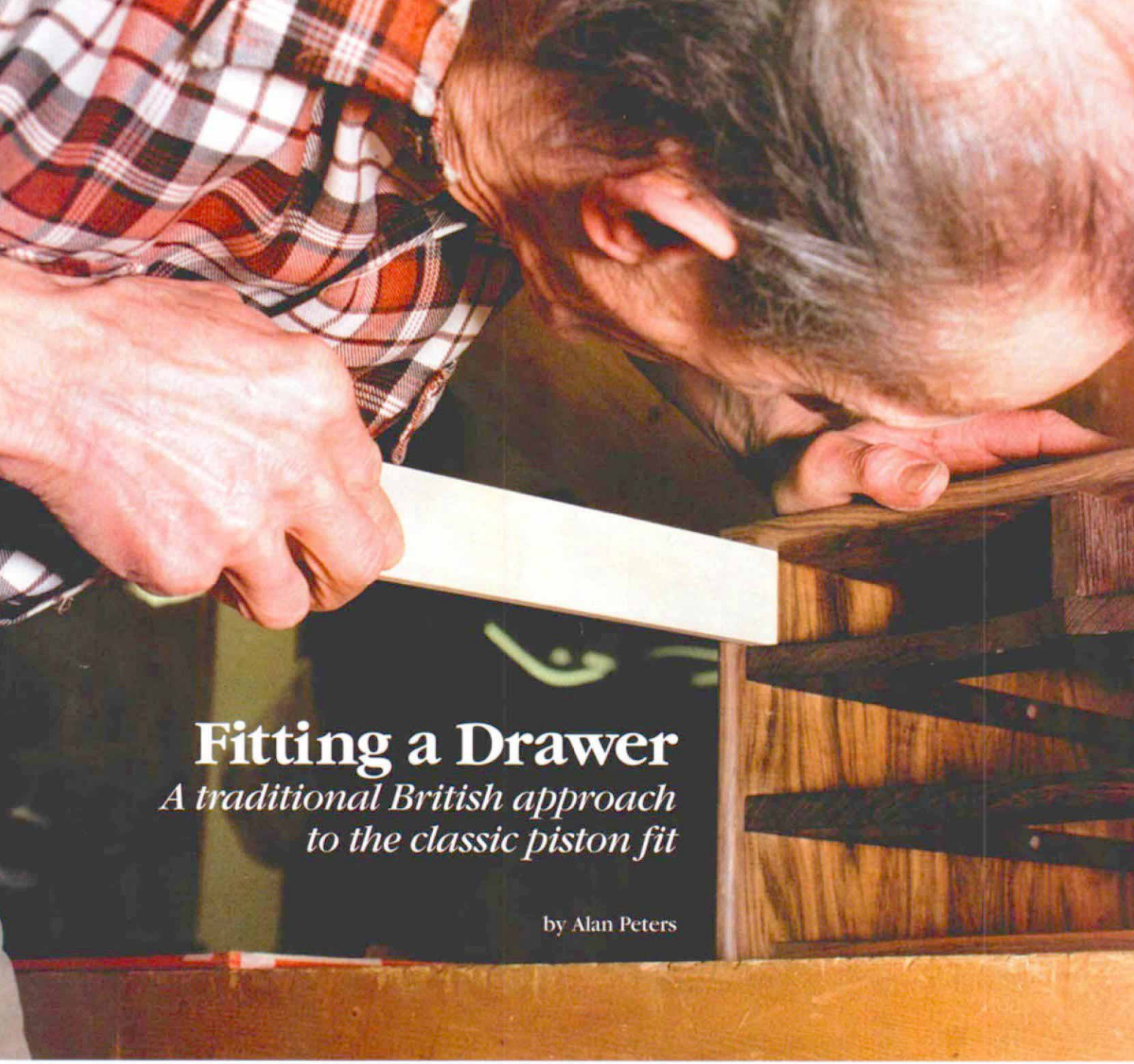


Fitting a Drawer

A traditional British approach to the classic piston fit

by Alan Peters

My wife, Laura, doesn't understand why I make such a fuss about drawer fitting. The drawers in our kitchen cabinets slide on plastic runners, and she says they work better than the drawers in any of my furniture. I can't argue with that—those nylon rollers do their job well. But plastic slides don't belong on dovetailed drawers. Fine furniture requires another solution, an approach that substitutes craftsmanship for the manufactured precision of drawer slides.

