Building a Picket Fence

A carpenter uses shop-built sections and sturdy foundations for a traditional structure

by George Nash

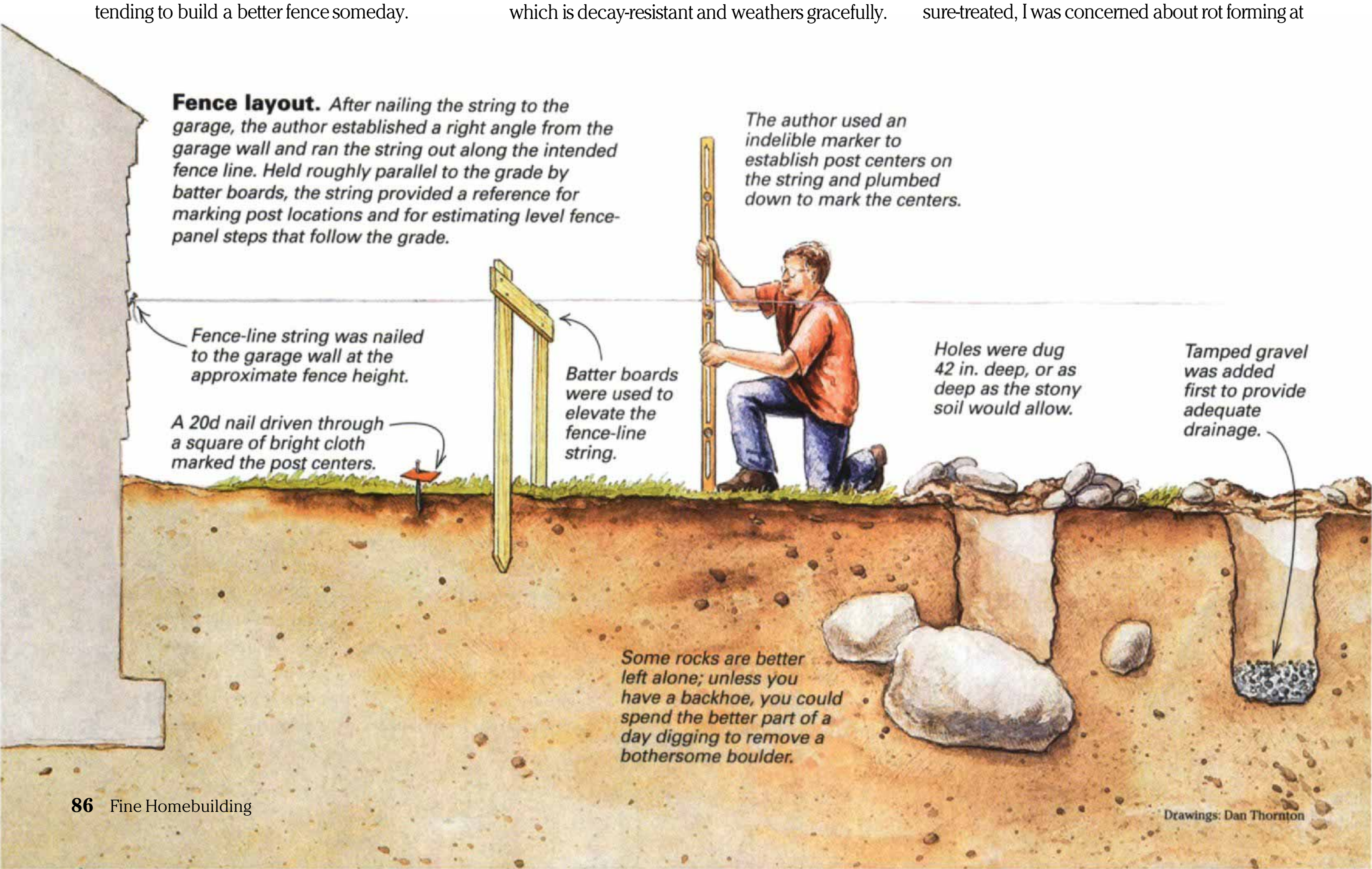
When my wife and I bought our quaintly down-at-the-heels mid-19th century cape, it was screened from the drive by a graceless fence of weathered-gray, 6-ft. tall pickets. Made from recycled window-muntin stock, the pickets were nailed to 2x4s and held up by round cedar posts driven into the ground. Even if it had been well built and standing straight and true, it still would have been all wrong. Seen from the house, 85 ft. back and 6 ft. or 8 ft. lower than the driveway's end, the closely spaced pickets blurred like the spokes of a spinning wheel into a solid screen. A privacy fence was the last thing we needed at the end of an 1,100-ft. long driveway. And what message did its style and condition give to visitors? Or indicate about the people who lived there? Better to live with no fence at all. So I tore it down, intending to build a better fence someday.

