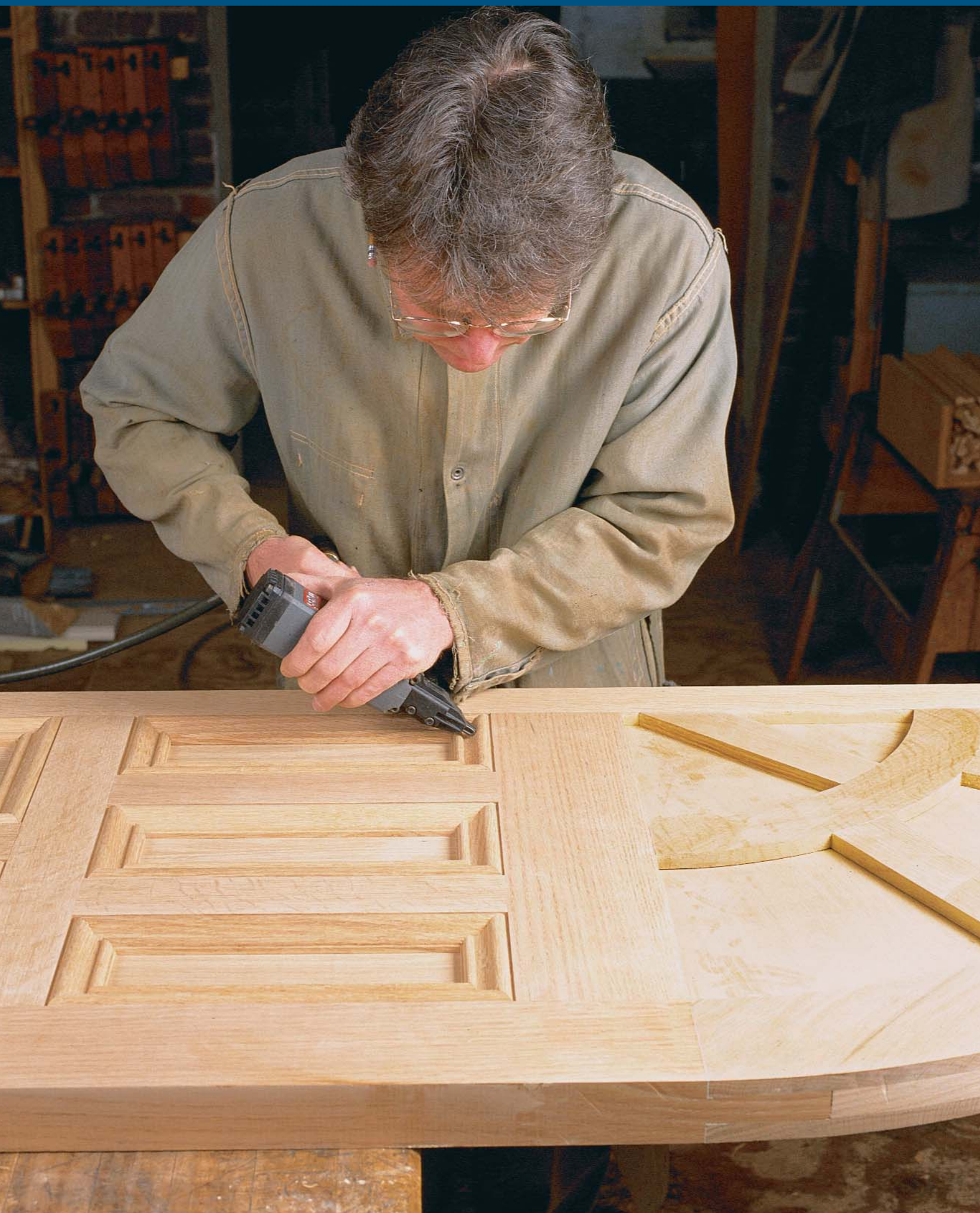
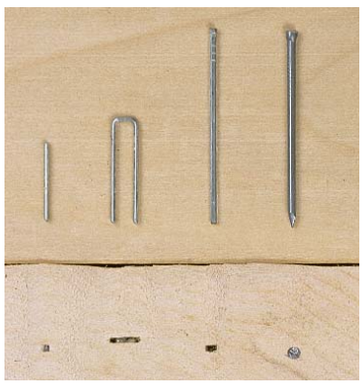


Using Pneumatic Fastening Tools

These shop workhorses are fast, accurate and versatile

by Robert M. Vaughan



***Three guns for furniture-making** (above), from the top: finish nailer, narrow-crown stapler and brad nailer. At left are fasteners and the marks their drivers leave on the wood. A hammered finish nail is on the far right.*

I cringed the first time I saw a nail gun. It was 20 years ago, and my boss was comparing finish nails hammered and set by hand to the same-sized fasteners driven by a pneumatic (pressurized air) gun. I changed my mind, though, after seeing how quickly the nail gun did the job and how accurately and cleanly the gun drove the nails. It left no ugly hammer dents on the wood—elephant tracks, as I call them (see the bottom photo). And the nailer could be used one-handed, leaving the other hand free to hold the work.