The technique we use in my workshop involves three successive levels of fitting. The first is of the individual drawer parts, then the assembled drawer without its bottom and, finally, the drawer with its bottom installed. The result is a drawer that fits so well that it's slowed by a cushion of air as you push it in. And when you pull out the drawer, any other drawers in the case are gently pulled back into the nearly airtight case. It takes time to achieve this piston fit, but the results speak for themselves. Other furnituremakers may pride themselves on their dovetails or some other joinery, but for me, a finely fitted drawer is the benchmark of a craftsman's skill.

Well-built drawers start with stable wood

Drawer sides should only be made of top-quality, mild-grained and, preferably, quartersawn stock. What you are looking for is wood that will remain straight, move very little with shifts in humidity and plane easily and cleanly. At the top of my list is Honduras mahogany. Most of my drawer sides are made of material salvaged from old, fac-

Photos: Vincent Laurence

SIDES FIRST

1. *Mark the drawer sides.* *Because each drawer is fit precisely to a particular opening, the location and orientation of each part is marked.*

2. Shoot the edge. *A sharp jointer plane and a shooting board will give you a straight edge that's 90° to the face of the drawer side. A little wax on the sole and side of the plane will help it glide better.*

3. *Snug but not binding*— *When the sides will just slide in and out without binding in the case, they're fit. If they do bind, look for shiny spots on the top edge, which indicate high spots.*

tory-made mahogany furniture. Because of its age, the wood is about as stable as it's ever going to be. After mahogany, quartersawn oak is my choice for drawer sides.

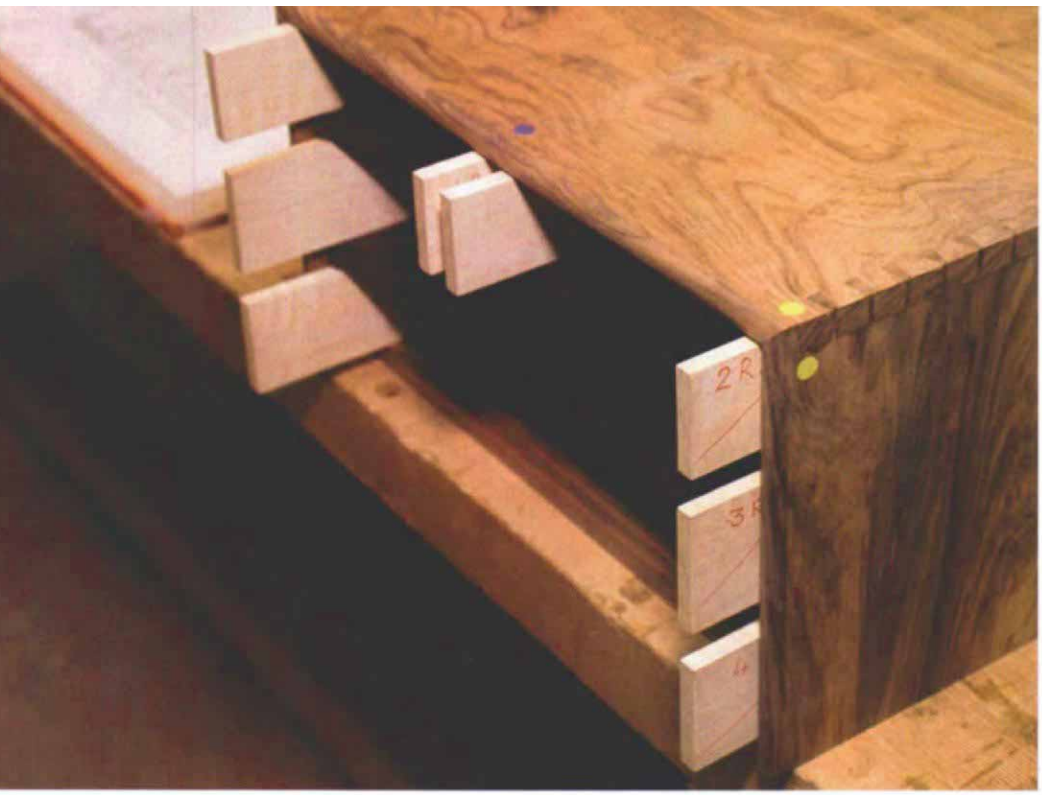
I make my choice depending on the wood used for the drawer fronts, always aiming for a contrast in color. I like mahogany with lighter colored drawer fronts, such as ash or sycamore, and oak sides when the drawer fronts are made of darker woods, such as walnut or rosewood. From time to time, I use other woods, such as teak, because it wears so well, and rippled (curly) sycamore on special cabinets or desks, where the visual quality of the drawer sides is very important.

