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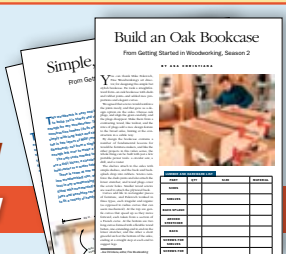
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New-Fangled Workbench

With six pipe clamps and some dressed framing lumber,



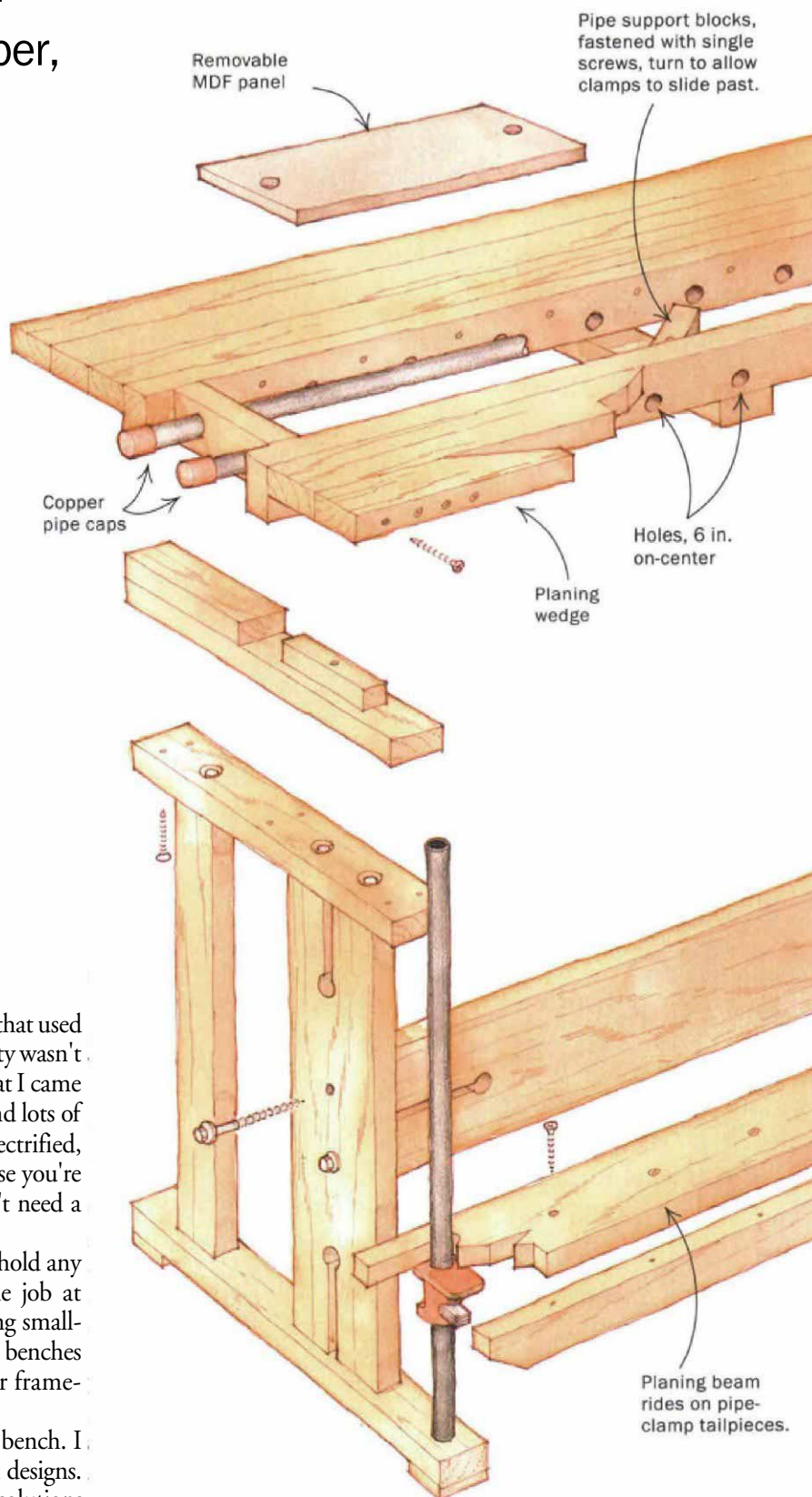
you can make an inexpensive bench that's as versatile as a Swiss Army Knife

BY JOHN WHITE

For five years I worked as a cabinetmaker in a shop that used only hand tools for the simple reason that electricity wasn't available that far back in the woods. One lesson that I came away with was the importance of a good workbench—and lots of windows. I now work in a shop that is, if anything, overelectrified, but a functional workbench is still important. Just because you're driving a car instead of a buggy doesn't mean you don't need a good road to get where you're going.