The most convincing part of the boss's impromptu demonstration was seeing that the air-driven nails stayed in the wood better than the hand-driven nails. A hammered nail breaks wood fibers each time it is struck, which reduces its grip. But an air-driven nail is injected into the wood all at once, which disturbs fewer fibers. The nail grips all the way up its shank. Guns drive nails with less splitting because the tips of the nails are like blunt chisels (see the photo at right). The ends of common finish nails are sharply pointed, so they tend to cleave the wood, causing splits. You can blunt the ends beforehand, but that's a time gobbler.

Early nail guns were used mostly in professional shops. These days, just about any shop can use one. You can pick up a good brad nailer for around $200. I've managed to accumulate nine pneumatic fastening tools and use one in nearly every project I do. And these tools are widely available from building-supply dealers, hardware stores and by mail.

How pneumatic drivers work

With one exception (see the box on p. 47), all pneumatic nail and staple guns are powered by high-pressure air. Fasteners are driven by a rod or blade connected at one end to a piston in an air cylinder. When a gun's trigger is pulled, air flows to the back of the cylinder, which drives the piston/driver assembly forward. The trigger is a two-way valve, so when it is released, a shot of air is diverted to the front of the cylinder. The air recycles the piston/driver to the rear of the cylinder, so it's ready for another shot. Usually, the internal air chambers are sealed with rubber O-rings.

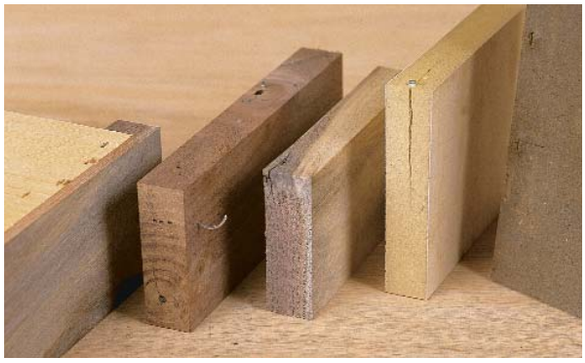
Sorting through the variety of guns and magazines

If you scan through a catalog from one of the big nail-gun companies (Senco, Paslode, Duofast or Bostich, for example), you'll probably be overwhelmed by the number of guns and fasteners. One of my catalogs shows nine gun-body styles, 11 nail sizes and brads, and 18 crown widths for staples. The fasteners come in several choices of tip shapes, wire material and coatings. But there are really only three pneumatic guns that are useful for furnituremaking: a brad nailer, a narrow-crown stapler and a finish nailer.

A brad nailer (sometimes called a pin nailer) together with a nar-

Photos except where noted: Alec Waters

Nail-gun safety



Keep fingers clear—*A nail driven by a pneumatic gun can deflect or even reverse directions if it strikes an embedded fastener, a knot or is too near an edge. The tearout in the lauan (left) and the bulge in the hardboard (right) were caused by staples.*

Safety glasses are a must when you're using an air nailer. An errant fastener bouncing around the shop isn't the only danger. A small chunk of wood can dislodge from your work, or the blast of air expelled from the top of the tool can set dust and debris in motion. Hearing protection is also a good idea.

Accidental discharge is the prime danger with air nailers and staplers. All new ones are fitted with a safety device to prevent this. Some guns require you to depress a second trigger or lever before the main trigger will engage. Most guns, though, have a nose safety that must be depressed against a solid surface before the trigger can be pulled. I like nose safeties the best. Once you're used to them, they don't slow you down.

Deflected fasteners are also a hazard (see the photo above). I've seen the leg of a staple stick out of the wood in the opposite direction it went in. So keep your fingers away from the nose of the gun, and point the tool away from you. Be especially careful when you're shooting at an angle or tacking on light pieces.

Nail guns usually have a label that gives recommended air pressure. Periodically check your regulator to make sure the air pressure is in the safe range. When you're loading the tool, disconnect it from the air supply, and when you reconnect it, point the nose away. Finally, if the tool jams or you need to work on it, disconnect the hose, and remove the fasteners. *—R.V.*

row-crown (¼ in.) stapler will handle the majority of your around-the-shop jobs. If you're trimming the inside of your house or doing a lot of architectural woodworking, then you'll want to add a finish nailer, too. Unless you build homes, though, there's no need for a framing nailer or a roofing gun. The stories on pp. 46-47 and on the facing page describe the guns that several woodworkers use and a few of the jobs they are good for.