Fit the drawer pieces individually and precisely

Regardless of how much care you put into making and fitting the drawer, it will not fit well if the opening in the case is not consistent front to back and top to bottom. Check the openings, and true them with a shoulder plane if necessary. Make sure, above all, that the case doesn't taper in from front to back. Once the case is trued up, sand the inside, and polish it with a good-quality paste wax.

I don't make or fit drawers on damp or particularly humid days. Instead, I'll wait for a dry spell so that the drawer parts aren't swollen with moisture. Also, whenever possible, I bring the drawer stock into the shop to acclimate for a few weeks before dimensioning it.

***Fit the sides first, top to bottom*—**The first step in fitting the drawer pieces is to



The sides have been fitted. The drawer backs are next. Colored dots at the corners of the case piece identify mating edges and indicate the front of the case.

cut them to rough size, say, within ⅛ in. of finished length and width. All pieces can be thicknessed to final dimension, as long as you bear in mind that you'll be planing and sanding them slightly to fit. Before I do any planing, I use a pair of winding sticks to be sure that all pieces are flat.

I work with the sides first, testing both faces of each side to see which planes better. I choose this side for the face because it will have to be planed to fit and mark it accordingly (see the top right photo on p. 73). If there's more than one drawer, I also indicate which drawer the part belongs to. The end of the drawer where I start my plane stroke becomes the front end so that all fitting is from front to back. If one edge of a drawer side is more difficult to plane, I try to make it the bottom edge because the top edge is where all the planing to fit takes place. Then I plane the inside of the drawer and sand it with 400-grit paper. After this, I shouldn't have to do anything more other than apply a coat of paste wax.

I cut the sides to length on the tablesaw and then plane the bottom edges on a shooting board. I saw the other edges to within 1/16 in. of the finished width (or less) and then plane them, too, on the shooting board (see the bottom right photo on p. 73). After nearly every pass with the plane, I check the fit in the case. If it binds, I check the top edge to see where it's bur-

DRAWER BACKS ARE NEXT

Fit the backs from side to side. Check the fit often because only one stroke of the plane separates a drawer that fits from one that's sloppy. These drawer backs have been cut to width to fit over drawer bottoms.

nished, indicating rubbing between the drawer side and the case, and remove a shaving there. When the side goes all the way home without binding, but still requires a fair amount of force, it's ready (see the photo on p. 72). There should be no play at all. Further fitting, which will make the drawer side move more freely, will take place after the drawer has been assembled. Repeat the process for all drawer sides in the case.

Fit the back perfectly—A perfect fit for the back is absolutely essential because it is used as the pattern for the front. With large drawers, I fit each back precisely to its opening, so it just snugs into the case opening on all four sides. This is important, because the opening often will not be perfectly square. Fitting the back (and then front) of the drawer to the opening helps to ensure a perfect fit.

