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STEAM IN THE GARDEN

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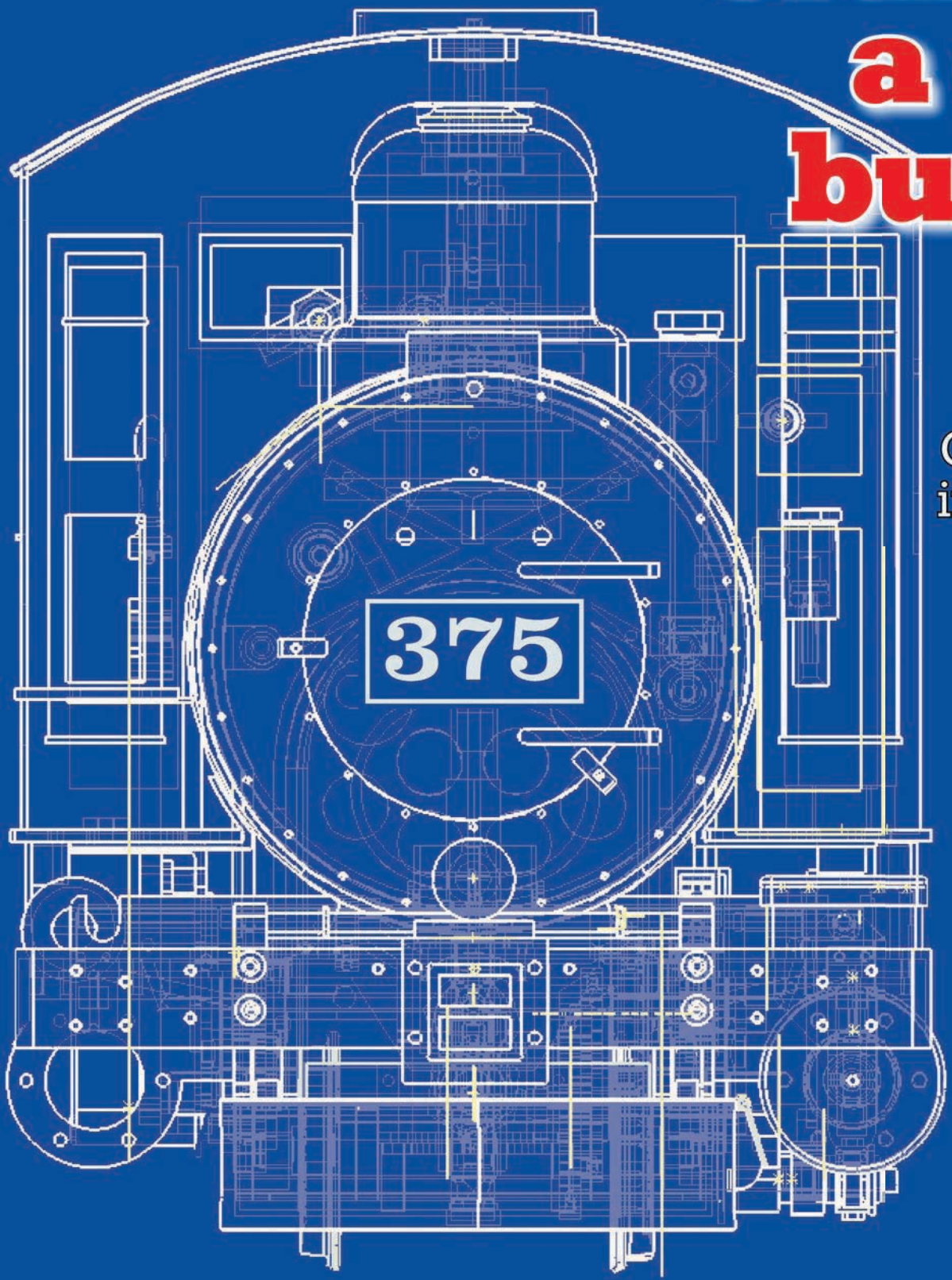

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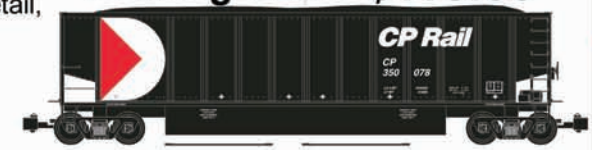

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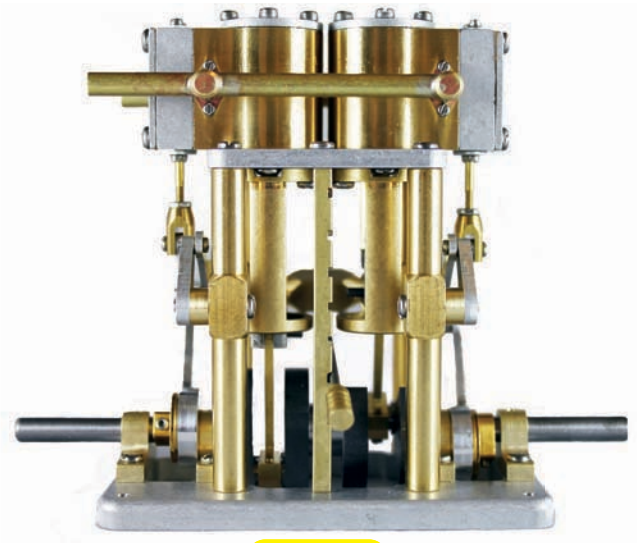

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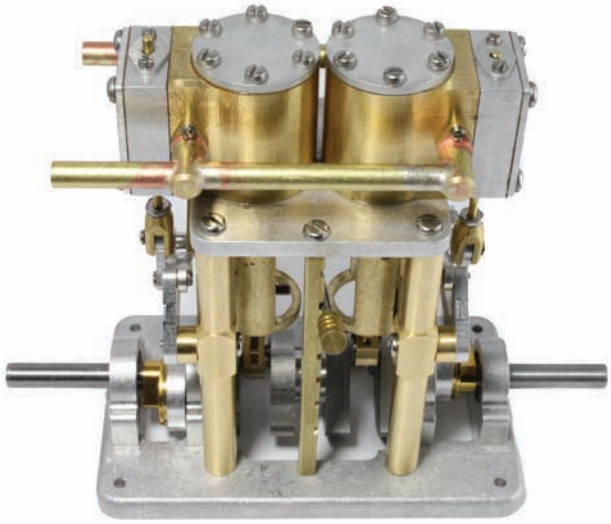

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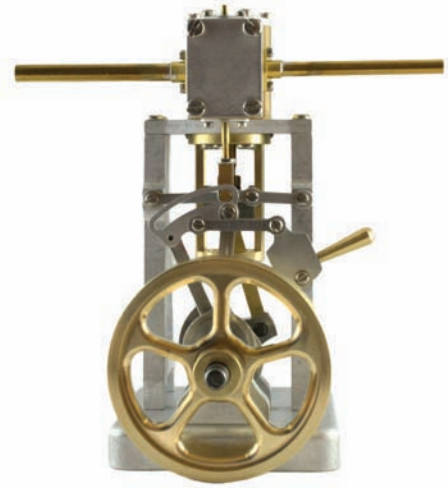

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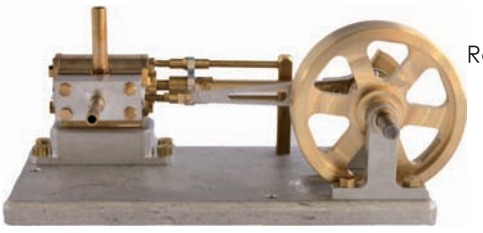

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Vol. 24, No. 2; Issue No. 132; March/April 2014

STEAM IN THE GARDEN

Gather friends, while we inquire,
into trains, propelled by fire ...

