

# Clamps on Site

## Select the right tool to get a grip on your work

by Felix Marti

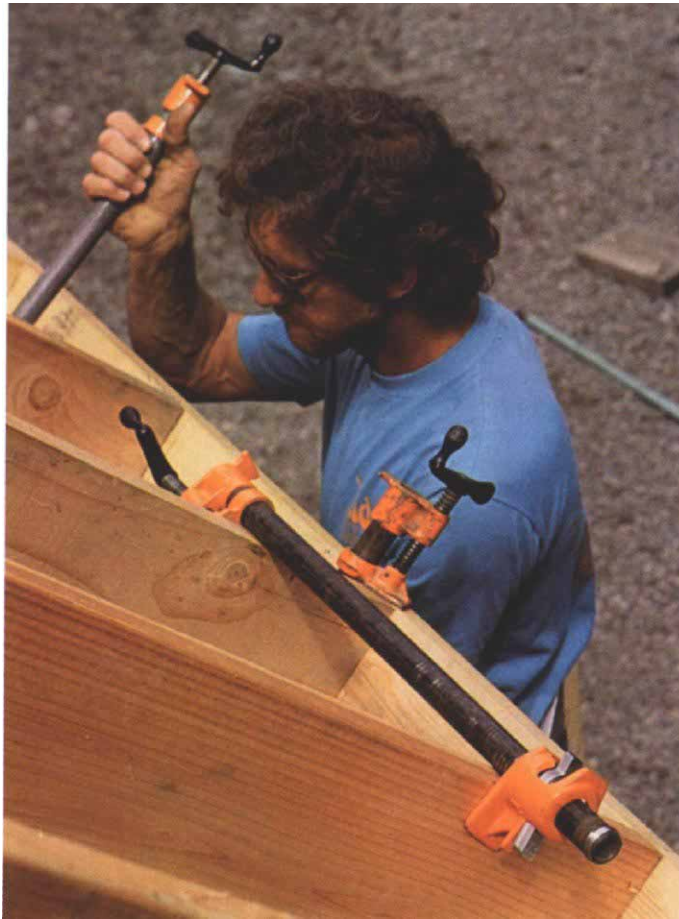
Clamps are like thumbs—they're easy to take for granted and hard to live without. But unlike thumbs, you can't have too many of them. In this article, I'll talk about the array of clamps I use around the job site (along with some of the newer, specialized clamps), and I'll offer tips on how to get the most out of them.

Most of the clamps I use are available from any well-stocked hardware store or mail-order tool outlet. A few can be hard to track down, however, and the "Sources of Supply" on page 73 will help you get in touch with manufacturers. If you can't find what you're looking for commercially, consider making your own. The ability to modify or make a clamp of some sort to solve a specific problem is a hallmark of the ingenious builder.

**C-clamps**—About as basic as a clamp can be, the C-clamp is the workhorse around our jobs. It consists of a C-shaped frame with a machine screw at one end (photo below right). A swiveling tip at the end of the screw bears against a foot at the opposite end of the frame. C-clamps are measured by how far they will open, and by their throat depth or "reach"—the distance from the inner edge of the frame to the center of the screw. You should use a clamp that opens just a bit more than the thickness of the material to be clamped; otherwise, you'll place abnormal stresses on the screw and the frame. For site work, I find that 3-in., 4-in. and 6-in. clamps fit most situations. I organize the clamps according to size, store them in joint-compound buckets and lubricate their threads occasionally.

C-clamps are designed to be hand-tightened. If you haul on one with a pipe lever or a wrench, you'll likely ruin it by deforming the frame. C-clamps are also designed to clamp parallel surfaces. If you have to clamp two surfaces that aren't parallel, use wedges or angled seat blocks to direct the clamping force to the foot. This will keep the screw from bending.

Some clamps have plastic pads over the swivels and feet to protect the work, but I take



**Pipe clamp.** A sliding foot, or tail-stop, can be moved up and down a length of  $\frac{3}{4}$ -in. pipe to adjust the distance between the clamping surfaces. Here, a pipe clamp aligns a pair of rafters while another brings the rafter and the subs fascia into the same plane. Photo by Felix Marti.