Unlike some framing and roofing nailers that use coil-style magazines, brad nailers, finish-nail guns and staplers use straight magazines. Staplers and brad nailers have their magazines 90° to the driver. Finish-nail guns can have right-angle magazines or angled magazines (see the top photo on p. 46). Angled magazines are handy when you need to get the nose into a tight corner.

Magazines are either open or closed. The open style lets you see how many fasteners are left, and the closed type keeps out dust and dirt. Some new nail guns have see-through magazine covers, which is a nice feature. Typically, nailer magazines hold about 100 fasteners; stapler magazines usually hold more than 150 fasteners.

Unfortunately, you cannot interchange staples, brads and finish nails from one gun to another (one exception is the orange Airy gun shown on p. 43, which shoots brads and staples). Even worse, you usually can't swap one brand of fastener with another of the same length (they're often different gauges).

It's nice to be able to shoot a wide range of fastener lengths. But because magazines accept a limited size range, you'll need more than one gun to accomplish this. If you own a brad gun and want to sink 2½-in. fasteners in hardwood, for example, you'll have to buy or borrow a bigger gun.

Finish nails, brads or staples?

Common finish nails have thick shanks to withstand the pounding of a hammer. But if you're nailing hardwood, you still have to drill a pilot hole so the nail won't bend over or split the wood. By the time you've drilled the wood and blunted the end of the nail, you might as well use a screw. By contrast, pneumatic-fastener shanks are thin, and the guns will drive and set the fastener in one shot.

A staple will hold two pieces of wood together better than a nail of the same length, and because staples have thinner shanks, they are less likely to split the wood. Staples are less expensive per fastener than nails or brads. And more staples fit into an equivalent magazine space, so you'll have to reload less often.

Brad and nail holes, though, are more inconspicuous than staple slots. Some nailers shoot T-head fasteners that leave rectangular holes, which on reproduction work can resemble a cut nail hole found on an original molding.

Staples, brads and nails come in strips (single rows of glued-together fasteners), like desk staplers use. A spring-loaded follower in the magazine pushes the strip toward a launching chamber, just like a manual staple gun. Be sure to load only the recommended fasteners for the gun. Building-supply stores carry a wide selection, but if you can't find what you need, call the manufacturer, or look in the yellow pages under pneumatic tool distributors.

Shooting fasteners

To use an air nailer or stapler, hold the two pieces of stock you're fastening with one hand, and compress the joint by pushing down the nose of the tool. This will also release the gun's safety. Squeeze the trigger (or both triggers if your gun uses this type of safety), and the tool will drive and countersink a fastener so quickly that your pieces won't have time to shift—glue or no glue. The fastener will go in the direction that the nose is pointed.

To get the most fastener penetration, support the stock on something sturdy like a bench or in a vise. I've accidentally nailed things to my bench, so I put down a piece of particleboard to protect the top. I often shoot stop blocks to the particleboard to help hold work for routing, handplaning or sanding.

Other equipment you'll need

Pneumatic fastening tools need clean, dry, pressurized air. Besides an air compressor, you'll need a regulator and a filter (separator). A regulator lets you adjust the air pressure, so you can set how deep the head will go. You can vary the pressure in most compressors between 90 and 120 psi. The separator keeps moisture and compressor contaminates out of your tool.

Nail guns don't require a huge compressor, just one that outputs

Pneumatic guns excel in the shop

Queen Anne tables sure aren't nailed together, but metal fasteners can still be useful in building fine furniture. Case pieces may have assemblies that can be glued and nailed because the heads will be concealed. Even in places where nail heads will be exposed, you can use a brad nailer. Brad holes are so small that they are almost invisible when filled with putty.

Fasteners help in other cabinetmaking jobs, too (see the photos on this page). A brad nailer's speed and accuracy is handy when you're pinning together miters, installing stops for glass doors or tacking on solid-wood edging. And staplers are great for securing cabinet backs, utility drawer bottoms and glue blocks.

But the biggest benefit of staplers and nailers is speeding up mundane shop tasks. My favorite use of these tools is making jigs and fixtures. Air guns work faster than screw guns. I hold the parts in place and pop in fasteners. When I'm finished, I pry up the stops and fences, pound over the fastener shanks and toss the parts in the scrap heap.