Cover: Rob Lenicheck's computer-assisted design drawing of the Denver & Rio Grande Western's No. 375, which he scratch-built as a coal-burning 1:20.3-scale model. **Page 22.**

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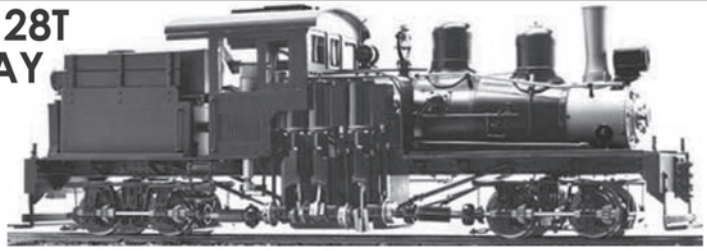

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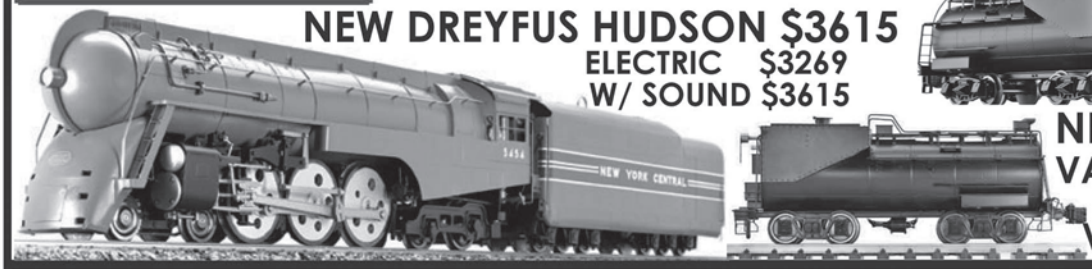

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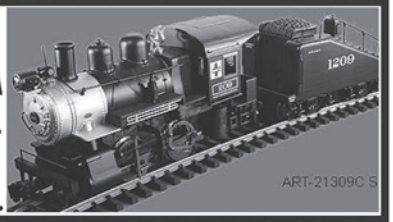

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LATEST WAYBILL

Wagon train

Suppliers to the small-scale live steam hobby seemed to be focused on rolling stock in the early part of 2014, with new offerings from Roundhouse Engineering Co. Ltd., The Train Department and distributors for Accucraft Trains Co.

Roundhouse, based in Doncaster, England, is now offering a three-plank coal wagon kit, which includes etched brass and wood parts. The cars are 106mm long (4 3/16-inches), 59mm wide (2 5/16-inches) and 53mm tall (two-inches). The kits come with link-and-pin couplers and wheel sets that can be adjusted to either 32mm or 45mm track. The company did not provide a projected price for the kits.

The Train Department of Hazlet, N.J., has introduced nine new rolling stock kits in 1:13.7-scale (7/8ths), including a caboose and a series of wagons based on real rolling stock.

The caboose kit comes with a pre-assembled, laser-cut steel frame and a laser-cut basswood body. The kit's wheels come from Sierra Valley Enterprises and it includes a resin-cast stove, brake hardware and link-and-pin couplers. The company says the door and windows can be made operational.

Roundhouse wagons: *These two-plank coal cars can be adjusted for 32mm or 45mm track.*

The finished caboose will be 8 3/4-inches long, 4 3/4-inches wide and 7 1/8-inches tall (to the roof; the stove's chimney will add another 1 3/8-inches to the overall height). The Train Department is taking pre-orders on the 1:13.7-scale caboose, which will retail for $225, plus shipping.

Additionally, The Train Department has released seven other new 1:13.7-scale wagon kits, including models of a Canadian waist-side coal wagon, a Taiwanese Pingxi coal wagon, a cane wagon and cane utility wagon from Bundaberg, Australia, a steel cane wagon, a Welsh steel slate wagon and a steel bulkhead/flat wagon. The company is also develop-

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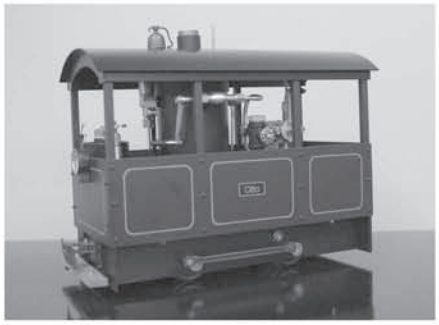

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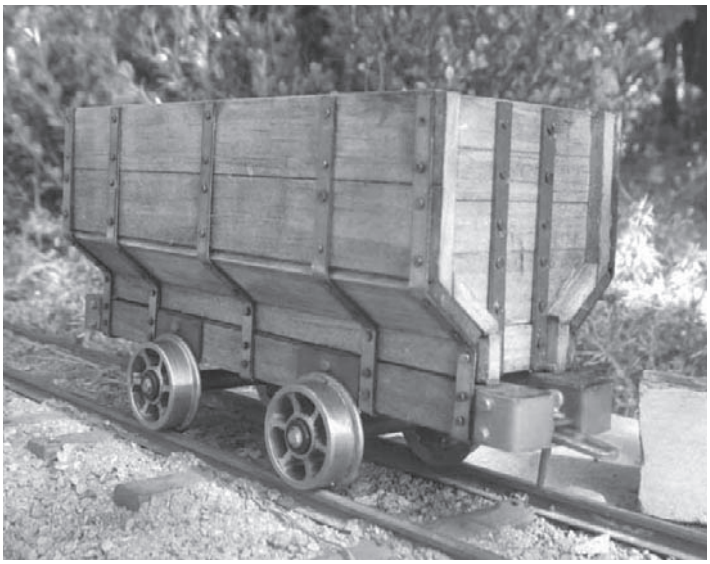


Train Dept. 1:13.7-scale kits: *Top left, the caboose; bottom left, the waist side wagon; top right, the Pingxi coal wagon.*

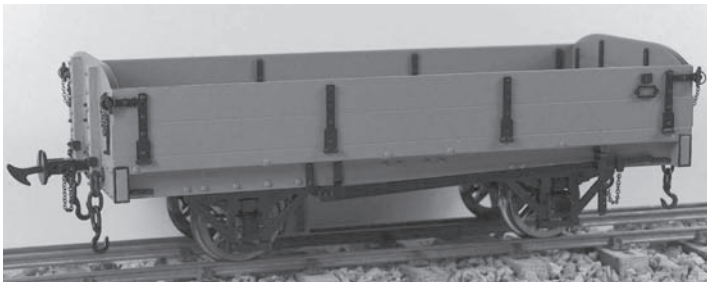
ing a steel-disconnect bogie kit.

These kits will retail for between $50-$78, plus shipping, said The Train Department.

Accucraft UK, based in Shropshire, England, released photos of its 1:20.3-scale Isle of Man two-plank goods wagon that had been previously been announced. The "M" wagon, developed in cooperation with TrackShack Ltd. of Peel, Isle of Man, will come with eight different running numbers or an unlettered version. The car, which comes in light gray, will be 217.5mm long (8½-inches) and 98mm wide (3⅞-inches).

The company said the Isle of Man wagons were to be available in March and would retail for £65 ($US107).

The Gauge 1 Model Co. of Kent, England, said it was expecting delivery of its 1:32-scale MK1 coaches



Accucraft rolling stock: *Top, the Isle of Man 'M' two-plank goods wagon; bottom, the MK1 coach.*

in February. The company commissioned Accucraft Trains Co. to build seven different passenger cars in a variety of stylings and paint schemes.

The coaches include flush-glaze windows, sprung-brass buffers, Kadee couplers, metal bogies, full interior compartment detailing and unique running numbers. Paint schemes include British Rail/South-

ern Rail green, crimson and creme, chocolate and cream and maroon.

Gauge 1 said a group of four coaches would retail for £975 ($US1600).

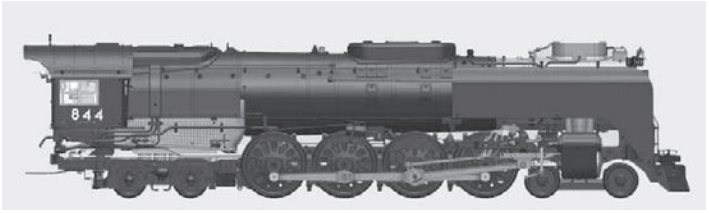
Roundhouse is on the Web at http://roundhouse-eng.co.uk/ and by phone at (01) 44 1302 328035, while The Train Department is at http://www.thetraindepartment.com/ or (732) 770-9625, Accucraft UK is at http://www.accucraft.uk.com/ or (01) 44 1694 723799 and Gauge 1 is at http://www.g1m.co.uk/ or (01) 44 1634 666064.

U.P. No. 844 for 2014

Aster Hobby USA LLC said late last year that it expects its next U.S.-profile 1:32-scale live steam model, a Union Pacific FEF (for its Whyte wheel notation of 4-8-4), No. 844, to be delivered late this year.