Designing a friendly, graceful fence that will last—We knew that we wanted a fence that would be architecturally appropriate and that would also feel welcoming. Waist-high pickets would invite conversation across the fence while maintaining polite reserve. I opted for a 3-ft. height.

I decided to use 1x3 stock for my pickets with the same 2½-in. spacing between them. I designed the picket tops by sketching various combinations of angles and radii until I found a couple of examples that I liked. I transferred these designs to full-size cardboard mock-ups and showed them to my wife, who picked my favorite of the bunch. I enlarged the same shape to use for the post finials. I then copied the patterns onto ¼-in. hardboard for use as cutting templates. My choice for picket material was native clear Eastern-white cedar, which is decay-resistant and weathers gracefully.

As for the fence itself, I wanted it to start at our garage/greenhouse and run straight down a gradual slope for about 120 ft. Initially, I spaced the posts approximately 5 ft. apart; this distance is close to the classical ideal proportion of panel width to height. The post centering was determined by my requirement for a full-width picket space next to each post. With 11 pickets at each panel, the on-center post spacing worked out to be a satisfactory 5 ft. 1 in. The pickets would be draped so that their tops formed a concave arc. I also wanted a gate to open onto the walkway that leads to the house's front door.

The stringers, or rails of the frame that would carry the fence, would be pressure-treated 2x4s on the flat and would sit in dadoes in the backs of the posts. Even though the framing was to be pressure-treated, I was concerned about rot forming at



Fence layout. *After nailing the string to the garage, the author established a right angle from the garage wall and ran the string out along the intended fence line. Held roughly parallel to the grade by batter boards, the string provided a reference for marking post locations and for estimating level fence-panel steps that follow the grade.*

A traditional picket fence can be gracefully ornamental. A well-designed fence can invite conversation between neighbors and establish a visual boundary without appearing like a barrier. Note that the threaded tension rod mentioned in the article has not yet been installed on the gate.

Cutting the posts. *After cutting the finials in the shop, the author braced and plumbed the post in the hole, and measured the distance between the finial vein and the grade. By subtracting the height of the fence panel, he determined the amount to cut from the bottom of the post.*

