

WOODWORKER'S WJOURNAL

"America's leading woodworking authority"™

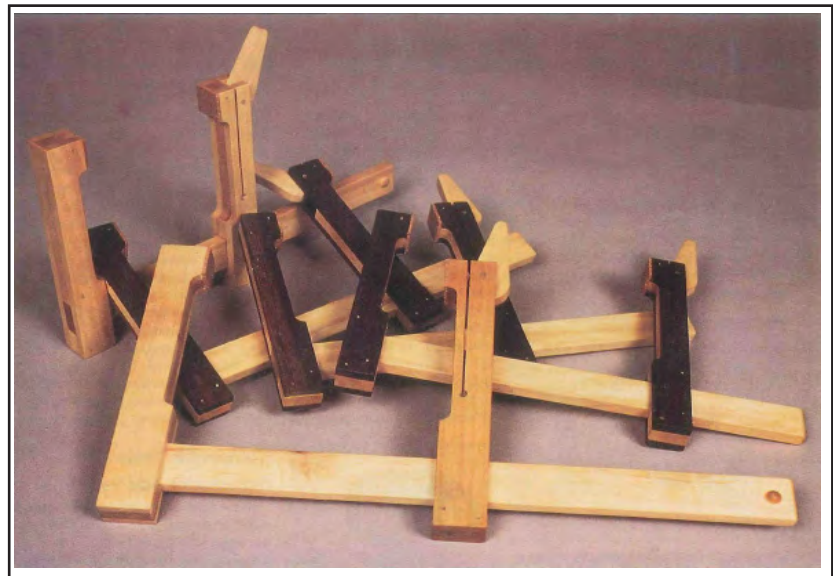
Classic Plan

In this plan you'll find:

- Step-by-step construction instruction.
- A complete bill of materials.
- Construction drawings and related photos.
- Tips to help you complete the project and become a better woodworker.

These plans are best viewed with Adobe Reader installed on your computer. If you want to get a free copy, visit:
<http://adobe.com/reader>.

Light-Duty Cam Clamps



For the Woodshop

LIGHT-DUTY CAM CLAMPS

by Bob Colpetzer



The author makes simple, light-duty cam clamps from leftover hardwood stock.

I often face the dilemma of not having enough clamps for the project. On the other hand, equipping a shop with clamps, as you've probably noticed, can be a budget buster. To balance my needs and my available woodworking funds, I tried a couple of new approaches. First, I began planning the assembly phases of my projects to work around my limited clamp supply. Second, I started making my own clamps from leftover materials I had in the shop.

Some of the clamps I've made are single-purpose, geared to a particular project I'm assembling. Others I've

designed for more universal use. I consider them light- to medium-duty clamps; they apply just enough pressure to hold well-cut, snug-fitting joints together while the glue dries. I've found that if I take the extra time and care to make sure all joints fit precisely, I can get by with minimal clamping pressure.

Before You Start

The adjustable cam clamps shown *above* happen to be my favorites. They're easy to build and serve the purpose for a lot of different clamping jobs. The cam operates fast, and you

can vary clamping pressure simply by adjusting its position.

Although I'm presenting only one size here, you can make cam clamps to fit almost any job simply by scaling the drawings. To save money, I usually make mine from leftover hardwood shorts that I couldn't bring myself to throw away.

You can make these clamps from almost any wood, but I find that a close-grained hardwood such as birch, beech, or hard maple works best for the interior jaw parts, the cam, and the bar. The jaw sides can be made from any hardwood.

Cut the Parts To Size, Then Drill the Pin Holes

Step 1. To make the jaw sides (A), face-joint and cut two $\frac{1}{4} \times 1\frac{1}{4} \times 17$ " pieces of hardwood stock. Crosscut two 8" lengths from each of these. (See the Exploded View and Side View drawings.) For the jaw centers (B) and ends (C), prepare a $\frac{3}{8} \times 1\frac{1}{4} \times 17$ " piece of close-grained hardwood, then crosscut two $6\frac{1}{8}$ " and two $1\frac{1}{2}$ " lengths.

Step 2. For the clamp bar (D), rip and crosscut a piece of $\frac{3}{8}$ "-thick stock to $1\frac{1}{8} \times 16$ ". Cut a $\frac{1}{16}$ " chamfer around one end of the bar.

Step 3. To make the fixed jaw, select one of the side pieces you cut. Using dimensions shown on the Side View, lay out the $\frac{1}{16}$ " hole centerpoints (*photo A*). Next, dry-assemble the fixed jaw parts as shown on the Exploded View, aligning the edges and front end of the two $\frac{1}{4}$ "-thick sides and the $\frac{3}{8}$ "-thick center. Use the clamp bar as a spacer to position a $\frac{3}{8}$ "-thick jaw center end at the rear of the jaw. Then, clamp the assembly. Make sure that the clamp bar is tight and square to the jaw, then drill the $\frac{1}{16}$ " holes where marked.