The company said its manufacturer, Aster Hobby Inc. of Yokohama, Japan, is pioneering its use of computer-assisted design (CAD) with No. 844. The companies provided the community with a number of CAD drawings of the pilot model of No. 844, produced with the 3D application Solidworks.

Aster said the model will be offered in black and in a "greyhound" livery (No. 837), but provided no other details on the model. From the CAD drawings, the locomotive appears to be an alcohol burner. The



Aster Union Pacific coming along: *The new 1:32-scale 4-8-4 rendered with 3D computer graphics.*

model "will equal or better in detail, performance and appeal with any earlier released Aster U.S.-prototype model," said Aster.

Delivered to Union Pacific in December 1944, No. 844 is unique in that it is the only Class One railroad steam locomotive operating today that was never retired. No. 844 — originally designed as a passenger locomotive — is used for excursions and for public-relations purposes, though it is sometimes used to pull freight.

Of the 45 constructed FEFs, only three besides No. 844 are still in existence: No. 814 is on display in Council Bluffs, Iowa; No. 833 is on display in Ogden, Utah, and No. 838 is in Union Pacific's shops in Cheyenne, Wyo., used as spare parts for No. 844.

Aster Hobby USA, of Campobello, S.C., is on the Web at http://www.asterhobbyusa.com/ or by phone at (864) 587-7999.

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The No. 1 "Falk" is a 1:20.3-scale, 0-4-0 brass, Gauge 1 (45mm) live-steam model of a locomotive built in San Francisco and used as a Pacific Northwest logging engine. With axial pump, it runs more than 10 minutes. 21½-inch radius. 8¾-inches long, 4¼-inches wide, 6-inches tall (222mm by 109mm by 151mm).

BRITISH BLACK 5 in 1:32 scale
All brass model of LM&S' 4-6-0; G-gauge with whistle. 24¼-inches long, 3½-inches wide, 4¾-inches tall, 11 pounds. Single-flue, butane-fired boiler, runs more than 60 minutes with automatic water feed.

BR41 in 1:32 scale
Our first German live-steam model train, the BR41 is a 2-8-2 brass and stainless steel G-gauge locomotive, 29½-inches long, 3 13/16-inches wide and 5⅝-inches tall. It's butane fired by a ceramic burner.

BRITISH 8F in 1:32 scale
Real Stephenson valve gear highlight this butane-fired model of the LM&S 2-8-0. 24-inches long, 3¼-inches wide, 4¾-inches tall, 11 pounds Run-time of 50-plus minutes with auto water feed on four-foot radius curves.

U.S. Porter in 1:20.3 scale
This 0-4-0 loco is simple and easy to operate, yet it is also a fine-scale brass model. 8¼-inches long, 3½-inches wide, 5⅜-inches tall (210mm by 90mm by 137mm). 45mm gauge. 3.6 pounds (1.65 kg).

COACHES: MK1 Coach in 1:32 scale
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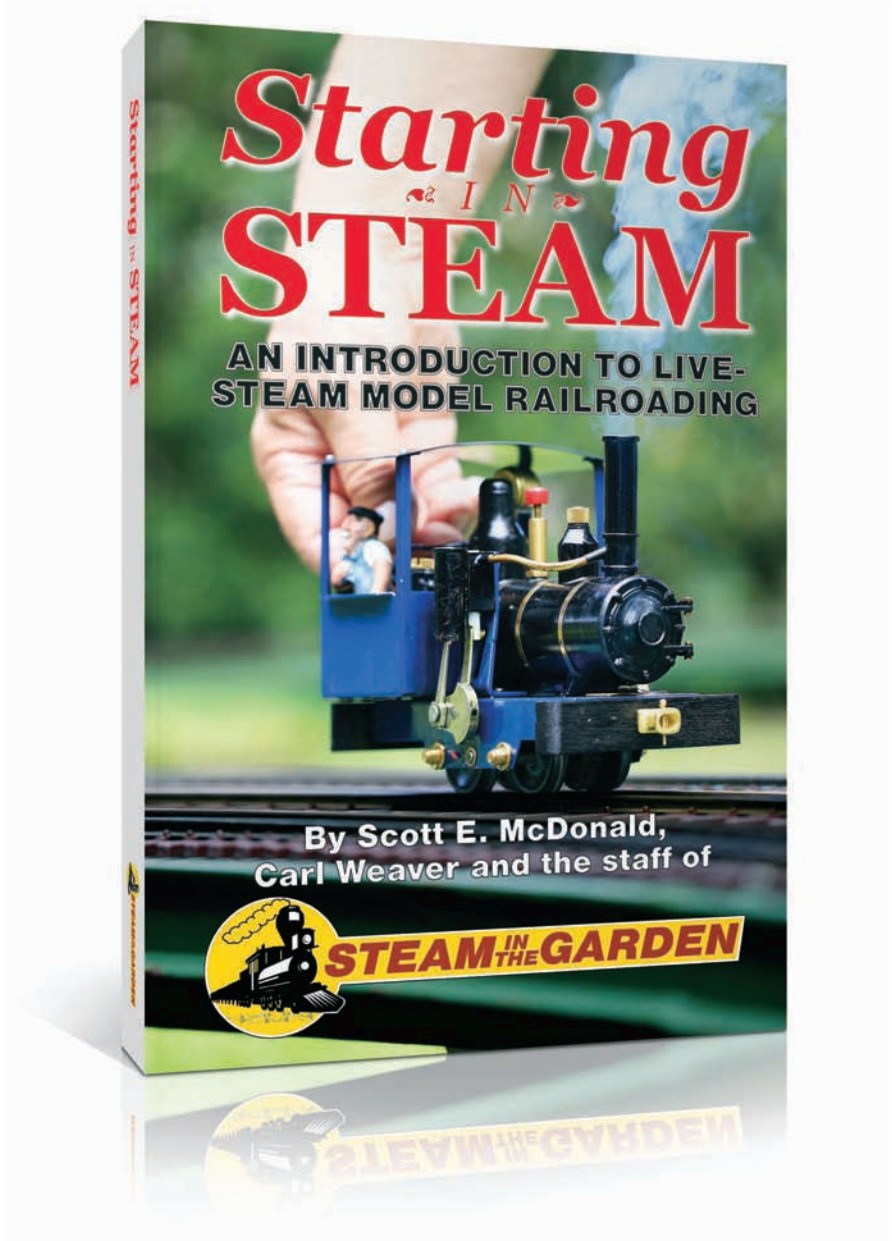


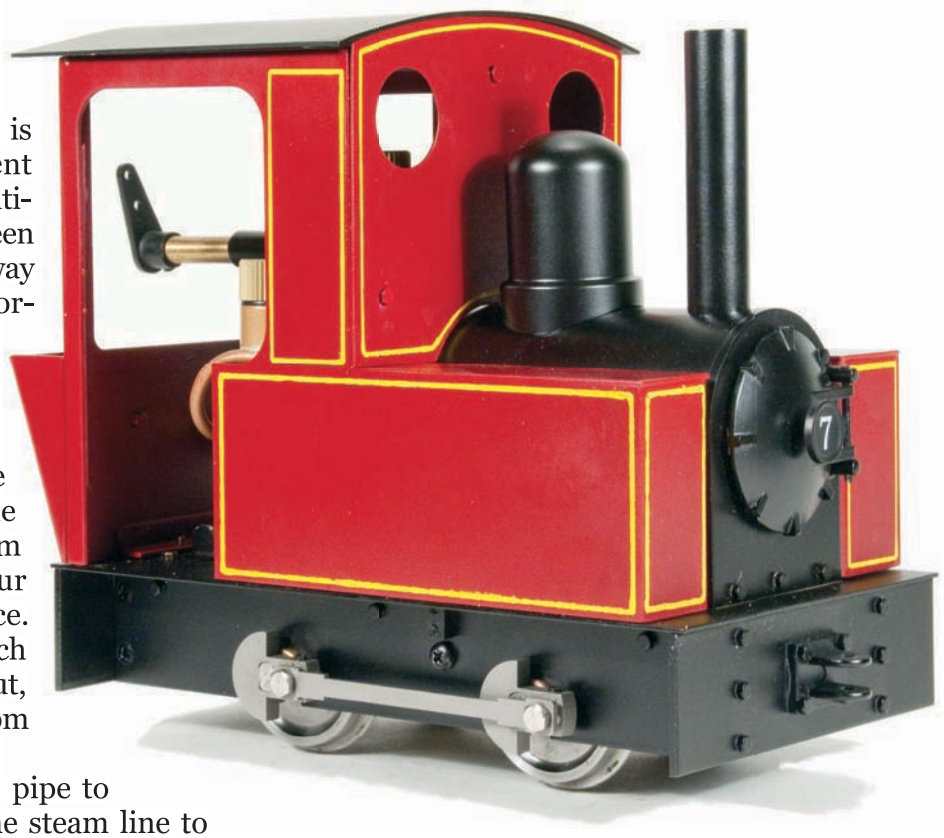
Starting in STEAM will be available in Spring 2014 as both a paperback and as an e-book. Including new material and important articles from *Steam in the Garden,* this 138-page book not only introduces new hobbyists to the fun and excitement of small-scale live steam, but will also provide experienced steamers with tips and tricks from seasoned hands. Reserve your copy of *Starting in STEAM* today.