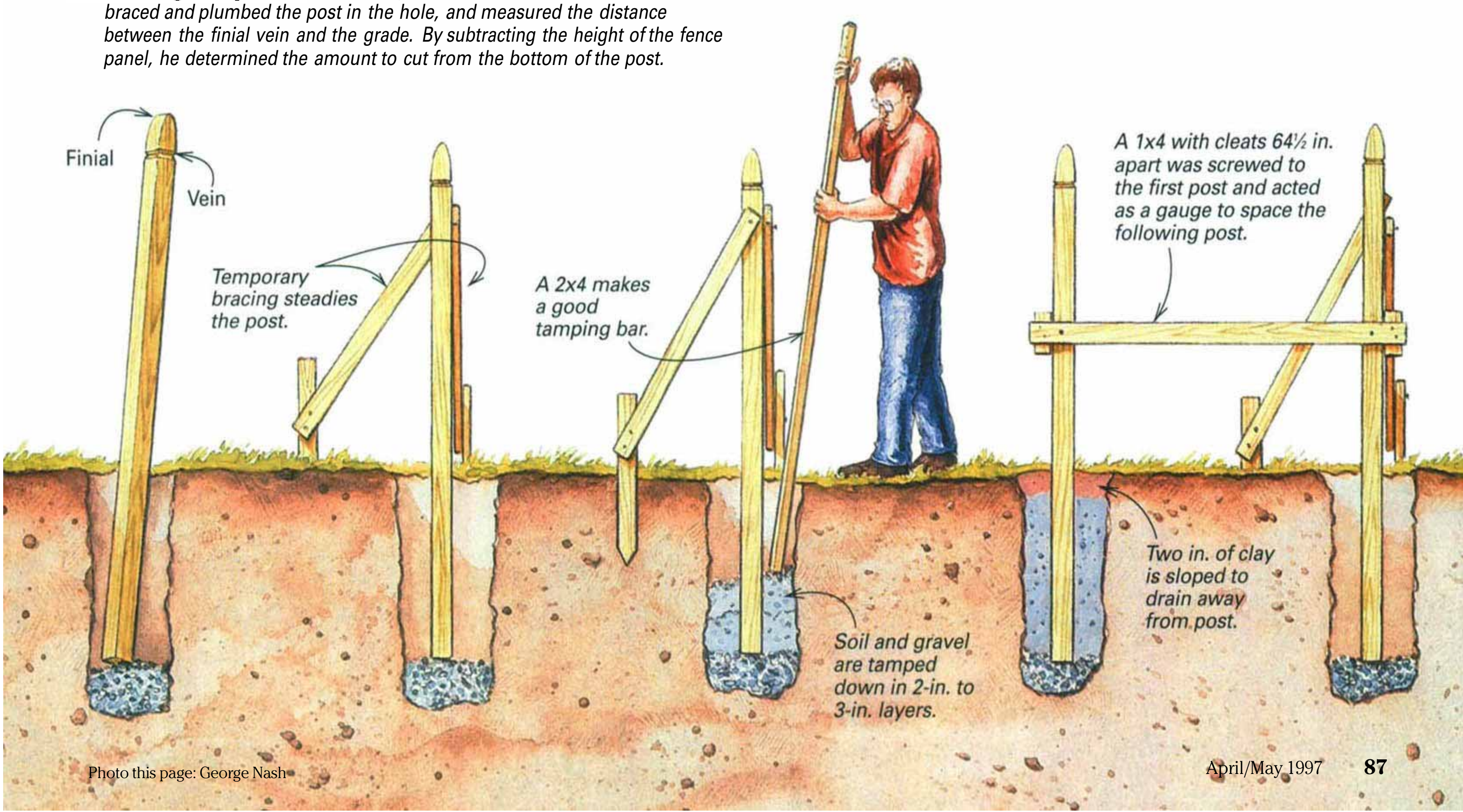


Photo this page: George Nash

Cutting the post finials in the shop yields consistent results. After a hardboard template is used to trace the outline of the finial, the design is roughed out on a bandsaw and finished with a belt sander.

Cutting the veining detail with a radial-arm saw. This procedure is a quick, accurate method of making the shallow 45° bevel cut below the post finial. Note the stop block nailed to the table.