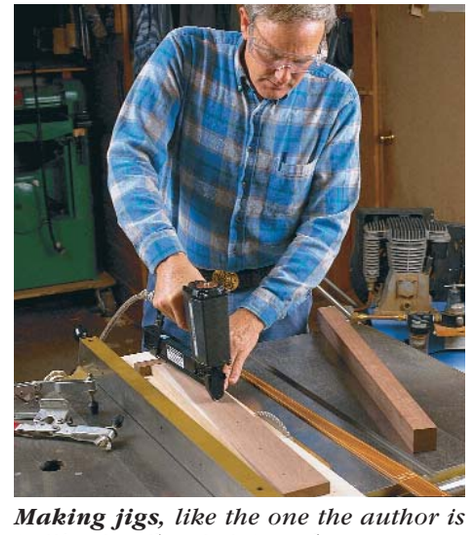
Staplers also are handy when I'm cobbling together boxes, bins and shelves. Try banging together a butt-joined drawer box using a hammer and nails. By the time you get things squared up and clamped for nailing, I'll already have made three boxes with a stapler. —*R.V.*

Installing face frames, *cabinet backs and drawer bottoms.*

Tacking on molding *or solid-wood edging.*

Securing glue blocks, *cleats and supports in pedestals, cases and tables.*

Pinning together mitered frames *and other delicate assemblies.*



Making jigs, *like the one the author is putting together, to taper a leg.*

***Convenience that's built in**—The finish nailer (top) has an angled magazine for getting into corners, a nose safety instead of a trigger safety and an easily removed nose for clearing jams. The bottom gun has a see-through magazine cover.*

Relying on nail guns

Norm Abram, host of *The New Yankee Workshop* television show (see the photo at right), has inspired more woodworkers to use nail guns than any one I can think of. Because he is constantly finding new uses for them, I asked him what he likes most about them and what he dislikes about them. I also interviewed three other craftsmen—a period furnituremaker, a cabinetmaker and a custom stairbuilder—to find out which pneumatic guns they own, what fastener sizes they prefer and how important the guns are (compared to other tools they own) for the architectural work and cabinetmaking they do. *—Alec Waters, associate editor*

Phil Lowe: I have a Senco SLP 20 brad nailer that's nice to have but not absolutely necessary, I suppose. I like being able to shoot different fastener lengths. When applying moldings and making jigs, I use the full range that my gun accepts, ⅝ in. to 1½ in. long.

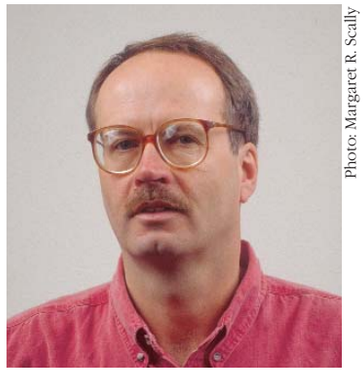


Photo: Margaret R. Scally

Sven Hanson: I own an Airy 0241S gun, which shoots ⅝-in.- to 1⁹⁄₁₆-in.-long, 18-ga. brads, and I rent a Senco SFN1 finish nailer for trim work. Their usefulness falls between my bandsaw and belt sander. Nailers are more efficient than other fastening methods.

100 psi of pressure. The bigger the compressor's air-storage tank, the better. At 100 psi, each 2½-in. finish nail uses one-twentieth of a cubic foot of air; each 1-in. brad uses one-fortieth of a cubic foot of air. For furniture work, a ¼-in.-dia. hose is fine. I use a straight hose—the shorter the better. Coiled hoses and long hoses can snag things or drag a lightweight nailer or stapler off the bench. You'll also have to buy a quick-disconnect coupler.

Lubrication and maintenance

Pneumatic guns need periodic oiling and cleaning. This is to ensure that the O-rings seal properly and that the chamber stays lubricated. The instruction manual will show what to clean and where and how often to oil. A few of the newer guns have sealed, no-lubrication chambers.

The two weakest parts of nail guns and staplers are the driver and the chamber below the head valve. Occasionally, the steel used in the driver is too soft or too brittle, which can cause it to wear quickly or to break. Luckily, drivers usually are easy to replace. You probably can change the driver and the critical O-rings yourself, but take the gun to a dealer to have more serious work done.

The chamber area can be a source of problems if it is made of soft steel or is inaccurately machined. The chamber guides the driver through its range of travel and also positions the fastener for firing. A worn or dirty chamber will let the driver ride over the fastener and jam the gun. An occasional jam is a fact of life with all air guns. The better guns have flip-up covers on the top of the chamber that let you clear the jam easily (see the top left photo).