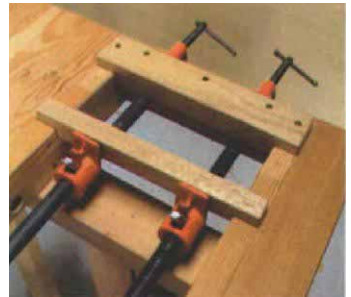
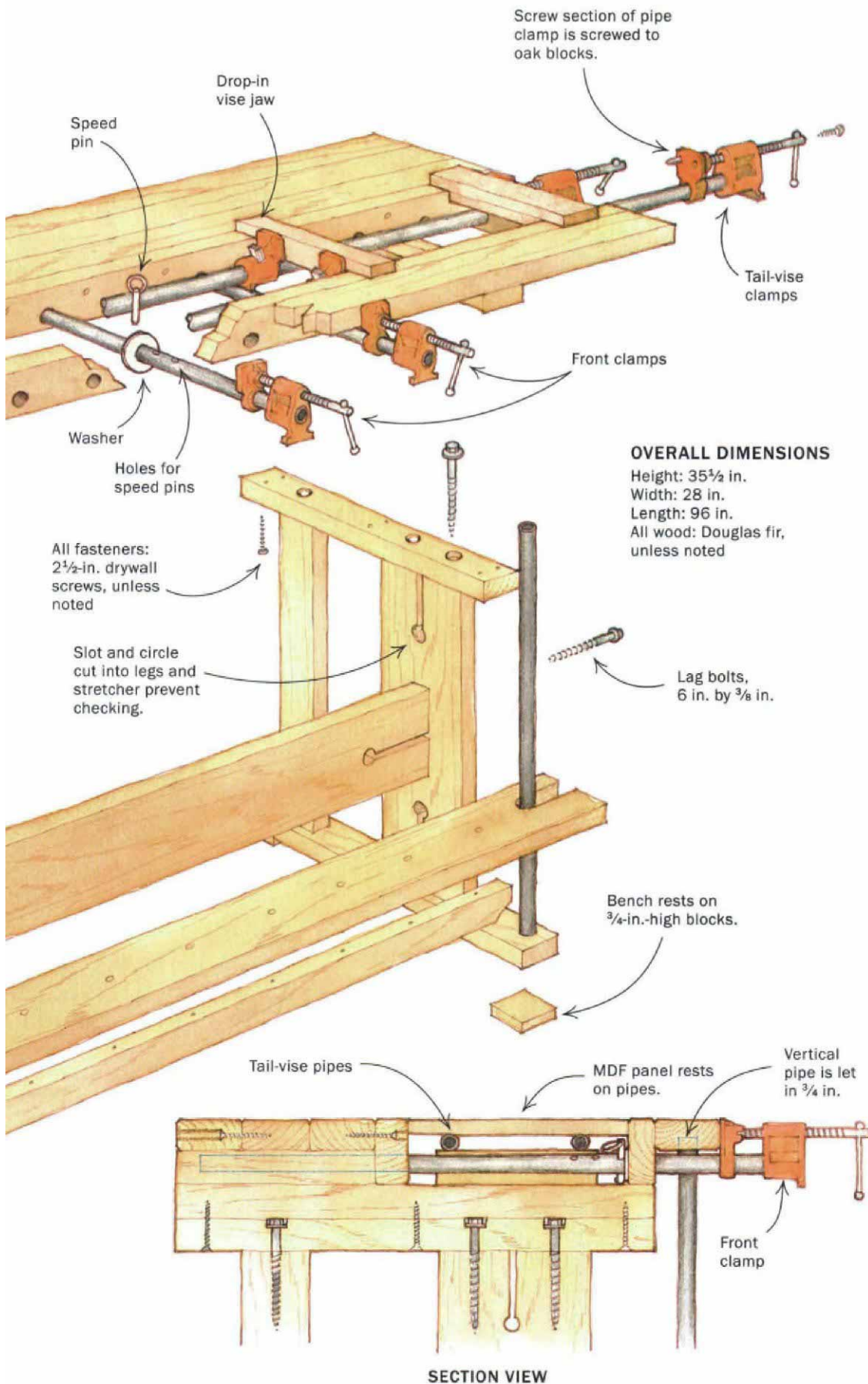
On a perfect bench, the various vises and stops would hold any size workpiece in the most convenient position for the job at hand. Traditional workbenches are adequate for clamping smaller pieces, a table leg or frame rail for instance, but most benches can't handle wide boards for edge- and face-planing or frame-and-panel assemblies.