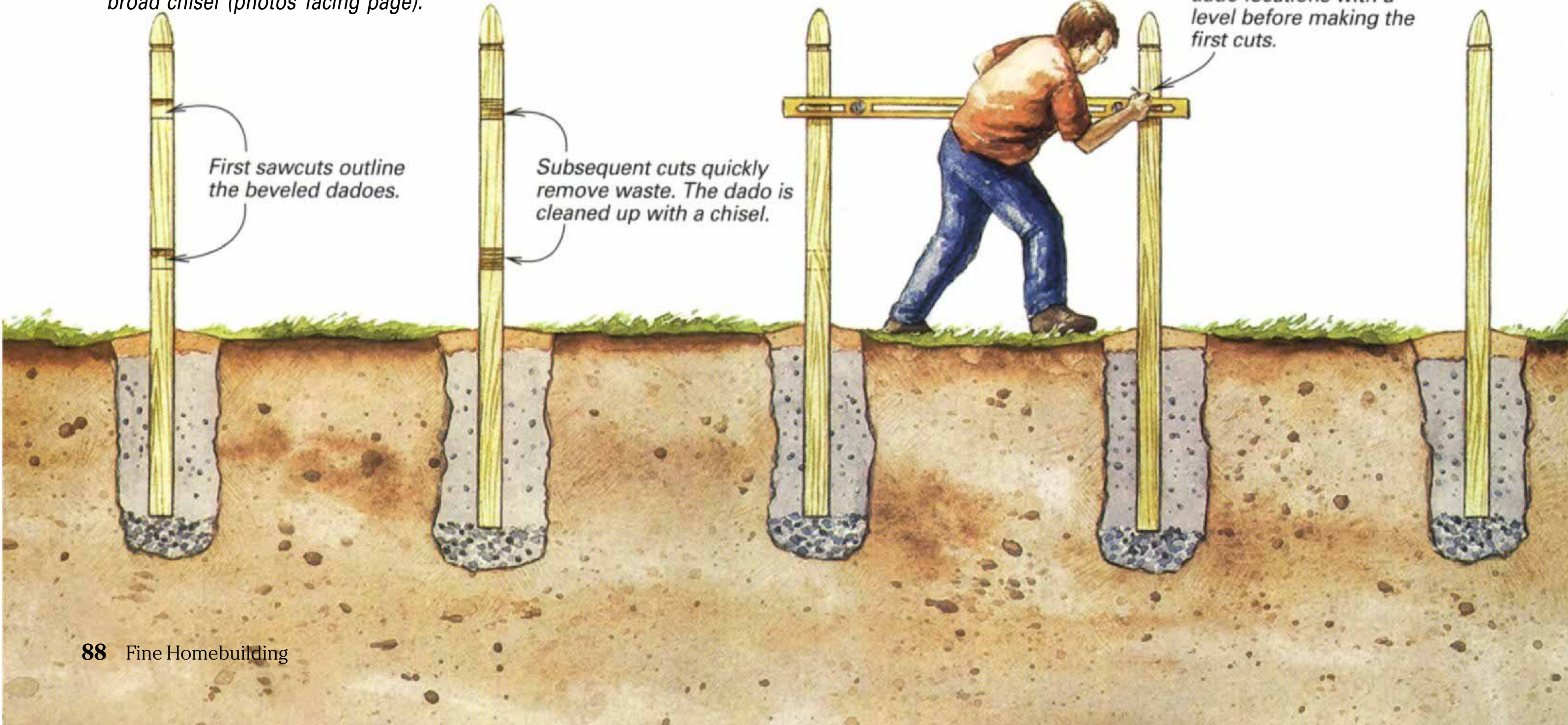
the junction of the stringer and the pickets, and planned to rip a 15° bevel on the top of the stringer. This also meant that I would have to cut a corresponding beveled dado into the post (photo bottom right, facing page).

Laying out a level fence line on a gradual slope—I began the layout by nailing a string onto the side of the greenhouse/garage at the fence height of the first post location. I then ran the string out along the intended line of the fence to a temporary post at the far end of the line. I set up batter boards to hold the Stringline roughly parallel to the slope of the ground. When viewed against the facade of the house, however, this proposed fence line looked awkward. I decided to make the fence step gradually down the slope in level panels. A bonus of keeping the stringers level was that the notches or dadoes that I cut into the posts would remain a constant 90°.

Next, I measured and marked the post locations on the string with an indelible marker. I plumbed down from the string and drove a 20d nail through a square of bright plastic to mark the post center.

Cutting the post finials in the shop—I wanted an ornamental post top, or finial, that was an integral part of the post. I designed the tops to resemble a fatter version of the pickets and decided that it would be easier to cut them on the bandsaw before setting the posts (photo left). I also cut a decorative vein (opposing 45° cuts on the radial-arm saw) around the post at the base of the arc (photo right) to emphasize the importance of the posts so that they wouldn't be mistaken for overweight pickets. This vein would also serve as a benchmark to set the posts at the proper height.

Marking and cutting the post dadoes. *To strengthen the fence, the horizontal members (the stringers) were set into notches, or dadoes, cut into the back of the posts. Dado positions were marked out with bevel and combination squares, and cut with a circular saw and broad chisel (photos facing page).*



Setting the posts to prevent frost heave—Because frost heave was a real concern, I dug the post holes as deep as I could. Where the soil was cooperative, I went down about 3½ ft; where it wasn't, I stopped wherever the rocks told me to. I tamped a layer of gravel into the bottom of the hole to provide drainage (sidebar p. 91). I dropped the first post into the hole, roughly plumbed and braced it, and measured the distance between the grade and the finial vein. Subtracting my desired height from this number gave me the length to cut from the bottom of the post.

I reset the trimmed post plumb in the hole and braced it. Backfilling the hole with 3-in. layers of gravel, I tamped it as I went and capped it with 2 in. of heavy clay, sloped to provide drainage.