**Two clamps.** A quick-action clamp on the left and a C-clamp on the right secure a jamb extension to a 90° angle jig.



them off when using the clamps for glue up. They're squirrely, tending to move around a bit as the clamps are tightened, and they don't do anything to spread clamping pressure the way a caul will. My favorite cauls are strips ripped from sink cutouts. They have laminate on one side, which won't bond with the glues I use, and their  $\frac{3}{4}$ -in. thickness spreads the pressure well. For thin cauls, I use  $\frac{1}{4}$ -in. hardboard.

To determine quickly and accurately the distance between two surfaces, I'll often use a pair of long 1x2s and a C-clamp (two C-clamps if the sticks are spanning more than 8 ft.). I slide the 1x2s apart on their long axis until they abut the opposing surfaces. Then I clamp them together to record the exact distance without a tape measure.

C-clamps also make good handles for small, hard-to-grip loads on the job site. During remodeling, for example, you can use one to get a firm hold on a piece of blocking that must be carefully removed from a joist or a stud bay.

**Pipe clamps**—Pipe clamps consist of two elements affixed to a length of pipe: a head that contains a screw and the crank; and the foot, or tail-stop, that carries the anvil pad against which the pressure is applied. Together, the head and foot are called the *fixture*. One element of the fixture is stationary;

the other slides up and down the pipe as needed and is held in place by a spring-action clutch. I prefer a pipe clamp with a stationary head and a sliding foot because it allows room for a big crank handle that can be easily turned. Sliding heads are fitted with wing-nut handles because there isn't much clearance between the head and the pipe. Pipe-clamp fixtures are made for both  $\frac{1}{2}$ -in. and  $\frac{3}{4}$ -in. pipe. Stick with the  $\frac{3}{4}$ -in. stuff—it's more stout. And be sure to use black pipe, not galvanized. Galvanizing hardens the pipe surface, making it difficult for the sliding clutch to get a bite. I have pipe clamps in 2-ft., 4-ft. and 6-ft. lengths, and I typically keep couplings on their ends to protect the

threads and to allow the clamps to be linked into longer clamps.

When I fasten subfascia to rafter tails, I align the top of the subfascia with the tops of the rafters. Rafters aren't always straight, so this alignment sometimes requires a fair amount of persuasion—perfect for a pipe clamp (top photo, facing page). Pipe clamps often come loose when vibrated, so a nail gun or a screw gun is good for making this connection.

When building cabinets, I run pipe clamps diagonally across casework to square the carcass prior to applying the backing panel. I also square frame-and-panel doors with pipe clamps before C-clamping the corner joints during glue up.

**Bar clamps**—Bar clamps are a variation on the pipe-clamp design, but instead of a pipe for a frame, they use a solid-steel rail or a square metal tube. Like pipe clamps, bar clamps are often used to glue boards edge-to-edge, but both tend to bow the boards away from the clamps. You can counteract this phenomenon by using cauls and clamps placed in opposition to the bowing, or with edge clamps (top photo, right).

Truth be told, I don't care much for traditional bar clamps. Bar clamps that are as sturdy as 3/4-in. pipe clamps usually cost more than pipe clamps, and they can't be extended by linking them together. But there are some new versions of bar clamps on the market that are worth noting. For example, Bessey's K-body bar clamp has 3 1/2-in. deep jaws that remain parallel throughout their clamping range. According to the Bessey folks, steel rollers within the sliding jaw evenly distribute the clamping pressure, eliminating the bowed-board phenomenon. To verify their claims, I ripped some 1/2-in. plywood into nine strips, 2 1/2 in. wide. Then I placed the strips edge-to-edge and drew them together with a pair of K-body clamps. Nothing bowed or popped.

Universal's aluminum bar clamps are well made, sturdy and very light, which can be a real plus when it comes to moving a glued-up assembly with lots of clamps on it. In addition, they can quickly be converted to miter clamps with the addition of slip-on miter jaws (photo right).

Both Adwood and Hafele make bar clamps that have wide, cylindrical

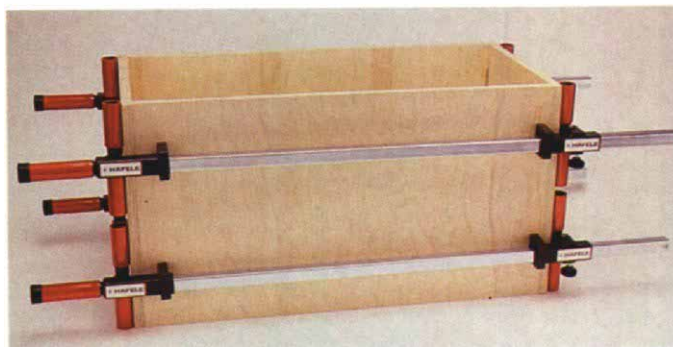


**Edge clamp in the field.** Affixed to a bar clamp, an edge clamp can exert downward pressure to counteract the tendency of edge-glued boards to bow upward.

