A Fence Forever

Furniture-grade details dress up a steel-frame fence

BY SCOTT GRICE

When my colleague Mark Newman and I initially reviewed the plans for this fence, one detail the architect specified jumped out at us. The plans called for a long run of tall 6x6 cedar posts milled to fit over 2-in. steel tubes anchored in concrete. This seemed like a lot of work with little chance of precision and a lot of potential for wood checking, twisting, and deteriorating.

The post details weren't the only challenges we saw in the plans. The architect's design took elements from the house and incorporated them into the fence. The broad, multilayered belly band on the house inspired the entablature along the top of the fence, and the repeated-column motif became the posts with plinths and caps. These details clearly tied the fence to the house, but on a freestanding structure exposed to the weather, they would be difficult to accomplish.

Mark is a finish carpenter and furniture maker, so he took on the challenge of designing the wood parts that would make up the entablature (sidebar p. 91). My job was to create a structure capable of supporting these furniture-grade details: an assembly of steel posts and stainless-steel mesh through which climbing plants could grow.

Steel has a long life

A few years ago, I started using ⅛-in.-thick 2x2 steel tubing instead of pressure-treated wood posts for all my fences. I've seen so many wood posts that check, twist, and bow over time that I knew there had to be a better way to build a fence. Steel prices have gone up in the intervening years but not enough to stop me from using it.

With just a few adjustments in the installation process, I have found steel to be an almost-perfect fence-post material. Steel has great longevity, strength, and ease of installation. There are a few steel-tubing suppliers in my area, so I chose the one that was closest to the job and that would cut the steel to the rough lengths I needed. At the time, the steel cost about $2 per ft.

Stainless-steel mesh for between the posts is not as widely available. I searched online to find a mesh that ivy could grow into and that would provide some privacy. Once I found what I wanted (www.thewesterngroup.com), I followed the

Drawings: Dan Thornton

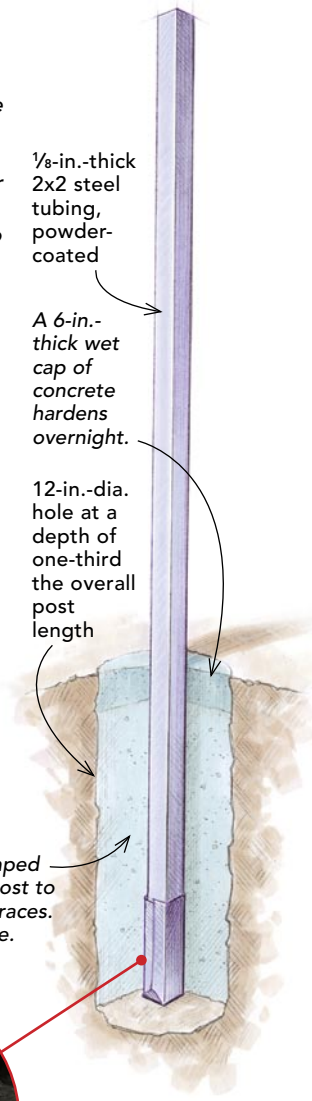
STEEL POSTS SET IN CONCRETE ENSURE A SOLID STRUCTURE

Set steel posts precisely with line, level, and spacers. When aligning a long run of posts, I leave nothing to chance. I always set the corner and end posts first. Once they're solidly anchored in poured concrete, I can extend stringlines at grade and eye level to establish a vertical plane. Spacer boards cut from 1x3 stock enable me to set posts at the correct spacing.

Plumb against stringlines. *By using a level in conjunction with stringlines, I can plumb a post in both directions without having to move my level from front to side.*

Use spacer boards to hold the post in place. *Spacer boards brace the post in two directions at grade level. Now the post can be adjusted for plumb without its position changing relative to the other posts.*

A few clamps hold the post in place. *When I get the post where I want it, I clamp it to a post that has been set.*



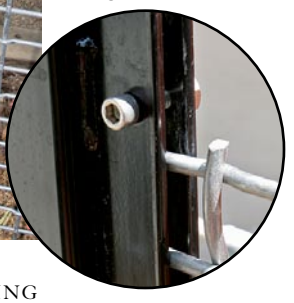
Commonly used for door flashing, an adhesive membrane wraps the bottom end of the post. This prevents groundwater from accumulating inside the post and causing damage.

A WET CAP OVER DRY CONCRETE SAVES TIME

Encasing every post in poured concrete takes a load of time and labor. Because the concrete is fluid, every post has to be braced. The faster, easier alternative is to tamp dry concrete mix around the post as you fine-tune its position. Moisture in the soil will eventually harden the dry mix, and a good tamping job eliminates the need for braces.