Using a circular saw, I cut the dadoes in the back of the post and removed waste with a chisel (photos right). I leveled across from the first post to locate the corresponding dadoes on the next post. Another trick I used was to screw to the first post a length of 1x4 with cleats 64½ in. apart that would act as a gauge to locate the next post quickly.

Prefabricating the panels saves time—Although I could have built the fence in place, I knew that a jig would make my job much easier. I could assemble the panels in my shop, maintain a standard of sizing and spacing, and stay busy if the weather turned foul. First, I precut all the pickets, gang-sanding them to ensure uniformity (photo left, p. 90), and ripped the bevel on the stringers.

To build the panel jig, I stood a 4x8 sheet of ¾-in. plywood on its long edge and braced it on the shop floor. I drew lines to represent a pair of posts

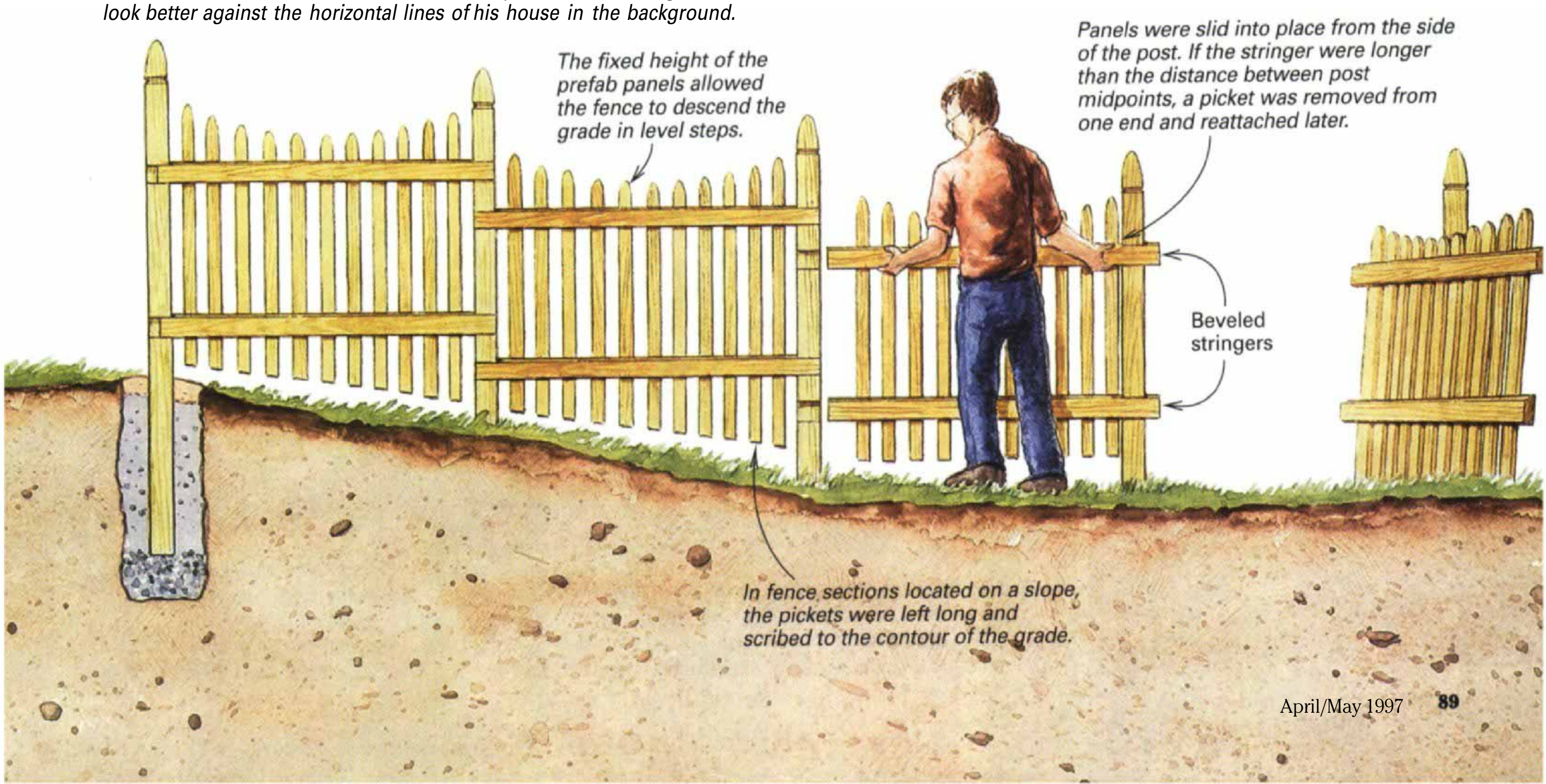
Square serves as a cutting guide. After marking the stringer positions, a circular saw set to the correct depth and angle is used to make the outline cuts of the dado.