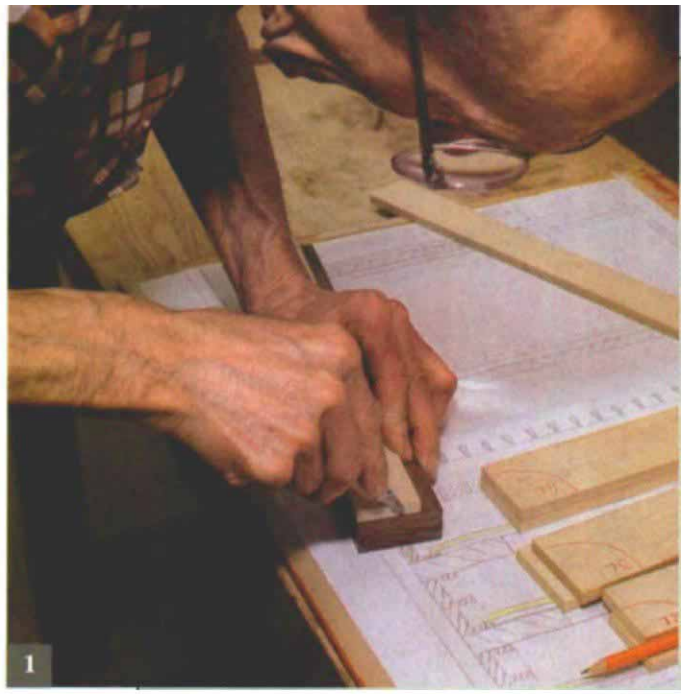
On small drawers, however, like the ones in this desktop unit, it's less important to fit the drawer backs from top to bottom. Because the drawers are so narrow, only the lengths of the backs need to be fit to the case openings. Openings this small can't be out of square by very much.

I mark the backs by indicating which drawer each one belongs to and writing this number on a little round paper dot that I can peel off later (see the bottom right photo on the facing page). I stick the dot on the inside of the drawer—facing the front of the cabinet, at the top—so I know how the back is supposed to be oriented throughout the fitting process.

To prepare the back, I shoot the bottom edge and then saw and plane the top edge to width to fit snugly in the drawer opening. Then I'll transfer the outline of the drawer back to the front before cutting the back to width to fit over the drawer bottom, which slides beneath it. In the case of a small drawer, though, I just cut and plane the back to width right away. I get this measurement—from the top of the drawer bottom groove to the top of the opening—from my full-scale drawing.

Next I shoot one end of the back square, set it in place in the opening and then position the other end as closely as possible to where it belongs. I make a pencil mark at this end, cut the back just a hair long and then plane it to fit, checking it in the case after each stroke (see the bottom right photo on the facing page).

To prevent end-grain tearout at the edge of the board (what we call spelching here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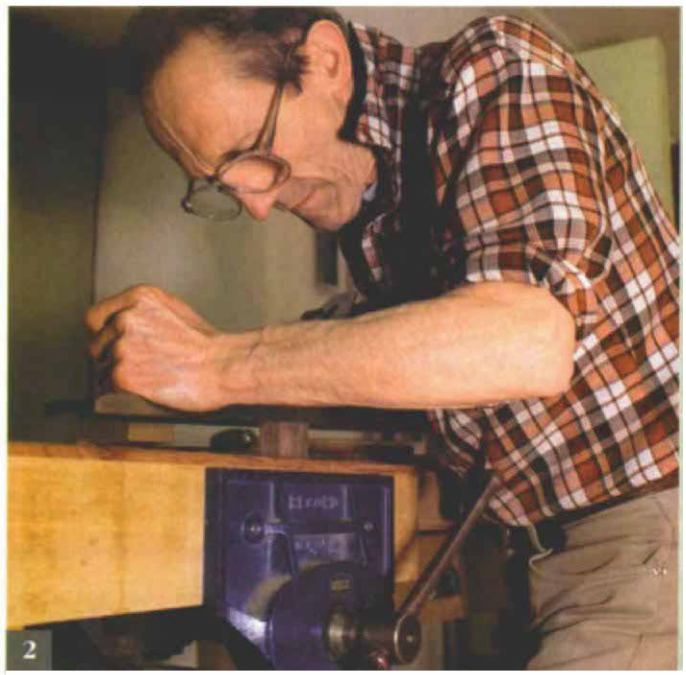
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DRAWER FRONTS ARE LAST