Recently, I moved my shop and needed to build a new bench. I began by researching traditional American and European designs. I found that although our predecessors had many clever solutions to the problems of holding down a piece of wood, no one bench



DOUGLAS FIR WORKBENCH

To minimize costs, the author milled workbench stock from Douglas fir framing lumber, sawing clear sections from the center of 2x10s and 2x12s. The bench is fastened with drywall screws and lag bolts. Six pipe clamps in different configurations are used as vises.



Oak blocks span tail-vise clamps. The screw ends of the pipe clamps are screwed to the end of the bench through holes drilled in the clamp faces.



Pipes rest on blocks that turn. Tail-vise pipe clamps are supported by blocks fastened with one screw. To slide a clamp past, turn the block.



Front clamps are easy to adjust. The clamps fit in holes in the bench front and are secured with large washers and speed pins.



Sliding height adjustment. Pipe-clamp tailpieces slide on cast-iron pipes held captive in the top and bottom of the bench. A T-shaped Douglas fir planing beam rides on the clamps.

solved all or even most of the problems I had encountered in 25 years of woodworking. Frustrated, I finally decided to design a bench from the ground up.

At first I had no success. A design would address one problem but not another, or it would be far too complex. I was about to give up and build a traditional German bench when I came up with a design that incorporates pipe clamps into the bench's top, the front apron and even the legs.

Planing beam slides on pipes

On the front of the bench is an adjustable, T-shaped planing beam that runs the full length of the bench. It is supported on both ends by the sliding tailpieces of Pony pipe clamps. The ½-in. cast-iron pipes on which the clamps slide are incorporated into the bench's legs. I used Pony clamps throughout this project because they are well made and slide and lock very smoothly.

The planing beam continuously supports the full length of a board standing on edge. The stock for the planing beam can be as narrow as 2 in. and as wide as 30 in. The planing beam can be set to any position in seconds. Of all of the bench's features, the planing beam is the most useful. I use it dozens of times daily when building a piece of furniture.

You've probably noticed that there is no front vise to secure the board being

planed. Instead, the force of the plane pushes the workpiece into a tapered planing wedge attached to the far left end of the bench. This is an ancient device, and for handplaning it is far more practical than any vise. You can flip the board end for end or turn the other edge up in an instant with one hand. You don't even have to put down your plane.

To make a shoulder vise when needed, I drilled holes 6 in. on-center along the bench's front rail to mount pipe clamps horizontally. I pair up two clamps with a drop-in vise jaw, which is just a length of 1¾-in. square hardwood. The jaw can be as short as 8 in. or longer than 6 ft. I have several jaws of different lengths.

The front vise can be used with the planing beam supporting the workpiece from below. This is useful because some proce-

dures, such as chopping mortises, drive the work downward through the jaws of a conventional vise, scarring the wood.

Traditional tail vise is replaced with pipe clamps

On the bench's top, two pipe-clamp bars are recessed into a 10-in.-wide well, replacing a conventional tail vise and bench dogs. The clamp-tightening screws project from the right end of the bench, and the movable jaws project ¾ in. above the top. Both the fixed and movable jaws have oak faces. This clamp setup makes it easy to hold down boards for surface-planing because nothing projects above the board's surface to foul the tool. The top clamp bars have a clamping capacity of just over 7 ft.

Blocks of wood support the pipes. Each one is screwed to the frame of the bench



Planing wedge. When used with the planing beam, long work is held against a wedge-shaped stop at the end of the bench. The harder you push against the work, the tighter it is held in place.