**Miter fixture.** Universal's lightweight aluminum bar clamp (photo below) can be converted into a miter clamp with the addition of slip-on, V-shaped jaws.



**Cylindrical jaws.** Hafele's top-spanner bar clamp (below) has PVC-wrapped cylindrical jaws that can get a bite on workpieces that come together at any angle between 45° and 135°. Photo courtesy Hafele.



**Beyond the C-clamp.** Locking clamps, pistol-grip bar clamps and quick-action lever clamps exert similar loads as C-clamps do but do it faster and one-handedly. Left to right: American Tool Co.'s bar clamp has a sliding

jaw with a locking lever, and its C-clamps have a wide range of reaches. Center: a Quick Grip bar clamp. Last three: Bessey's all-steel quick-action clamp, lever clamp and Super Grip clamp. Photo by Rick Allen.



cal steel jaws wrapped with PVC plastic sleeves (photo left). The wide jaws exert pressure over a broad area, and their cylindrical profile allows them to draw together workpieces that meet at other than 90° angles—for example, the carcass of a triangular cabinet.

The Quick Grip clamp, on the other hand, is a new type of bar clamp that, in my opinion, has limited use on the job site. It's a good idea: a squeeze-grip handle allows you to exert the clamping pressure one-handedly. Problem is, the pressure is minimal, and I don't like the handle.

**Quick-action clamps**—Cross a bar clamp with a C-clamp and you've got a quick-action clamp (bottom photo). It has a sliding head that can be moved along the bar for fast contact with the work. This feature is especially helpful when using the clamp to align heavy or unwieldy parts, such as framing members. Quick-action clamps can have deeper reaches than C-clamps (up to 9 in.) and can be opened wider—Jorgensen quick-action clamps are up to 60 in. long. On site, I keep several with 4-in. reaches and 8-in. to 12-in. bars and some with 8-in. reaches and 16-in. bars.

I often use screws, counterbored and plugged, to affix door casings to framing. A couple of 12-in. quick-action clamps do a good job of holding the casing in place and snugging it to the dry-wall at the same time (softwood cauls protect the casing from damage).

When assembling window-jamb extensions, door jambs or other butted joints, I use C-clamps or quick-action clamps along with a simple 90° angle jig to align and hold the pieces while I screw them together (bottom photo, facing page). Another jig that can be used with C-clamps or quick-action clamps makes it easy to bend sheet metal on site (drawing p. 73).

Part of what makes a quick-action clamp useful can also render it useless. If the screw is fully retracted and you slide the head down the bar to engage the foot, that's where it will stay, wedged shut. To prevent this, always keep a few threads exposed between the head and the swivel tip for backing off room.

**Locking clamps**—Anyone with a passing interest in hand tools has come across locking pliers—the



**Hold-down.** De-Sta-Co clamps apply a point load by way of a lever-activated cam.



**Spring clamp at the corners.** A pivoting-jaw spring clamp has tiny teeth that secure mitered corners, 90° or otherwise.

**Edge clamping.** Combined with a quick-action clamp, Wetzler's edge screw applies pressure to a counter edge strip (left). Adwood's heavy-duty edge clamp has self-adjusting, spring-loaded jaws (right).



most common brand is the Vise Grip. Their close cousins are locking clamps, and they can be very useful on the job site for applying pressure one handedly, even in situations that call for wide openings or deep reaches (bottom photo, previous page). I use them for jobs like gluing veneer to a substrate, or plastic laminate to countertops.

De-Sta-Co makes a lot of cam-over clamps that fall into the locking-clamp category. You adjust the jaws to engage material tightly when you throw the lever handle. I use their fixed-mount clamps on sliding table-saw fixtures or to hold a workpiece during routing (top photo, left).

Bessey's lever clamp combines a locking-lever jaw with the rail of their all-steel, quick-action clamp (bottom photo, previous page). The result is a heavy-duty clamp that can exert 50% more pressure than their comparable quick-action, all-steel clamp.