http://www.steamup.com/starting

Improve 'Dora's' proportions by lowering the BOILER

Text, photos and illustration by Marc Horovitz

One of the criticisms that Accucraft Trains' "Dora" has suffered is in the category of looks. Some people think the engine is downright ugly. While this sentiment brings a tear to my eye, everyone is entitled to their own opinion, or so I've been told. If you belong to this camp, one way of improving the locomotive's proportions is to lower the boiler. You may find this is easier than it sounds.



Better looks: *With a lower boiler and a new cab front, 'Dora's' proportions are greatly improved.*

Disassembling the engine

As with many "Dora" projects, we must first take the engine apart. The body work is quickly separated from the locomotive by removing the four hex-head screws that hold it in place. The arrows in **Photo 1** show you which ones to take out. With those screws out, the tanks and cab can be removed from the chassis.

Unscrew the nut securing the gas pipe to the burner (**Photo 2**). Disconnect the steam line to the lubricator from the throttle by unscrewing that nut (**Photo 3**). Now, by removing the four screws indicated by arrows in **Photo 4**, the boiler assembly will simply lift off. When the boiler's off, you can set the chassis aside for the duration. The boiler will now stand alone (**Photo 5**).

Modifying the boiler mounts

In taking measurements, I found that the boiler can be safely lowered by around .450-inch. The limiting factor is the exhaust line. You might be able to get away with a little more by rerouting the exhaust line but, for this project, we'll leave it where it is.

Unscrew the three screws at the base of the smoke box (**Photo 6**). This will release the mounting bar that's behind the front plate (**Photo 7**). Set the bar aside for now. Remove the two nuts from the rear of

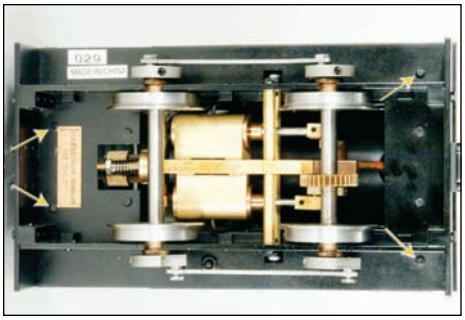


Photo 1

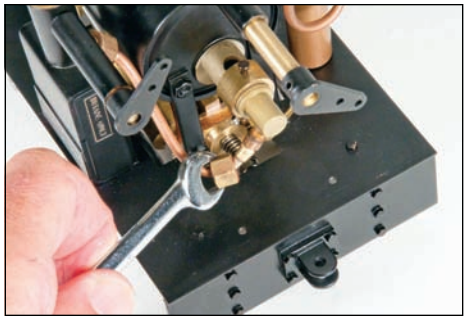


Photo 2

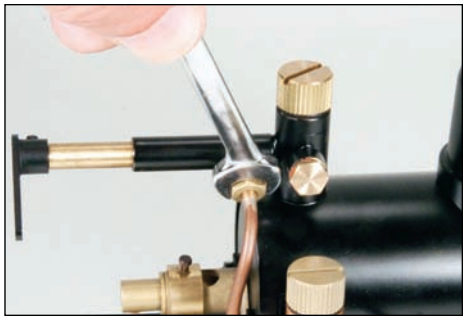


Photo 3

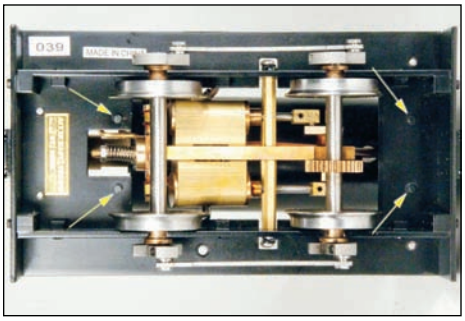


Photo 4

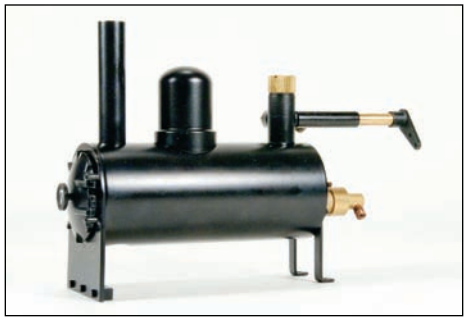


Photo 5

Photo 6

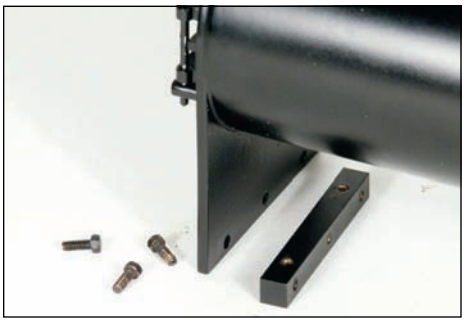


Photo 7

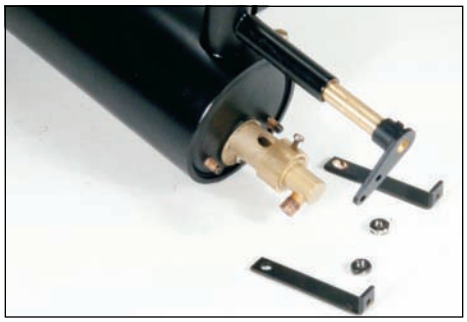


Photo 8

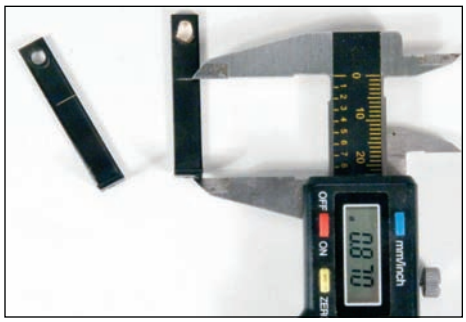


Photo 9

the boiler that secure the rear supports and remove the supports (**Photo 8**).

We'll modify the rear supports first — they're easier. Set your caliper to .870-inch. Using the "L" bend at the bottom of the bracket as a guide, scribe a line across each bracket, as shown in **Photo 9**. Measure the width of the bracket (mine measured .250-inch), divide by two and scribe lines across your first lines (**Photo 10**). These will mark the center points for drilling. Center-pop each point and drill one-eighth-inch holes (**Photo 11**). Smooth any burrs on the backside with a file.

Note: I found the original hole in one of my brackets to be ovaled out. This was probably because of the stud on the back of the boiler to which it attaches being slightly off, requiring an elliptical hole so the boiler would sit level. Be aware of this and be prepared to oval out one of the holes on your brackets, too, if necessary. We'll address this later.

Set your caliper to one-inch or thereabout and scribe another line on each bracket, above the new hole you drilled (**Photo 12**). This will be the cut line to shorten the bracket. Now cut the top off each bracket. You can do this any way you like. Use a shear, a hacksaw, a rotary tool, or whatever — anything will do. Clean up the cut edges with a file. The shortened brackets should look like **Photo 13**. If you'd like to repaint the brackets, you could do that now or later. Set them aside.

Dealing with the smoke box

Set your caliper to .450-inch and scribe a line across the bottom of the front of the smoke box, as per **Photo 14**. This will be the cut line for shortening the smoke box to the proper height.