Lift-out MDF panels. The panels, cut in different lengths from MDF scraps, make a durable yet disposable center surface for the bench. The panels get removed when the tail-vise pipe clamps are in use.

with a drywall screw. The single screw allows each block to swing out of the way of the pipe-clamp tailpieces as they are slid to accommodate long work.

The top pipe clamps can also be used to hold panels in place that have other tools permanently attached, such as a vise or an electric grinder. I have a tilting drill-press vise attached to a square of medium-density fiberboard (MDF) that I clamp to the bench for metalworking or for holding a piece of wood to be carved. I plan to design a drop-in router table for the bench; there's enough space between the pipe-clamp bars to fit a small machine.

When the top clamps aren't in use, the well is covered by several sections of $\frac{3}{4}$ -in. MDF that simply drop in and lay on top of the pipes. Because MDF is so inexpensive, I treat the panels as sacrificial surfaces. I cut into them, screw jigs to them, whack them with a hammer, and when they get too chewed up, I toss them. To save my back, I buy pre-cut MDF meant for shelving; it comes either 12 in. or 16 in. wide. This pre-cut stock is useful for all manner of jigs and prototypes, and I always have a few lengths around the shop.

Douglas fir makes a solid bench

The bench, as I built it, is 8 ft. long and was designed to accommodate fairly large

work, such as doors and other architectural millwork. The design can be shortened or lengthened, and it could be reversed end for end if you are left-handed.

I built the bench out of Douglas fir instead of hardwood. Douglas fir at its best is a dense, stable wood that machines cleanly and holds fasteners well, important attributes given the way I wanted to assemble the bench.

Wide planks—2x10s and 2x12s—of Douglas fir framing lumber will often be sawn right out of the center of the log, and a half or more of the board will be quartersawn and knot free, with tight, straight grain. By carefully choosing and ripping these planks, you can get some beautiful material for a lot less than the price of even mediocre furniture woods. Some of the trimmed-out wood that isn't good enough for the bench can still be used for other projects such as shelves or sawhorses.

If you start with green lumber, sticker it for a few months to get the moisture content down. To prevent checking, trim the ends to get a clean surface and then apply duct tape over the end grain. Even if you start with kiln-dried wood, give it a couple of weeks indoors to stabilize before starting to cut. Use the best wood for the frame, benchtop and beam, saving lesser quality stock for the leg assembly.

Screw joinery is fast and strong

My method of assembling the bench with drywall screws and lag screws (and no fitted-and-glued joinery) is unconventional, but I've used this style of construction for years. The finished bench is rock solid, and the joinery goes quickly.

Most of the screws were counterbored with a $\frac{3}{8}$ -in. drill, sometimes quite deeply, to bring the screw heads $\frac{3}{4}$ in. shy of the edge being joined. On the 3-in.-wide, edge-jointed benchtop boards, the counterbore is $2\frac{1}{4}$ in. deep. The deep bore minimizes the amount of wood under the screw head, which in turn minimizes the loosening of the joint as the stock shrinks.

After drilling the counterbore, follow up with a long bit to drill a clearance hole for the screw shank. Then line up the pieces to be joined and install the screws a couple of turns to mark the centers, drill pilot holes at the marks in the adjoining piece and assemble the bench.

One of the advantages of this type of construction is that if the wood shrinks and

the joints loosen up, you can retighten everything in a few minutes with a screwdriver. I did this about a month after assembling the bench, and it has stayed solid ever since. Don't overtighten the screws. Excessively crushing the wood under the screw's head ruins the resilience that allows a joint to flex slightly and remain tight.

The keyhole slots in the legs and stretcher are functional; as the boards shrink, they allow the wood to flex without cracking. In effect, they are preemptive cracks that look a lot better than the ones that would form randomly otherwise. When you install the lag bolts, drill clearance and pilot holes and go easy on the torque when you tighten them up. The joint will be stronger if you don't overstress the threads in the stretcher's end grain.



Horizontal clamps run full length. A pair of pipe clamps, running under the benchtop, hold work in the same way as a traditional tail vise.

The pipes used with the clamps cut easily with a hacksaw or a small pipe cutter. For the smoothest operation of the clamps, clean up any burrs along the length of each pipe with a file and then smooth it down with emery paper. This is a messy operation, creating a staining black dust, so do it away from your woodworking area. Wipe down each pipe with a rag and paint thinner when you are done. □

John White keeps the Fine Woodworking shop running smoothly.