**Handscrews**—Handscrews are my clamps of choice around the table saw—I don't like steel near spinning saw blades. I use handscrews whenever I have to clamp a fixture to the fence or a featherboard to the table. I also use a handscrew as a stop on my radial-arm saw's fence. I turn it at an angle toward the blade so the workpiece engages the corner of the handscrew's jaw, preventing sawdust buildup against the stop.

Clamped to the bottom of a door, a handscrew can make a serviceable door buck—it's usually wide enough to keep the door from falling. Clamping a handscrew to each end of a board, then clamping the handscrews to a pair of sawhorses creates a pretty good field vise for boards requiring edge treatment, such as planing or sanding (photo top right).

Because a handscrew has two screws, its jaws can be perpendicular or at an angle to each other. This characteristic allows a handscrew to conform to odd shapes or to pinch nearly inaccessible places with a point load. If you've got some threaded rod and a couple of 2x4s, you can make a site-built version to reach tough spots (drawing p. 73).

**Spring clamps**—Spring clamps are light-duty clamps that resemble big clothespins. They don't exert much pressure, but they can be operated with one hand, and they're inexpensive. I use spring clamps for holding steel studs in their channels prior to screwing the studs in place. They are also good for holding a chalkline, anchoring a tarp where tape won't work or securing a template to a workpiece.

The spring clamp I wouldn't be without is the pivoting-jaw miter clamp (middle photo, left). Its jaws have tiny teeth that grip opposing pieces of wood. The clamps make it easy to assemble runs of baseboard or crown with glue and air-driven nails—especially a run with short pieces in it.

**Strap clamps**—Once in a while, I'll have to bring together a number of parts that can't be easily gripped with ordinary clamps—cylindrical assemblies like hot tubs and planters, for example. They are best held together temporarily with strap, web or band clamps. This type of clamp encircles its subject with a belt that can be tight-



**Clamp-on sawhorse vises.** A sturdy anchor at one end of the sawhorse can make it a lot easier to plane the edge of a board. Stanley's steel vise (photo below) has prebored holes for attaching wooden jaw liners. Bessey's version has plastic jaws that ride on a pair of guide bars (bottom photo). The bars can be removed, allowing the jaws to swivel and thereby accommodate irregular shapes. A handscrew clamped to the end of a sawhorse can also make a serviceable vise (photo above).



ened with a self-locking cam device. Band clamps usually have four preformed metal corners that can be threaded onto the strap and used to draw mitered frames together.

Two less-sophisticated (but cheaper) ways to apply similar clamping action are to use rope or inner tubes. For example, tie a loose noose of rope around the workpiece, pass a sturdy stick through the noose and twist the stick until it tightens the noose. Anchor the stick with a block or a nail. I've also used loops of truck inner tube cut into big rubber bands to make clamps for gluing up columns. They can be linked to make any length.

**Wedge clamps**—When I lay flooring, I snug bowed strips together using a pair of wedges cut from a 1-ft. long 1x6 (drawing below right). The fixed wedge is screwed to the subfloor to act as an anvil. The driving wedge bears against the tongue of the flooring. I lop off the point of this wedge to create a flat spot to knock it back out.

I also use wedges to plumb and line framed walls. I put pairs of opposing wedges between the brace-blocks nailed to the subfloor and the bottoms of the 2x4 braces. Moving the wedges in and out allows me to fine-tune the alignment of the walls.



**Irregular angle clamp.** Made by Bessey, this two-jawed clamp brings together parts that meet at odd angles, such as this stair railing. Photo by Felix Marti.

**Clamp chowder**—In addition to the basics, many specialty clamps on the market can take the pressure off the builder and put it on the workpiece, where it belongs.

I have a couple of clamp-on carpenter's vises that are made specifically for sawhorses (photos facing page), and I'm surprised at how much I

use them. Their jaws open up to 3½ in.—enough to do edge work on most job-site materials. Stanley and the Warren Tool Group both sell them. Bessey's version rides on removable rails, allowing it to clamp irregularly shaped workpieces.

When you have to apply edging to a counter or a cabinet, and there's no easy purchase for a pipe clamp, edge clamps can bail you out (bottom left photo, facing page). For occasional use, I'd suggest edge screws, which are used in conjunction with a quick-action clamp to bear on the edging.