Again, there are probably many ways of cutting the bottom off the smoke box. I chose to use a hacksaw. I wanted to cut near the line, but not over it, so I gripped the boiler assembly by the smoke box front, upside down, in my vise, with the cut line just below the jaws of the vise. Then, resting the hacksaw blade on both jaws of the vise, I carefully started cutting (**Photo 15**). I checked the cut several times as it was being made and I found the method worked.

Photo 10

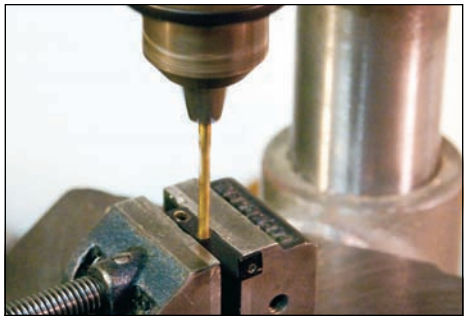


Photo 11


Photo 12

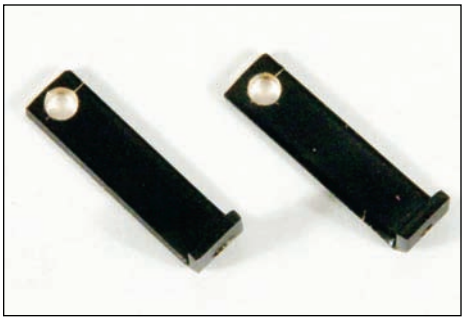


Photo 13

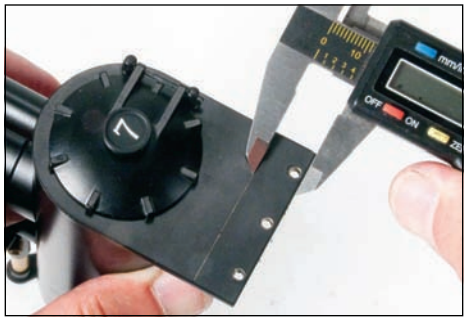


Photo 14


Photo 15

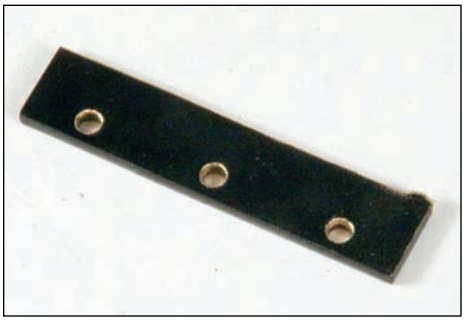


Photo 16


Photo 17

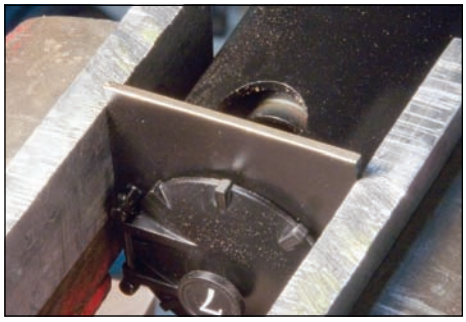


Photo 18

The cut-off piece can be seen in **Photo 16**; save this piece — you'll need it later.

My cut was both rough and not to the line (**Photo 17**). I raised the work piece in the vise until the cut line was above the vise jaws, then finished the job with a large file. The bottom (cut) edge must be both even and square, so work carefully. The finished edge can be seen in **Photo 18**.

Now is probably a good time to reattach the rear brackets, so go ahead and do that. Your boiler should now sit flat and level (**Photo 19**). However, if you found — as I did — that it wobbles slightly, cast your mind back to that ovaled-out hole. It's time to do the same to one of the new holes on one of the brackets — the same side that was ovaled before. Figure out if the hole needs to go up or down and do the job with a round needle file.

With a couple of small machinist's clamps, clamp the piece you cut off the smoke box front to the smoke box, as shown in **Photo 20**. Make sure that both the side edges and the bottom edges are flush and don't cover the holes. You can now use the cut-off piece as a drilling guide for the new holes.

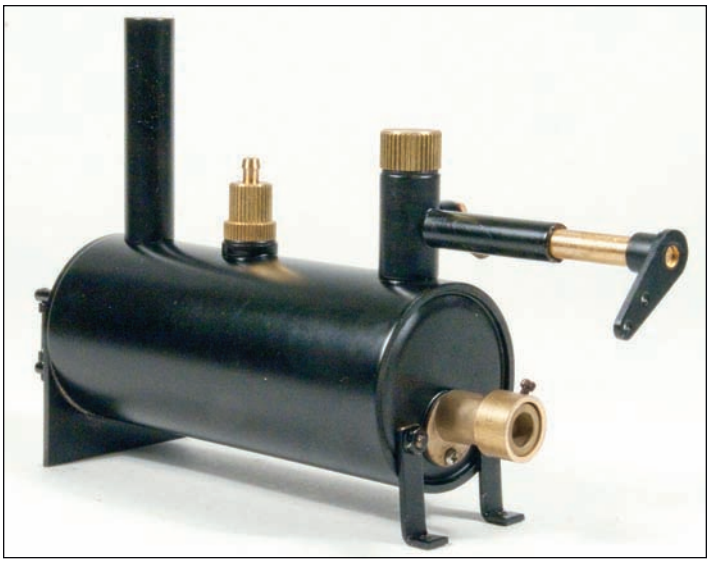


Photo 19

Drilling these new holes might prove a little difficult — not the drilling, actually, but holding the work. With the throttle valve removed, I found that