Step 4. Repeat the process described in Step 3 to assemble the movable jaw.

Step 5. Using dimensions shown on the Exploded View, lay out the location of the 45° cam notch on the $\frac{3}{8}$ "-thick jaw center piece. Then, bandsaw the end to shape as shown in *photo B*.

Assemble and Glue The Clamp Jaws

Step 1. From $\frac{1}{16}$ " brass rod, cut eight 1" lengths. File the ends so they



Photo A: Carefully lay out and mark the centerpoints for the brass pin holes on the face of one fixed and one movable side piece.

BILL OF MATERIALS

CLAMP

PART	T	W	L	MTL.	QTY.
A Jaw sides	$\frac{1}{4}$ "	$1\frac{1}{4}$ "	8"	H	4
B Jaw centers*	$\frac{3}{8}$ "	$1\frac{1}{4}$ "	$6\frac{1}{8}$ "	H	2
C Jaw center ends*	$\frac{3}{8}$ "	$1\frac{1}{4}$ "	$1\frac{1}{2}$ "	H	2
D Clamp bar	$\frac{3}{8}$ "	$1\frac{1}{8}$ "	16"	H	1
E Cam	$\frac{3}{8}$ "	$1\frac{1}{8}$ "	$2\frac{7}{8}$ "	H	1

* Parts cut to finished length during construction. Please read all instructions before cutting.

MATERIALS LIST

H-hardwood (see text)

SUPPLIES

$\frac{1}{16}$ "-thick sheet cork, $\frac{1}{8}$ " button plug, $\frac{1}{16}$ " brass rod, $\frac{1}{8}$ " brass rod

will slide smoothly into the holes. Next, spread glue on the mating surfaces of the fixed-jaw parts and the clamp bar, and reassemble the pieces. Then, drive the $\frac{1}{16}$ " brass pins into the holes to align the parts, and clamp the assembly (*photo C*).

Step 2. Glue and assemble the movable jaw the same way. Remove any glue squeeze-out from the cam notch and the bar slot. Allow the glue to dry on both assemblies.

Step 3. Cut the brass pins flush using a pair of diagonal wire cutters. File the pins flush with the sides, then sand to remove the file marks.

Step 4. Fit the movable jaw to the clamp bar. To do this, sand or

scrape the sides and edges of the clamp bar, removing just enough material to make it fit snugly but still slide smoothly. Caution: Be careful not to remove too much material, especially from the edges of the bar; this will reduce clamping capability.

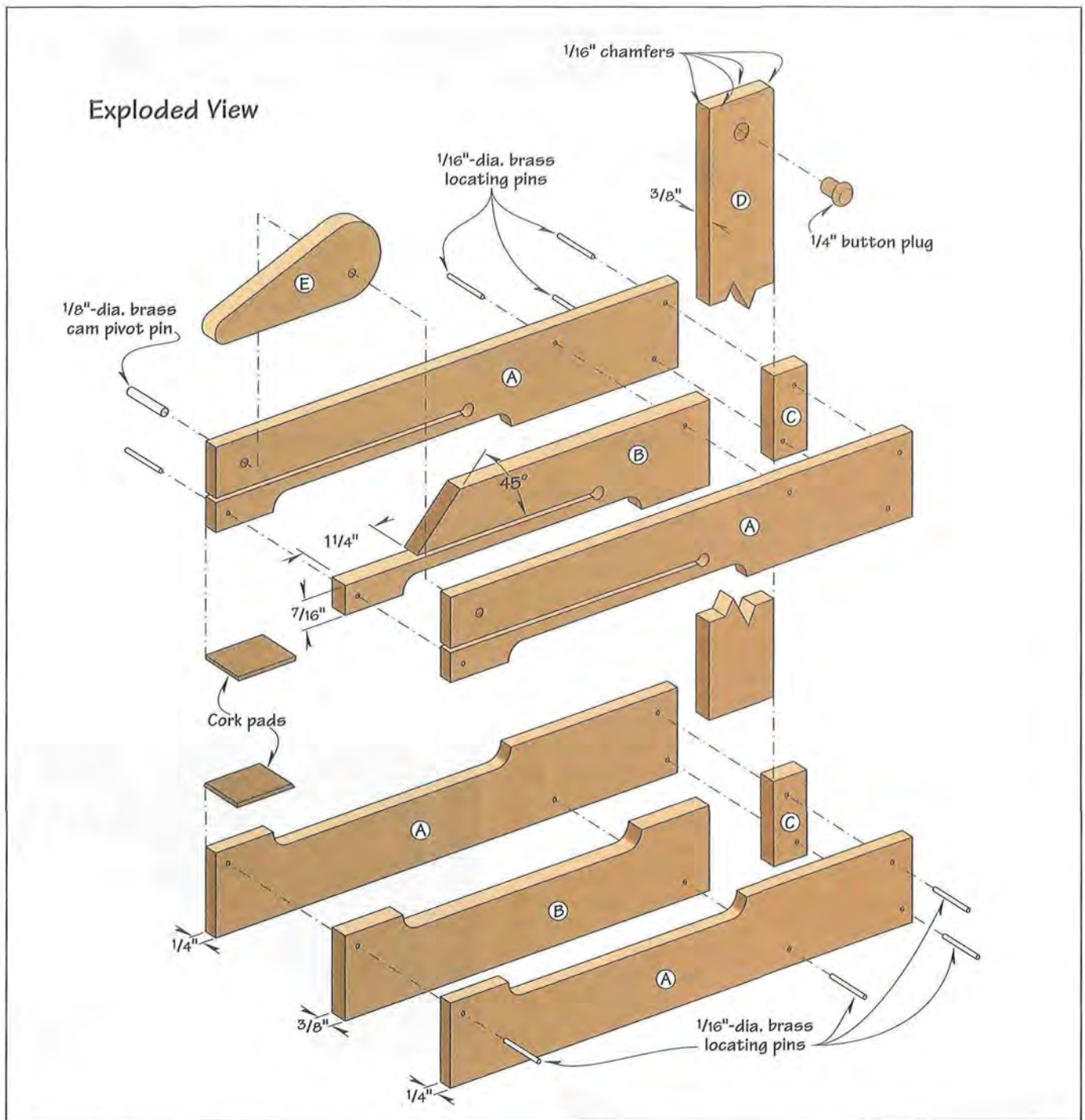
Step 5. Slide the movable jaw onto the fixed jaw and clamp them together.