1. Mark the fronts from the backs. *Because the backs fit snugly from end to end (and on large drawers, from top to bottom), they can be used to lay out the fronts. Marking with a knife gives the author a precise line that he extends across the face of the drawer front with a small square.*

2. Plane a slight bevel on the ends. *This inward taper helps with the fitting of the drawer front.*

3. Fitting the fronts. *With the fronts snugged into place, no light or gaps should be visible at the top, bottom or sides.*

Fronts are fitted. *With all drawer parts fit to their openings, the drawers can now be dovetailed together.*

in England), I pivot the plane nearly 90° to the direction of cut as I complete the stroke. This way, the blade cuts across the fibers at the edge of the board rather than catching them and breaking them off. There should be no gap at all at the ends of the backs when they're in place in the case.

The front should fit like a plug—I mark out the length of the front by placing the corresponding back on it, with the bottom edges flush, and knifing marks at either end of the back (see the top photo on p. 75). After shooting the bottom edge of the front, I saw and then plane the top edge to fit, beveling it ever so slightly front to back. I check the fit after each stroke, holding the piece in its opening at an angle (because it hasn't been cut to length yet), being extremely careful not to take off too much with any one pass.

I fit the front from end to end in the same way that I do the back, except that I bevel the ends slightly, just like the top (see the center photo on p. 75). The front should fit its opening exactly, with no gaps around it at all (see the bottom photo on p. 75).

Fitting the drawer box

Drawer joinery is another subject entirely—far too big to include in this article. Suffice it to say that any drawer worth fitting this well has been properly dovetailed. And be sure to mark out the dovetails so the tails stand slightly proud of the pins. The front and back of each drawer have