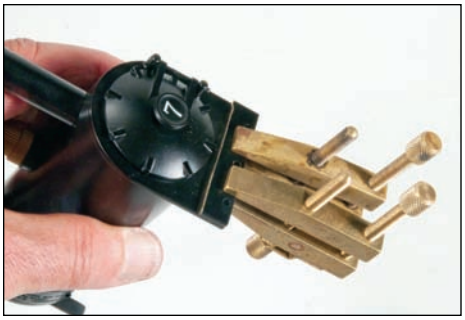


Photo 20

Photo 21

Photo 22

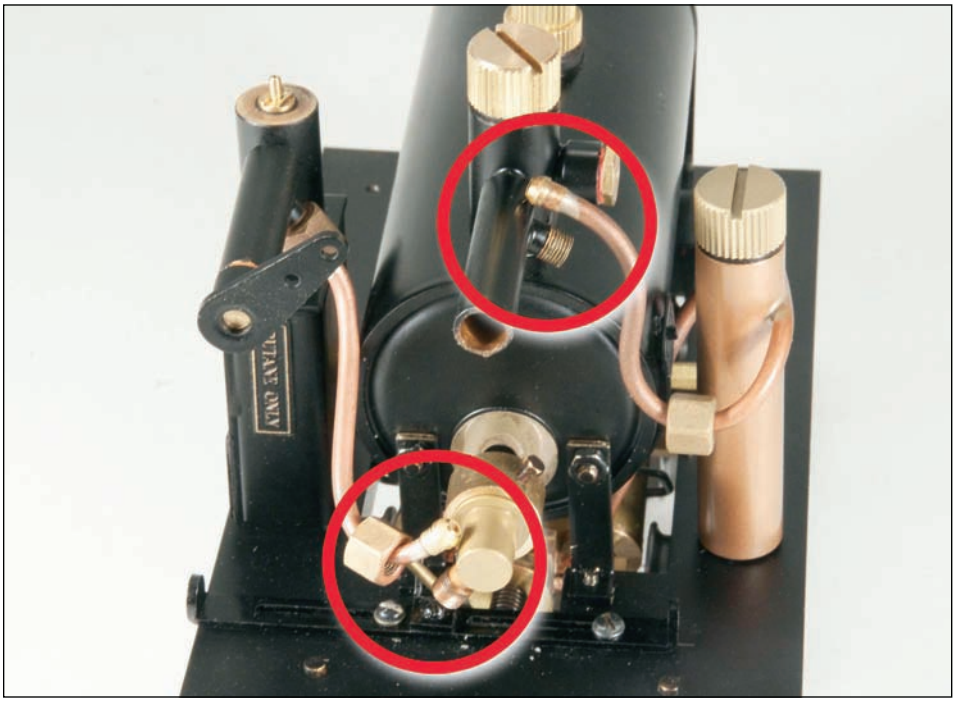


Photo 24

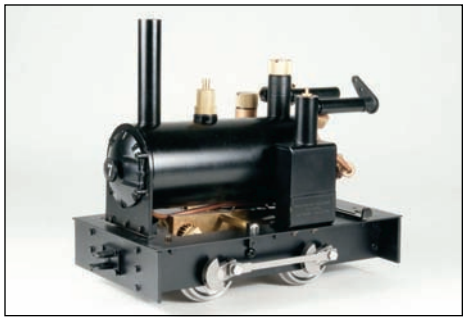


Photo 23

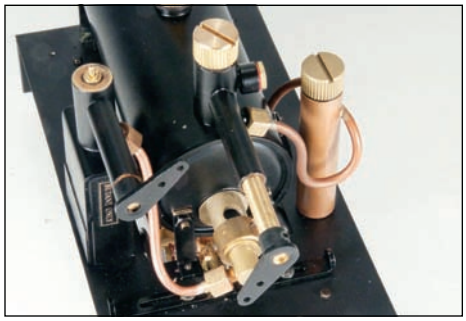


Photo 25

I was able to hold the boiler in my vise, smoke box up. I then used an old electric hand drill with a 3/32-inch bit to drill the new holes (**Photo 21**). The finished piece is shown in **Photo 22**.

Now it's time to put everything back together. Screw the mounting bar to the inside of the smoke box front, then replace the boiler on the chassis (**Photo 23**). You may find that you have to massage the exhaust pipe a little to get it to fit. Don't be shy. Just be sure that, when everything is back together, the exhaust pipe isn't so low that it fouls the mechanism.

Also, you may now find that the reversing lever is too long and that it hits the burner in mid gear. No problem — just snip off one-eighth-inch or so from the top of the handle. Given the burner's now-closer proximity to the reversing handle, I strongly recommend that you do the slider conversion described in the last issue (*Steam in the Garden*, January/February 2014, No. 131) to make reversing much easier and less hazardous.

With the boiler back in place and everything functioning mechanically, you'll find that the gas and steam lines don't match up anymore (**Photo 24**). You will have to carefully bend the copper lines back into alignment with their connectors.

You'll find the copper stiff and hard to work. Just take it slowly, using your fingers. Start with the gas line, which should be the easiest to remedy. By a combination of bending the gas line and rotating the jet in the burner tube, you will be able to get them to align properly. You must be able to get the nut well started with just your fingers. If you can't, the alignment is bad and you run the risk of cross-threading the nut if you try to force it on.

When the gas line is as it should be, it's time to tackle the steam line. The same techniques apply — slowly and carefully bend the line into position. If you have to resort to pliers, do so sparingly and with great caution, as you can do a lot of damage with them. The nose of the fitting on the line must not only fit in the socket, it must be accurately aligned with it as well. Again, you should be able to easily screw the nut on with your fingers when things are

Photo 26

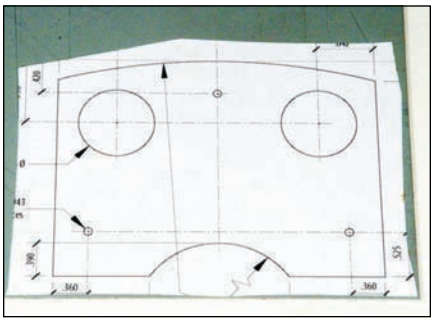


Photo 27

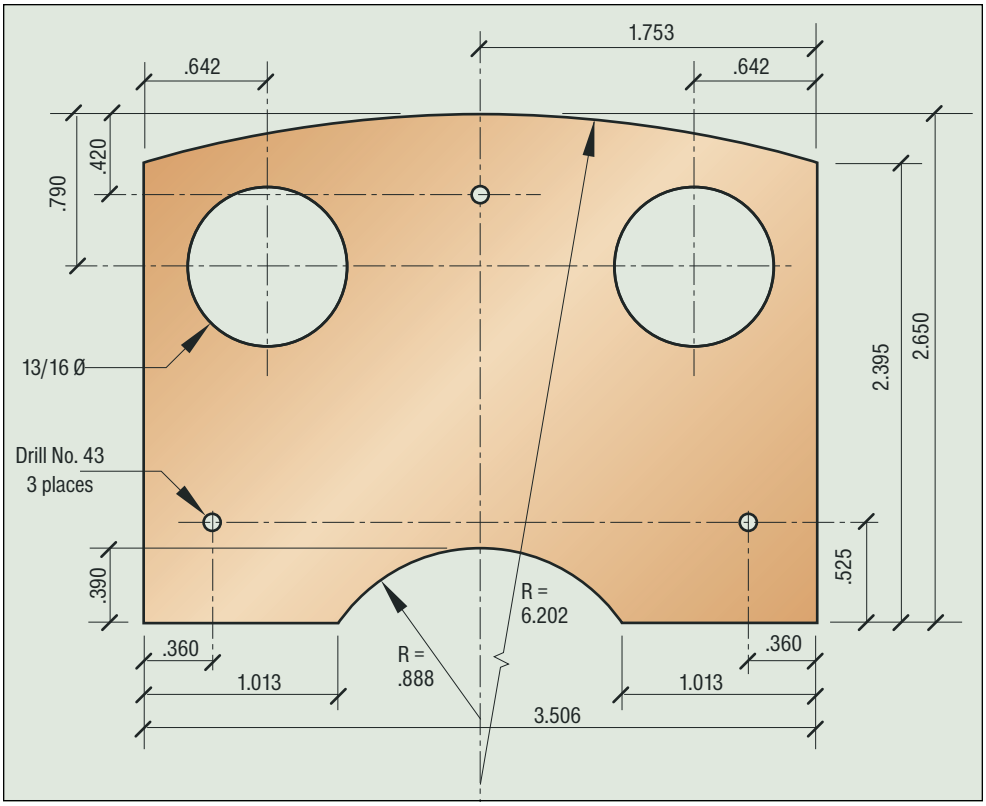


Figure 1: *A new cab front; drawing is 1:1 scale and can be photocopied.*

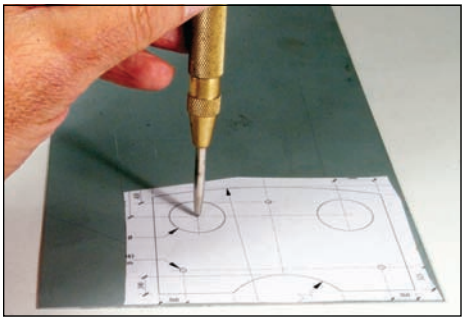


Photo 28

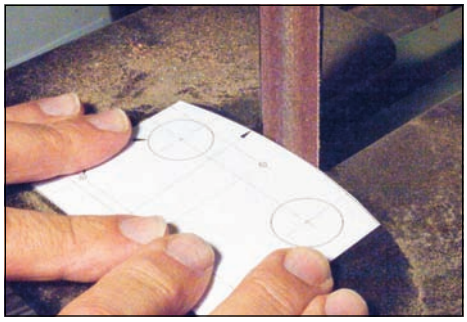


Photo 29

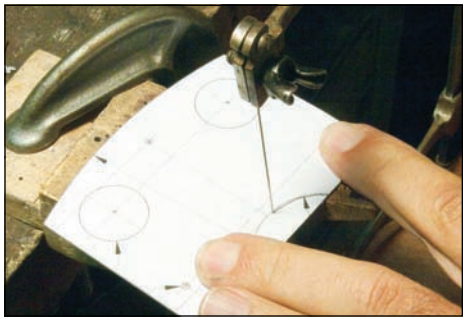


Photo 30

properly lined up. The reconnected lines will look like **Photo 25**.

Congratulations! You should now have a functioning, more attractive "Dora" with a lower boiler. But wait — there's more! If you temporarily replace the cab and tanks on the chassis, you'll see there's now a huge gap between the boiler and the cab (**Photo 26**). This won't do. We'll have to fix it.

Plugging the hole

Figure 1 shows a new cab front to cover the old one and fill the gap. I've shown round windows but you can make them anything you like.

You'll need to cut the new cab front out of a piece of sheet metal. I suggest something fairly stiff and flat — brass or steel in the range of .020-inch to .030-inch should be fine. If you're using aluminum, you might want to go a little thicker. I used some .028-inch steel sheet. It's a material that I like to work with and I've got a lot of it.