Photo B: Bandsaw the cam notch on the end of the jaw center.



Photo C: Glue and assemble the fixed and movable jaws, then drive brass alignment pins and clamp.



Next, trim the ends of both jaws on the tablesaw as shown in *photo D*.

Step 6. With the jaws still clamped edge to edge, lay out the $\frac{1}{4}$ "-deep relief notches on the inside edge of each jaw. Bore $\frac{1}{2}$ " holes to radius the ends of the notches. (See *photo E*.)

Step 7. Bandsaw the notches, cutting just outside the line, then smooth the sawn edges. To do this, install a $\frac{1}{2}$ " straight bit in your table-mounted router. Make an auxiliary fence from a $\frac{1}{4} \times 2$ " piece of plywood cut to the same

length as your router table. On one edge, centered between the ends, bore or cut a $\frac{3}{4}$ " clearance hole for the router bit. Clamp the fence to the router table so that the bit's cutting edge protrudes $\frac{1}{4}$ " past the front edge of the fence. Then, elevate the bit to 1" and rout the straight edges of the notch tangent to the bored holes (*photo F*). Note: To start and stop the cuts at the proper locations, you may want to clamp stops to the table to limit the workpiece's travel.

Step 8. Lay out the centerpoint for the cam pivot-pin hole on the movable jaw where dimensioned. Temporarily insert a wood scrap in the cam slot, then, using your drill press, drill the $\frac{1}{8}$ " hole through the jaw. Lay out the saw kerf and stop hole where dimensioned, then drill the $\frac{3}{16}$ " stop hole. Now, using your bandsaw and a fence or straight guide, saw the kerf to the hole.

Step 9. Using dimensions shown on the Side View detail, lay out the clamping cam on $\frac{3}{8}$ "-thick stock. Drill



Photo D: Trim the jaws to uniform length on the tablesaw.



Photo E: Bore 1/2" holes to radius the notch ends.



Photo F: Rout the notch edges using stops to limit travel.



Photo G: Reverse the movable jaw to use clamp as a spreader.

Continued from Page 84

the 1/8" hole, then saw and sand the cam to shape. Cut a 1" length of 1/8" brass rod, insert the cam in the notch, then insert and drive the pin. Next, test the cam's action. If it works smoothly, glue

in the pin by placing several drops of low-viscosity cyanoacrylate adhesive around the pin and letting it wick into the joint. Then, file and sand the pin flush with the jaw sides.

Now, Add the Finishing Touches

Step 1. Drill a 1/4" hole 1/4" deep centered 1/2" from the end of the clamp bar. Glue a 1/4" button plug into the hole to prevent the movable jaw from sliding off the bar. Note: If you want to make the clamp reversible so that it can be used to exert outward pressure (*photo G*), install a short #4 or #6 roundhead screw in the bar instead of the button plug. Simply remove the screw to reverse the clamp.

Step 2. Finish-sand all clamp parts and ease all edges using 150-grit abrasive. Next, cover the mating faces of the jaws (where the cork pads will be glued) with masking tape. Then, apply the finish of your choice. (I applied two coats of Watco Danish Oil, allowing the first coat to cure before applying the second coat.)

Step 3. From 1/8"-thick sheet cork, cut two pads to fit the mating surfaces of the jaws. Remove the masking tape from these surfaces, then glue the cork pads to the clamp jaws. **Wj**

Project design, photographs: By the author