Cutting several saw kerfs speeds up the process of making the dado. Here the author makes repeated cuts with the saw to rough out the post dado.

Removing waste from the cut with a chisel. A hammer and broad chisel are used to remove the waste from the cut and to ensure an even depth.

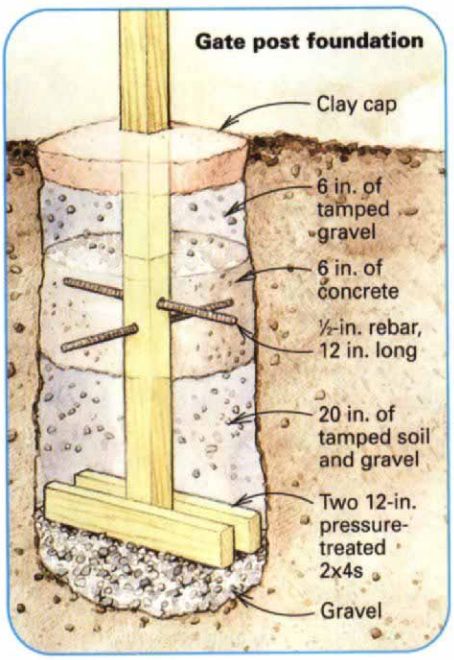
Beveled stringers shed water, avoiding rot. Water can't collect on the stringer top and seep between stringer and picket. Similarly, the beveled post dado protects the stringer.

Level fence panels step down with the grade. *Rather than build a fence that followed the varied contours of the front yard, the author chose to run the fence in level steps, which he thought would look better against the horizontal lines of his house in the background.*

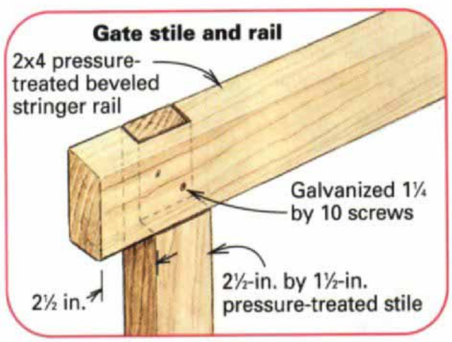


Gang-sanding the pickets saves time. Stacked vertically and secured with a pair of bar clamps, the pickets are held in a workbench and belt-sanded. This step also ensures a uniform profile.

Nailing the picket sections in the jig creates exact intervals. Pickets are nailed onto the stringers, which are held in position by guide blocks. A bent piece of ¼-in. plywood serves as a stop and determines the height of the individual pickets within the panel.