Make the base shed water. *Simple forms made from scrap material work just fine for a small amount of concrete. After the concrete set up, the forms were removed, and a bluestone veneer was applied over the concrete (photo below). The tops were pitched so that water can't pool around the steel posts.*

Clamp on the steel mesh with flanges. *One flange is welded to the tubing. The other flange pinches the steel mesh fast and is fastened with bolts installed every 16 in. The steel mesh is 3⁄16-in. stainless-steel wire on a 2-in. grid.*



manufacturer's link to a local supplier. This steel mesh cost $700 for a 6-ft. by 8-ft. panel of 3⁄16-in. wire on a 2-in. grid. I could have spent less by choosing regular steel over stainless and having it powder-coated with the steel posts.

Using steel requires planning

One crucial point in my plan is that the steel-to-wood and steel-to-steel connections need to be well thought out. Mark assured me that he could attach the faces of the posts and the entablature with self-tapping screws. However, making the post-to-mesh connection was a multistep process. First, we brought the posts to a shop where 1½-in. flanges were welded on everywhere we needed to attach the mesh. Every flange had a matching flange that was left loose. Both the flange and its match had been drilled with ¼-in.-dia. holes every 16 in.

Next, we sent the steel posts to be powder-coated, a process that provides a fast, durable finish that was more affordable than painting ($300 for 20 posts). Once the posts were set, the wire-mesh panels were sandwiched between the flanges and fastened with cap-lock bolts using the ¼-in.-dia. holes. This method created a mesh-to-post connection that didn't require on-site welding.

Use wet concrete for corner posts

Because this fence sat on a property line, I took my time locating, plumbing, and bracing the corner posts. Then I set them in wet concrete. The next day, after the concrete had set, I stripped the braces and ran two lines, one low, one high, between posts. On the ground, I used spacer boards to ensure that the distance between the posts was accurate. When possible, I brace the post 90° to the spacer (photo above). With spacers, strings, and a level, I can quickly set a line of posts and feel confident that they are dead straight.

The technique I use to set the proper height depends on the requirements of the job. Most of the time, I just let the post run wild and come back later to cut it to length with a portable bandsaw. This job required that the flanges for the mesh end 13 in. below the top. When setting these posts, I used a laser level to determine the proper height of the post before I backfilled the hole with concrete.

I have found that bracing steel posts is time-consuming work, so I try to keep it to a minimum. To this end, I set the infill posts in dry concrete. I set the post in the hole to the lines, add some dry concrete mix, tamp the concrete down in the hole, and check the post against the strings and with a level. I repeat this process, adding about 4 in. of concrete at a time. The main advantage of this system is that each post does not have to be braced.

Once the hole is filled with dry, packed concrete, I can move onto the next post. This saves on both time and materials. Also, while tamping down the concrete, I can continue to check the post, making micro-adjustments to ensure that the post is exactly where I want it to be.