You could use the dimensions in this drawing to mark out the part on your metal, using layout dye and marking-out tools, or you could do as I did and just photocopy the drawing, cut it out and stick it to your metal with some spray adhesive (**Photo 27**).

Once the drawing has been transferred to the metal, the first thing to do is to locate the holes. Lay the point of a prick punch on each of the cross hairs that mark the holes' center points and give it a tap with a small hammer. Then center-pop the marks with your center punch (**Photo 28**).

With the holes marked, cut out the piece. This needs to be done in a way that won't deform the metal. The straight sides can be cut with a shear or with a jeweler's saw. The curved roof line can be roughed out, then smoothed up on your belt sander (**Photo 29**) or with a flat file. The cutout at the bottom will almost surely have to be made with

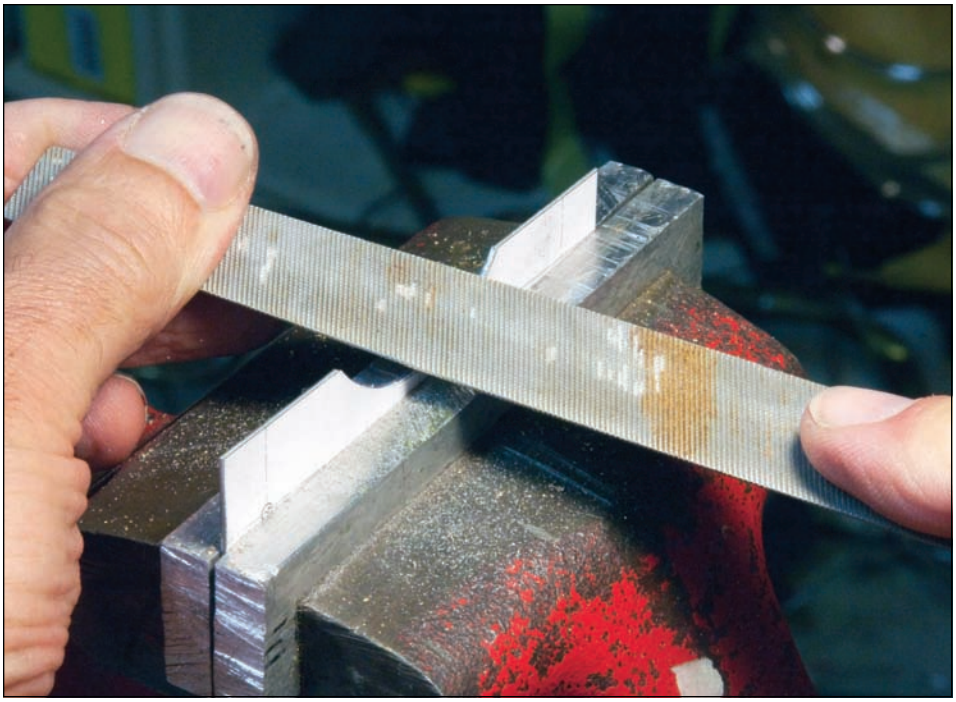


Photo 31

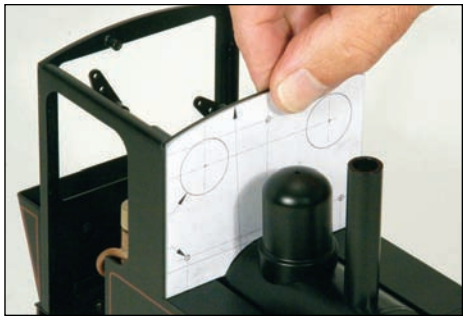


Photo 32

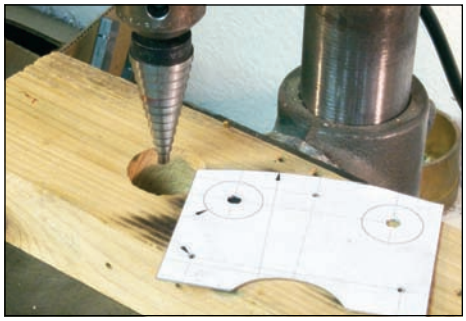


Photo 33

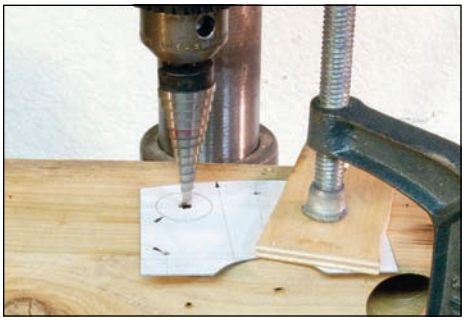


Photo 34

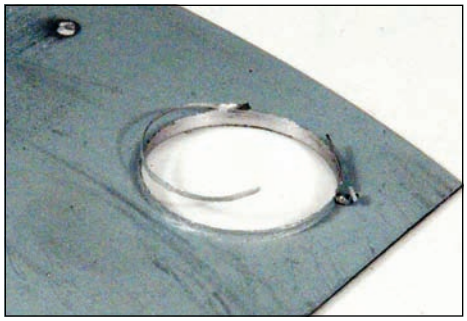


Photo 35

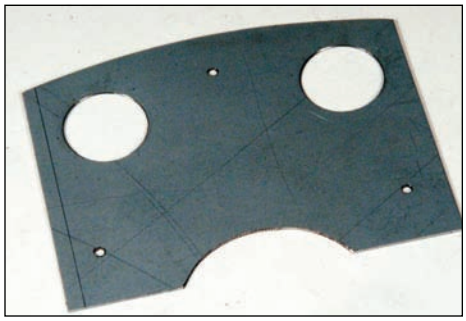


Photo 36

a jeweler's saw (**Photo 30**). Cut close to the line, then smooth it out with a half-round file (**Photo 31**).

At this point, try the new front on for size. Just place it in front of the cab (with the roof removed), over the boiler and see how it fits — it should be pretty good (**Photo 32**). If the boiler cutout isn't enough and the piece wobbles from side to side, just file it a little more until you get a nice fit.

The holes can now be drilled. Start with the small ones. Drill through with a No. 43 drill, then clean up the burrs on the back side. Go ahead and drill No. 43 pilot holes for the round windows, too, since you've already got that drill chucked up.

To drill the round windows, I suggest using a step drill. The hole in my drill-press table was not big enough to accommodate my step drill, so I had to resort to supporting the work with a piece of wood with a larger hole drilled in it (**Photo 33**).

To give my step drill a good start, I like to open up the pilot hole to the smallest step in the drill. In my case, this was 3/16-inch. Once that's done, go ahead and drill the window holes with the step drill. It's a good idea to clamp the work to prevent it moving while you're drilling (**Photo 34**).

When you've drilled the hole, you'll probably find that there's a large and nasty burr on the back side (**Photo 35**). The quickest and neatest way of dealing with this is to just turn the piece over and slowly run the step drill into the hole from the back, until the next-larger-size step cleans off the burr, leaving a nice, smooth edge. The finished cab front can be seen in **Photo 36**.

Remove the cab/tanks from the chassis. Place your new cab front in position over the old one. Take a No. 43 drill in your fingers and twirl it in each of the mounting holes (**Photo 37**). This will mark the places on the old front to be drilled and tapped (**Photo 38**). Supporting the cab with a piece of wood held in your vise, center-pop these three places (**Photo 39**).

Clearance for drilling the holes is tight. Chuck up a No. 51 drill in your pin vise. Using steady downward pressure with one hand, twirl the pin vise to drill the hole (**Photo 40**). The cab is steel and cuts fairly easily so it shouldn't take you long to get through.