FITTING DRAWERS TO THE CASE

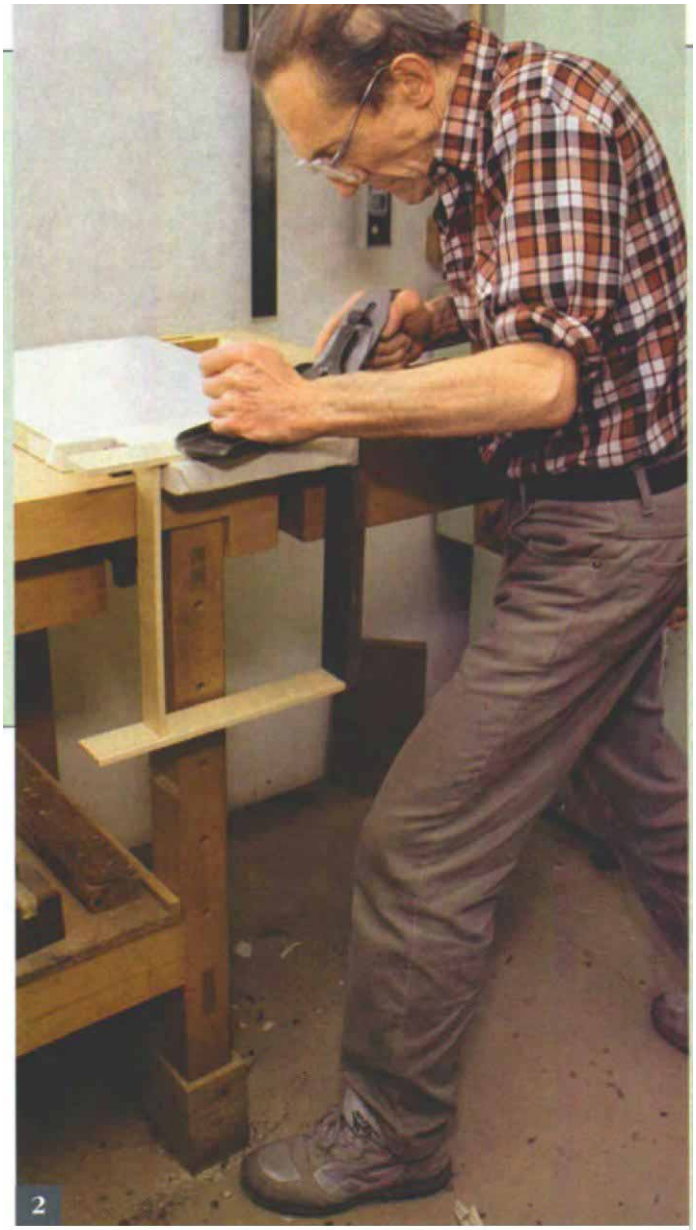
MAKE IT SQUARE

Make sure the drawer glues up square. *As soon as the joints are together, compare diagonals and adjust the drawer box if necessary.*

been fitted precisely to the opening, so you'll want to remove material from the drawer sides, not from the ends of the front or back, which are your reference lengths.

When I glue up a dovetailed drawer, I don't use any clamps, relying instead on the accuracy of the joints to hold the drawer together. I use glue very sparingly and just tap the dovetails home with a hammer. I use a block of wood to prevent the surface of the drawer sides from being marred. The same goes for mortises and tenons, which I sometimes use to attach the back to the sides as I did on this drawer. Extending the sides past the back allows the drawer to open fully without dropping out of its opening. Whatever the construction, if a drawer is going to fit its opening well, it's important to compare measurements from corner to corner when gluing up and to make adjustments to get the drawer square (see the bottom photo on the facing page).

A drawer board supports the drawer as you plane—Once the glue has cured (I wait several hours at least, but overnight is better), I take a chisel and pare away the top back corner of both sides (see the top left photo above). If the back corner was dovetailed, often it will have swollen up because of the moisture introduced by the glue. Even if that's not the case, taking down this corner will prevent the drawer from binding as it enters the case. I also ease all the arrises (the sharp corners where edge meets side) with a block plane



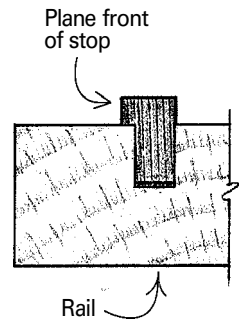
TRIM TO FIT

1. Pare away the top back corner. *This will prevent the drawer from binding as you try to fit it into its opening.*

2. Clean up the sides. *A few strokes with a plane will bring the sides flush with the end grain of the front and back, which have been fit precisely and should not be planed further.*

3. Plane stops *to position drawer front. If you have more than one drawer stop per drawer, remove material evenly from each.*

Section through drawer stop



Wood grain for stop is oriented vertically for strength.

Drawing: Vince Babak

followed by some fine sandpaper, and I soften the top edge of the drawer back.

I leave the bottom out at this stage so I can position the drawer over a drawer board to plane the sides (see the top right photo on p. 77). The drawer board fully supports the drawer but doesn't get in the way of the plane. The drawer board should fit quite accurately between the inside faces of the drawer front and back.

I take a few passes with a plane to bring the sides flush with the end grain of the drawer front and back and then check the fit of the drawer in its opening. I leave just a little sanding or planing to do after the drawer bottom is installed. I slide the drawer in and out of its opening rapidly a few times. This burnishes the sides and top edges of the drawer sides wherever they're rubbing against the case. I plane away these burnished (shiny) spots and check the fit again.

This process is repeated until the drawer will move in and out with relative ease, but no slop. The closer I get to a fit, the more often I check.

As you're planing the drawer sides, be careful not to remove too much material from the edge of the drawer front, where it would be visible from the front of the case. After cleaning up the dovetails, I often won't touch this area with a plane again. I just sand it lightly until the fit is right.