Photo bottom left, this page: Mark Stein

Details were designed with the weather in mind

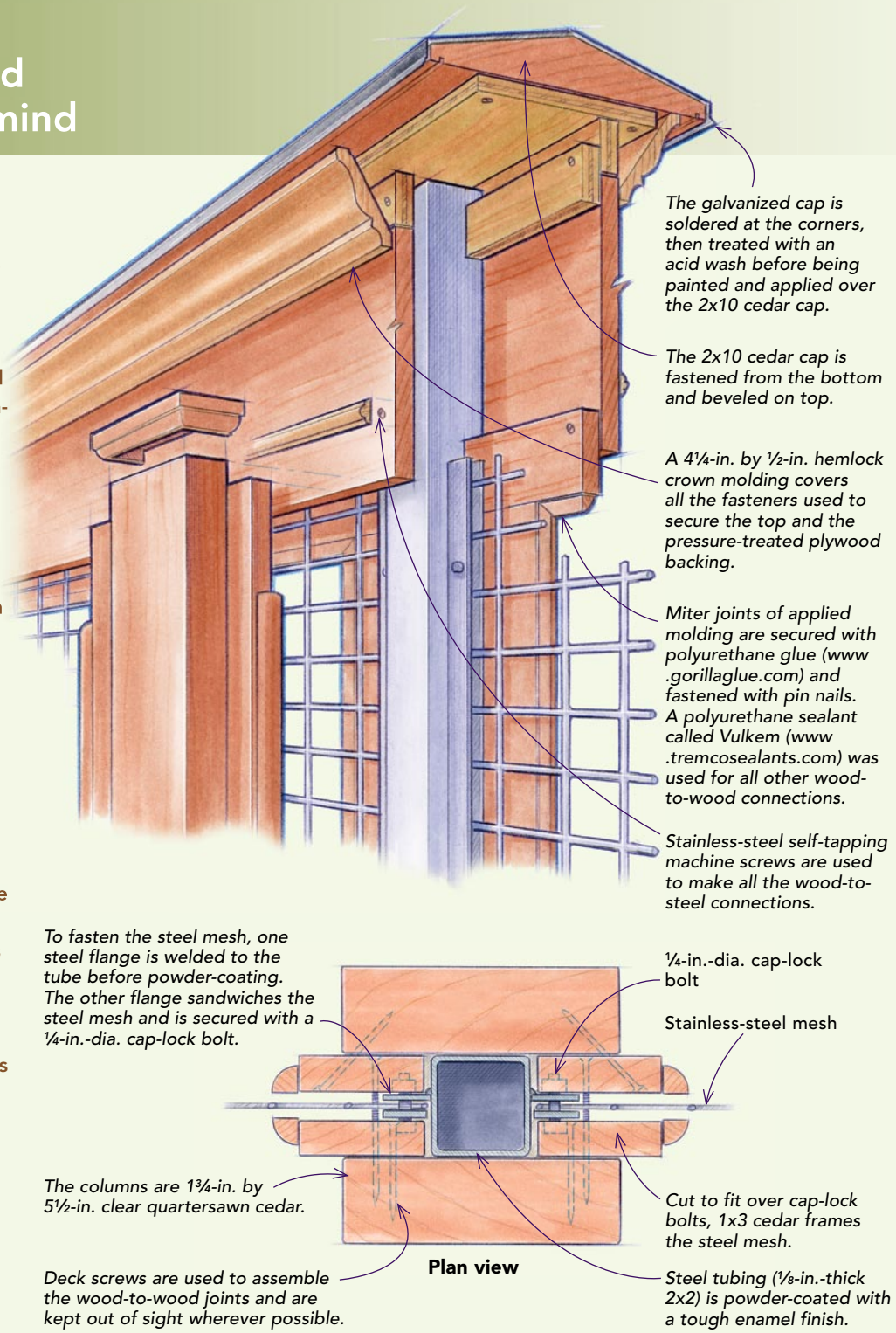
by Mark Newman

As a finish carpenter and furniture maker, I had to reverse a deeply ingrained assumption for this job: that wood generally shrinks after construction. Built in the summer, this fence of kiln-dried wood would be at its smallest the day it was finished. Even well-protected wood absorbs moisture during the wet season and shrinks during the dry season. A good coat of paint or finish slows moisture migration but can't stop it. The important lesson here: Leave room for wood movement. However, with a design that sheds water and allows for wood movement, we thought we could build a fence that would last for many years.

For material, we chose rot-resistant western red cedar and worked out an assembly order that allowed us to cover most of our fasteners with the next layer of applied moldings. The outer layer was toe-screwed from the back (plan-view drawing), hiding all the fasteners from the face side.

To give the wood as much protection as possible, we had all surfaces fully coated with oil-based primer and paint, which offers the longest-lasting protection. As we worked, we either painted all end cuts or buried them in adhesive. To protect the top, we sloped the cap with a 5° bevel to shed water and added a galvanized sheet-metal cap.

—Mark Newman owns Woodcraft Inc., a finish-carpentry and furniture business in Portland, Ore. To see Mark's process for making a curved section of cap for this fence, see "Master Carpenter" on p. 132.



The concrete hardens eventually as it absorbs moisture from the surrounding soil. Concrete set this way will probably never reach its optimally rated strength, however, so this method should not be used for situations where the concrete is under compression load.

Get the best of wet and dry concrete

Once I have all the posts set, I fill the last 6 in. (to slightly above grade) with mixed concrete. I slope the concrete so that water drains away from the post when it rains. This wet cap of concrete sets up overnight, and I get the best of both worlds. I use dry mix so that I don't have to brace the posts, and I can move quickly from setting one post to the next. I apply the wet cap to ensure that the posts are stable and won't move as the steel mesh is applied the next day.

This job required me to dress up the bottom of each post with a stone base that would visually support each column. After the wet cap had hardened, I formed a small base of concrete that I could veneer with bluestone that the homeowner had chosen. □

Scott Grice is a contractor specializing in fences and decks. He lives in Portland, Ore. Photos by John Ross, except where noted.