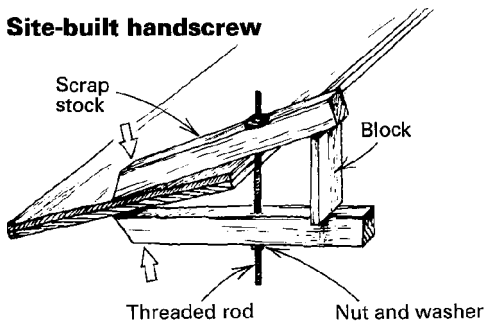
Adwood sells the ultimate edge clamp. Based on the old Chinese woven finger trap that tightens as you pull on it, Adwood's heavy-duty edge clamp automatically adjusts to accommodate panels from ⅜ in. to 3½ in. thick. But at around \$90 apiece, it might be hard to justify their price tag.

Bessey's irregular angle clamp is another tool you don't really need until you really need it (photo

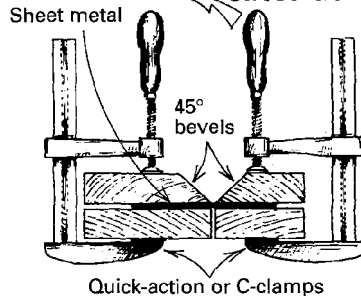
above). It seems best suited for joining stair parts and similar assemblies that meet at angles other than 90°. I tried one out as I researched this article and ended up buying it. □

*Felix Marti is a builder in Ridgway, Colo. Photos by Charles Miller, except where noted.*

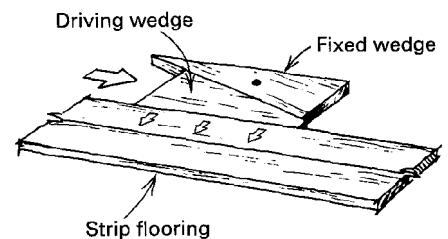
### Site-built handscrew



### Sheet-metal brake



### Flooring wedges



## Sources of Supply

• **Adjustable Clamp Co.**, 404 North Armour St., Chicago, Ill. 60622 (312) 666-0640

Makers of Jorgensen & Pony C-clamps, pipe, bar, quick-action, spring and band clamps; handscrews and hold-downs.

• **Adwood Corp.**, P. O. Box 1195, High Point, N. C. 27261 (919) 884-1846

Wide, cylindrical-jawed bar clamps for cabinets, heavy-duty edge clamps.

• **American Clamping Corp.**, P. O. Box 399, Batavia, N. Y. 14021 (716) 344-1160

Imports Bessey clamps—the most innovative clamps around. They

include angle and miter clamps, quick-action, Klemmy cam-style veneering clamps. Also locking clamps, bar clamps and K-body bar clamps.

• **American Tool Co., Inc.**, 108 So. Pear St., DeWitt, Neb. 68341 (402) 683-2315

Vise-Grips; C-clamps with swivel pads and regular tips, quick-set bar-clamp jaws, sheet metal and locking pipe jaws, chain jaws.

• **De-Sta-Co**, P. O. Box 2800, Troy, Mich. 48007 (313) 589-2008

Special-purpose clamps: cam-over, pull-action, push-action, air and hydraulic powered, bar clamps, wrench-tightened clamps and squeeze clamps.

• **Häfele American Co.**, 3901 Cheyenne Dr., P. O. Box 4000, Archdale, N. C. 27263 (919) 889-2322

Top-spanner cabinet clamp.

• **Stanley Tools**, The Stanley Tool Works, 600 Myrtle St., New Britain, Conn. 06050 (203) 225-5111

C-clamps, bar clamps, carpenter's vises, web clamps.

• **Universal Clamp Corp.**, 15200 Stagg St., Unit #3, Van Nuys, Calif. 91405 (818) 780-1015

Lightweight, sturdy aluminum clamps and face-frame clamps.

• **Warren Tool Group**, P. O. Box 68, Hiram, Ohio 44234 (800)-543-3224

Brink and Cotton line of C-clamps, pipe, bar, quick-action, spring and web clamps.

Carpenter's vises and handscrews.

• **Wetzler Clamp Co., Inc.**, Rt. 611, Mt. Bethel, Pa. 18343 (717) 897-7101

Pipe, bar, quick-action, spring and band clamps.

• **Wilton Corp.**, 300 South Hicks Road, Palatine, Ill. 60067 (708) 934-6000

Bench vises, C-clamps, quick-action clamps.

• **Woodcraft Supply**, Wood County Industrial Park, P. O. Box 1686, Parkersburg, W. Va. 26102-1686 (800) 225-1153

Pivoting-jaw spring clamp.