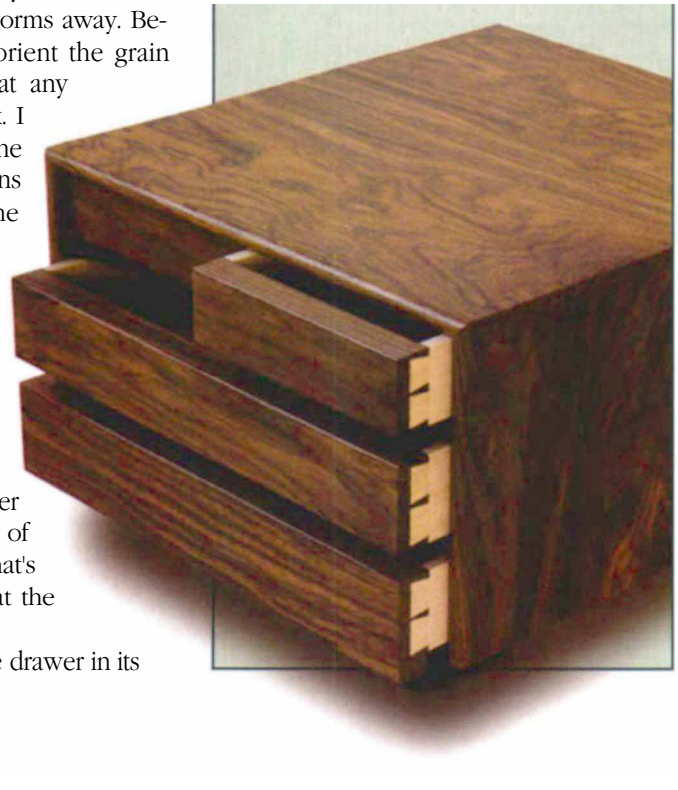
Final fit is with the drawer bottom in place—Once the drawer is sliding nicely in its opening, it's time to put the drawer bottom in. I almost always use solid cedar of Lebanon. It smells nice, my clients like it and it keeps moths and worms away. Because it's solid wood, I orient the grain from side to side so that any expansion is front to back. I spot-glue the bottom at the front so that no gap opens up there, and I screw the bottom to the back using slotted screw holes so the bottom can move.

To make sure that the bottom is seated in its groove all the way along its length, I set the drawer on the bench on one side and then tap on the other with a hammer. A piece of scrap protects the side that's being hammered. I repeat the process on the other side.

Next I check the fit of the drawer in its opening. Often it will need no further fitting. If it's a little snug, removing a shaving or two is the most that will be necessary. A light sanding with 400-grit usually will do.

With the drawer fit, I make sure all outer faces and edges are sanded to 400-grit (the insides have already been done). Then I apply a coat of paste wax to all surfaces except the face of the drawer front. It will be finished with the case later.

The result is a drawer that fits so well it's slowed by a cushion of air as you push it in. And when you pull out the drawer, any other drawers in the case are gently pulled back into the nearly airtight case.



Drawer stop determines the position of the front

All that remains is to get the plane of the drawer front where you want it—either flush with the sides of the case or back a bit if you prefer. Many furnituremakers simply glue a small block of wood to the drawer divider for a drawer stop, perhaps affixing a piece of leather or felt to cushion the impact. Unfortunately, this type of drawer stop will almost always get knocked out over time.

In my shop, we prevent this problem by mortising L-shaped drawer stops into the drawer dividers (mortises are cut before the case is assembled). The grain of the drawer stop is oriented vertically, perpendicular to the dividers. No amount of force will break off a stop like this, and the leg of the L-shape gives me material to plane away to get the drawer to stop where I want it (see the bottom photo and drawing on p. 77).

I check the drawer in its opening once more, this time to see how much material I must remove from the front of the stop. A few passes with a bullnose plane and the job is done. If you have more than one stop (I usually use two, one near either case side), try to remove material evenly from both stops. To see if you've succeeded, place a little pressure against the drawer front right in front of one of the stops. If the drawer front gives at all, the stop behind it has had more material removed from it. The other one will need a shaving or two removed to even things up. As always, the closer I get to where I want to be, the more cautiously I proceed.

Alan Peters first began woodworking as an apprentice in Edward Barnsley's workshop in 1949. He has been designing and building furniture ever since. In 1990, he received the OBE (Order of the British Empire) from the queen of England in recognition of his contributions as a designer and craftsman. He lives and works in Kentisbeare, Devon, England, where he manages a team of four other craftsmen.