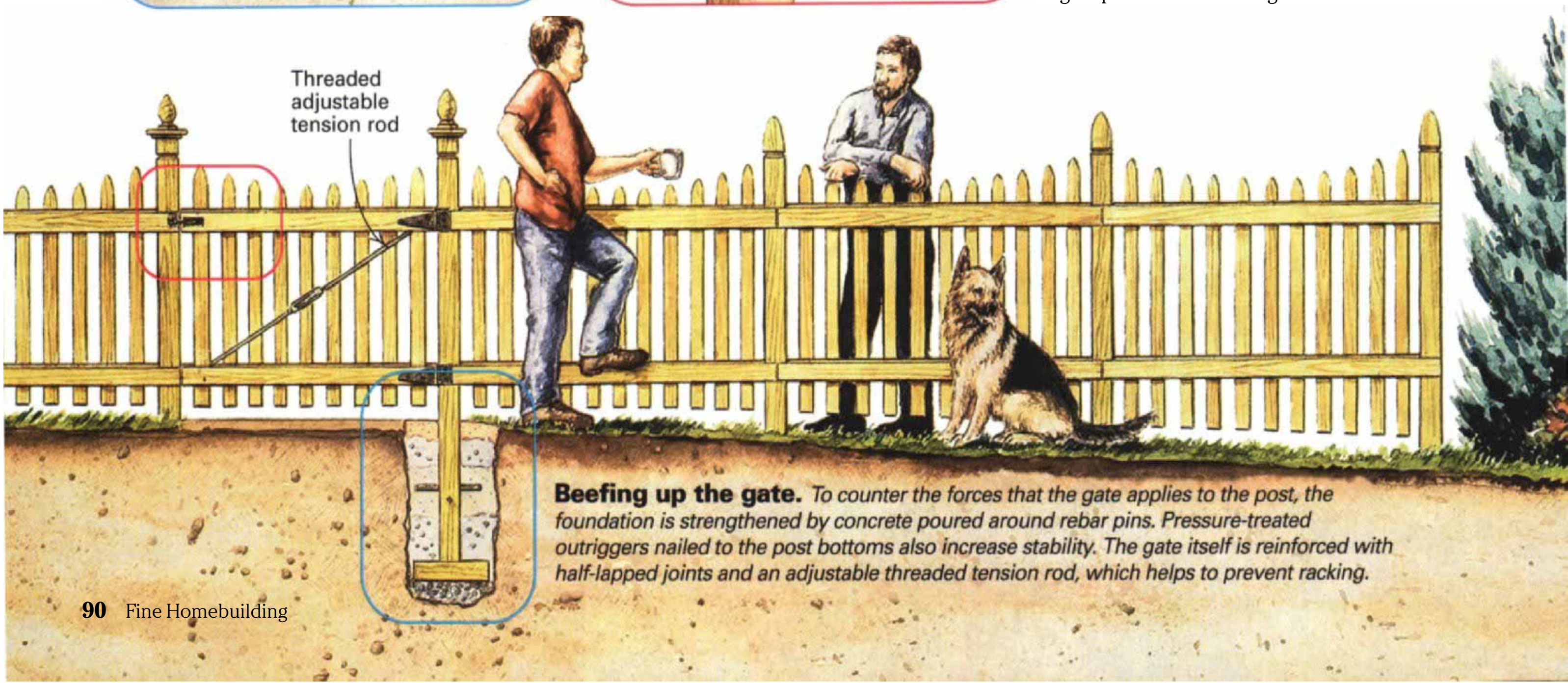


and the horizontal stringers. Next, I draped a piece of twine between two nails located at points representing the tops and centers of both posts to trace the curve of the picket tops. Flipping the sheet horizontally on a pair of sawhorses, I cut the line with a jigsaw and then screwed a strip of ¼-in. plywood along the curve. This strip served as a stop for the picket tops. I nailed guide blocks to the plywood to space the pickets and stringers evenly, and that would hold them in position for assembly. I could now start to nail the pickets to the stringers, using stainless 6d ring-shank nails (photo above right).



With the panels built, I could nail them to the posts, but not without complications. Because the dado tops were beveled, the stringers wouldn't slide in from the back; I had to slide them in from the side. There wasn't a problem where the stringers were only as long as the distance between post centers. But at each step in the fence where stringers had to end flush with the face of the post, the first picket had to be left out to allow enough room to slide the panels into the dadoes.

Building the gate to withstand the forces of nature—Gates are subject to stresses and troubles that proper construction methods will alleviate, or at least will forestall. The footings for the gate posts must be strengthened to counteract the



Beefing up the gate. *To counter the forces that the gate applies to the post, the foundation is strengthened by concrete poured around rebar pins. Pressure-treated outriggers nailed to the post bottoms also increase stability. The gate itself is reinforced with half-lapped joints and an adjustable threaded tension rod, which helps to prevent racking.*

Removing the finished section from the jig. Once the pickets are nailed to the stringers, surplus length below the bottom stringer is cut. The fence section is then popped out of the jig and is ready to install.

forces of the swinging gate (drawing right, facing page). To stop the post from twisting, I enlarged the post holes to accommodate crossbars nailed to the bottom of the post. I also drilled two ½-in. holes 24 in. from the post bottom and inserted two 12-in. lengths of rebar. Orienting the crossbars with the run of the fence, I dropped the post into the hole, then plumbed and braced it.