What can go wrong and how to fix it

Nails and staples often go awry. They sometimes follow softer grain. This usually happens when I'm shooting into the edge of flat-sawn stock that has prominent annular rings, like southern yellow pine. Changing the tool angle usually fixes this. Just as with hand-driven fasteners, nails and staples shot with a gun can split the wood or blow out a corner. To avoid this, keep the nose in from the ends and edges of your pieces. If you're shooting staples, you'll sometimes get tearout between the prongs. By orienting the staple with the grain, you can usually prevent this.

Norm Abram: On the show, I use a Stanley-Bostich gun and Hitachi and Paslode models. I own a few old Senco guns that I use at home. For cabinet backs and drawer bottoms, I like ¾-in. brads. I use staples to assemble lattice and 1¼-in. finish nails to install interior trim. For outside jobs, I like the new gas-cartridge guns.

The noses on some early guns marked the wood, so companies came out with rubber noses. But many of these noses won't let you get in corners, which is important if you want to toenail. Lately, on bookcases, I've been toenailing opposing brads under the shelves in the back to secure the parts until the glue sets.

Nailers certainly aren't as useful as a tablesaw, but most production shops would be hurting without them.

Photo: Joe Romero

Lon Schleining: I use a Senco brad nailer and finish nailer. Both guns shoot without vibration and impact. I can shoot a brad through a pencil without splitting it. I shoot 1-in. pins the most, mainly for molding work. Pinning a part without it moving is critical when I'm bending and tacking moldings around a circular staircase. Nearly as useful as my chop saw, nail guns fit into an assortment of tools that I use almost daily. □

Phil Lowe designs and builds period furniture in Beverly, Mass. Sven Hanson builds cabinets and furniture in Albuquerque, N.M. Norm Abram is a carpenter and furnituremaker who lives near Boston, Mass. Lon Schleining teaches woodworking and builds custom staircases in Long Beach, Calif.

Look ma, no hose!

Say you're in a spot where you can't use a pneumatic nailer. Maybe there's no room for a compressor, or no electricity, or it's too awkward to be tethered to an air hose. Paslode has a solution. ITW Paslode (888 Forest Edge Drive, Vernon Hills, IL 60061-3105; 800-323-1303) makes two nail guns—a framing nailer and a finish nailer—that are combustion powered. Called Impulse nailers, these guns are fired by the ignition of gas, so they don't need an air line. They use a fuel cartridge (good for up to 2,500 shots) and a rechargeable battery to generate the spark (see the photo below). A small exhaust fan runs almost continuously when you're using the gun.

Air-driven guns are quieter, faster and much less expensive than Impulse guns, but many woodworkers like the Impulse for job-site work. —*R.V.*

When you're shooting fasteners, pulling the trigger too slowly can cause two fasteners to shoot at once. Push down on the safety nose, and then pull the trigger decisively. Sometimes the nose will dent the wood. This is caused from the piston recoil as it recycles. Some nailers are fitted with a rubber tip (see the top left photo on the facing page) to prevent this problem. But you can minimize the denting with most guns by holding the trigger until the fastener shoots, lifting the nose of the gun off the stock and then releasing the trigger.

Air-driven fasteners hold like crazy. If you drive one in the wrong spot or one comes out the side of your work, it's difficult to drive it back. If this happens, I clip the nail or staple prongs off as close as I can. I use a fine nail set to tap out the fastener, so the head or crown protrudes a bit. Then I use a pair of 10-in. Vise-Grips and a small block to lever the fastener out. Last, I putty the hole.

Which tools to buy

Choose a gun that shoots the longest fastener the magazine holds into the type of wood you usually use. If you work in oak frequently, choose a gun that will drive a fastener all the way in. If you always work with poplar, pine and softer woods, then a low-powered tool is probably fine. If you need power, look for a gun that has a large-displacement air cylinder. It's true that this will make for a heavier and bulkier tool, but at least you won't have to set nails by hand. They usually bend over.

For cabinet-shop work, I recommend a narrow-crown stapler that can countersink a 1½-in.-long staple in oak. I use 1¼-in.-long staples the most. The next purchase should be a brad nailer for light assembly work. I like ⅝-in. to 1⅝-in. brad lengths. Airy makes a gun that will drive both brads and staples but only in short lengths and light gauges. One of these could be useful if you do upholstery, screening or make small craft items. Last, I suggest a larger gun for shooting up to 2½-in.-long finish nails. Finish nailers can take care of heavy work, like attaching face frames and doing architectural work, and you'll appreciate one of these guns when you're nailing overhead. □

Robert Vaughan is a contributing editor to Fine Woodworking.