I backfilled the post hole with about 20 in. of well-tamped gravel and soil. Next I formed and poured 6 in. of concrete around the rebar, as wide as the post and as long as the hole. After the concrete set up, I removed the forms, packed another layer of gravel onto the concrete and capped it off with a protective layer of clay.

To build the gate, I first measured the gate opening and deducted ¾ in. for swing and hardware clearances. I cut the frame components, using the pressure-treated stock for the rails and stiles. I let the stiles into half-lap dadoes cut 2½ in. from the ends of the rails, squared the frame, and screwed and glued it together. Before attaching the pickets, I screwed a threaded tension rod from the interior-hinge side of the gate to the lower-latch side. I had to modify my fence-panel jig slightly to allow room for the stiles but used it to attach the pickets.

I hung the gate using heavy-duty 6-in. T-strap hinges. For a latch, I chose a solid, simple string-operated model; I liked it because it worked easily and wasn't visible from the outside. I cut the two gate posts square just above the veining and added a pair of store-bought carved pineapple finials. Symbolizing hospitality, pineapples embody the message that I want to send to guests standing at the gate. □

George Nash is a writer and carpenter from Orland, Maine. His book Wooden Fences *will be published by The Taunton Press in September 1997. Photos by James P. Blair, except where noted.*

Fence-post foundations: concrete or gravel?

Fence posts are susceptible to a host of problems that include rot, ornery farm animals and, for part of the country, frost heave. Depending on the type of fence, regional weather and custom, fence builders are equally passionate about the superiority of earth-and-gravel or concrete backfill.

Concrete—It's a common notion that filling a post hole with concrete protects a post from frost heave. It can't, and it doesn't. Frost will heave buildings and tear down mountains. If it can get under the bottom of a post, it won't have any trouble popping a tiny cork of concrete out of its hole.

The ideal solution to this problem is to dig the post hole below the frost line. It also helps to drive two 12-in. lengths of ½-in. rebar through the post. If the bottom of the post is firmly attached to solid concrete, the frozen earth that's above it counteracts the uplifting grip of the frost on the post.

Some fence builders mistakenly believe that setting untreated wood in concrete protects it from decay. A wood post, especially if it's green, will shrink away from the concrete. The resulting gap is an ideal environment for decay and insect attack. Also, water trapped in the crack will freeze and expand, causing the concrete to break.

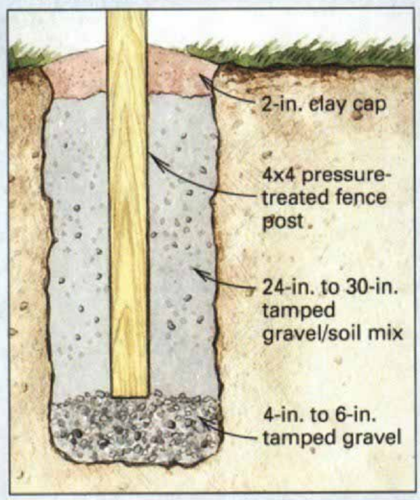
To avoid this disaster, slant the top of freshly poured concrete away from the post to help direct water away from the joint. Use kiln-dried lumber for the posts (even if using pressure-treated wood), and seal any cracks with a high-grade flexible, durable caulk or hot tar.

Even if the post hole will be filled with concrete, don't make the mistake of burying the bottom of the post in concrete. Instead, embed the post at least 2 in. into a base of gravel or stone. Any water that gets between the post and the concrete can drain away without causing problems.

Soil or gravel—Embedding a post in alternating layers of packed earth and gravel is a centuries-old method of firmly anchoring fence posts. It works best in stable soils, somewhat less satisfactorily in wet-clay soils prone to severe frost heave and not well at all in sand. The gravel provides drainage, and the packed earth provides lateral stiffness. A variation is to mix the gravel and soil into a fairly porous and firm amalgam. Packed in 2-in. or 3-in. layers, this mixture will support medium-height or low-height fences well.

In some areas, digging becomes impossible well above the frost line. Under such conditions, backfilling the post hole with pure gravel will create an isolation zone between post and frost-prone surrounding soil. Groundwater will move rapidly down through the gravel and seep into the subsoil. A protective layer of tamped heavy clay, shaped to drain water away from the post, will also help to keep the post hole relatively dry.—G. N.

Soil and gravel backfill works well in stable soils



Concrete backfill should extend below the frost line