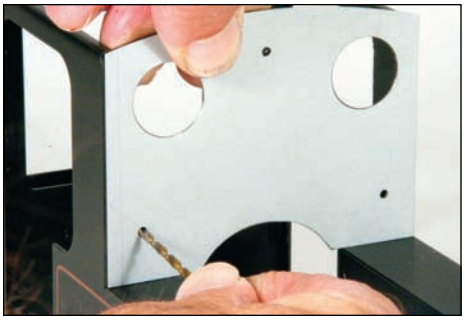


Photo 37

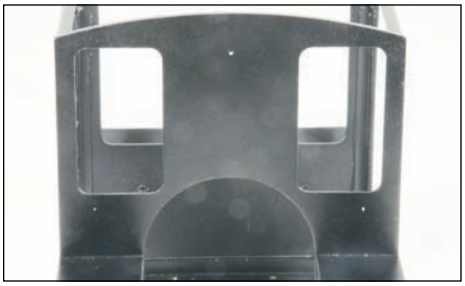


Photo 38

Photo 39

Photo 40

Photo 41

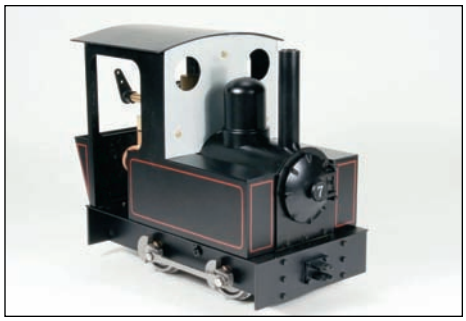


Photo 42

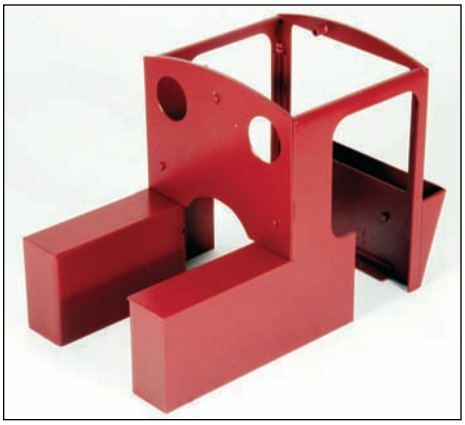


Photo 43

Photo 44

When all three holes are through, tap them 2-56 (**Photo 41**). Now replace the cab on the chassis and screw the new cab front to the old (**Photo 42**). Use any kind of 2-56 screws you like — I used hex-heads.

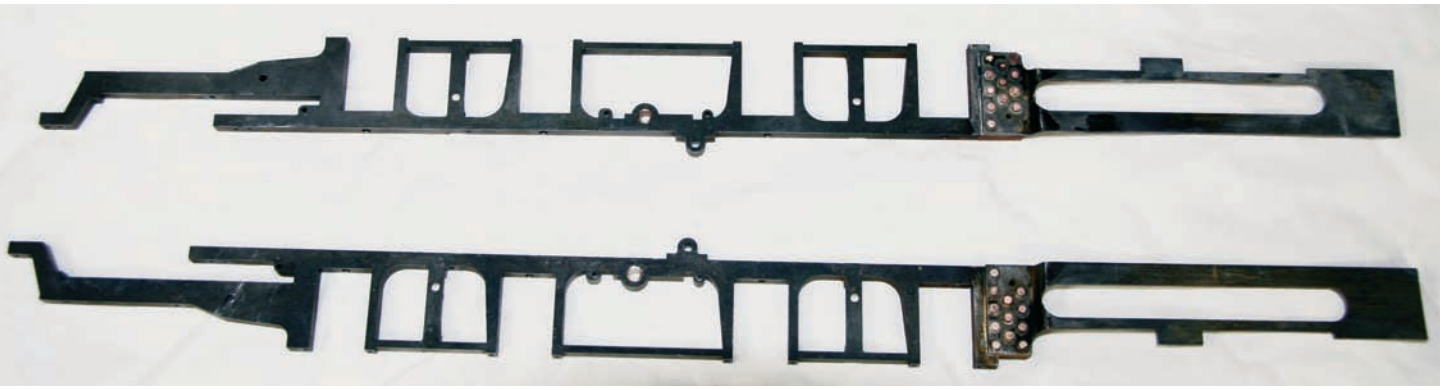
Obviously, the new cab front will need paint. If you find you can't match the original finish, I suggest just going ahead and painting the entire cab, tanks and new cab front. That's what I did, changing the color in the process (**Photo 43**). I was concerned about the original stripes showing through the new paint, as they are slightly raised, but I found a quick wipe with a rag dipped in acetone takes them right off. I just used a spray bomb to paint the body. I'm not that happy with the yellow lining I did and may remove it and give it another go.

Once the paint's dry, put it all back together and enjoy your new, better-proportioned "Dora." Compare the modified engine with the original (**Photo 44**).

Scratch-building a Colorado Consolidation for COAL

Text, photos and illustrations by Rob Lenicheck

No. 375: *The author's completed locomotive on his backyard railroad in Palo Alto, Calif.*



Since I grew up in Colorado, I have the Denver & Rio Grande Western narrow gauge running through my veins. And, as tired as many people are of them, I have always liked the outside-frame Consolidations and Mikados that the railroad used.

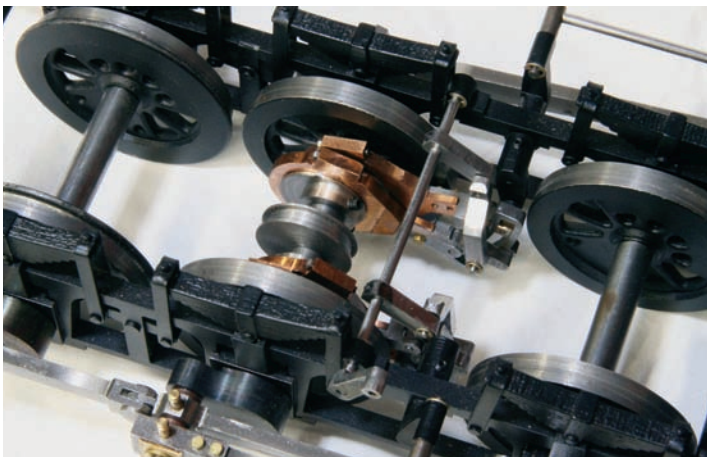
But before I made the decision to build one I had an occasion at the International Small-Scale Steamup in Diamondhead, Miss., several years back to get to run a Torry Krutze-built, coal-fired K-27 owned by Steve Heselton. Despite my initial reservation about the hassle of this method of firing, I fell in love with the interactive nature of running coal. Yes, the dark side had taken me. Thus, a design direction was given to my new project.

Since designing a coal boiler is significantly different and much more complex than my previous gas-fired effort, I consulted with various experts about the dos and don'ts of building a coal-fired engine. The unanimous opinion was "make the fire box as big as possible."

The D&RGW No. 375 — the sole Consolidation Class 25 in the railroad's stable and a 2-8-0 — was an easy choice: it could accommodate a big fire box and had no trailing truck to have to work around. (I also thought to myself at the time that neither Accucraft nor any other manufacturer would show interest in this locomotive since only one of its class ever ran on the D&RGW. Guess the joke's on me — see *Steam in the Garden*, May/June 2013, No. 127.)

It takes me a long time to build a live steam locomotive. This being my second iteration I thought things would go a bit faster. Wrong. This time it took about three years plus, working about two to three hours a day. I like to draw the engine up in 3D (I use Solidworks) so I know when I start cutting chips that I won't have any major part mismatches. If it fits together in the virtual world of zeros and ones, it will fit together in reality, provided that I can make the parts as I designed them but that's a "whole 'nother story."

For starters, I wanted to use full Stephenson's valve gear, so the gear was designed using Dockstader's wonderful and free valve gear design program.



Early parts: *Top, side frames. Bottom, the complete valve gear and middle eccentric for the axle pump.*

What a gift this man gave our hobby. If you haven't seen or used the program it can be found at http://www.billp.org/Dockstader/ValveGear.html. It's a great deal of fun and quite a learning experience to peruse the vast number of valve gears he has developed in this software. Each valve gear is shown graphically and has changeable parameters by which you can design your own variance.

I studied coal boiler design from various sources and came to the conclusion that there's no one way to do it. The really scary part is that you take a best guess about the many parameters such as number, diameter and length of flues, axle pump bore and stroke, blast pipe design and orifice size, fire box grate design, superheater or no superheater, bypass system design and others. Then you must put it together and hope it works. Luckily, I guessed correctly in most cases.

This time I had the frame made for me out of 3/16-inch carbon steel using wire electrical-discharge machining (EDM). This process gives a precise end result without any chamfer to the cut. This saved a ton of work and a few milling cutters. Was glad I did it this way — don't much care for machining steel.

The running gear build went fairly smoothly. But a few ah-hah moments did occur: I designed the

— Continued on Page 26

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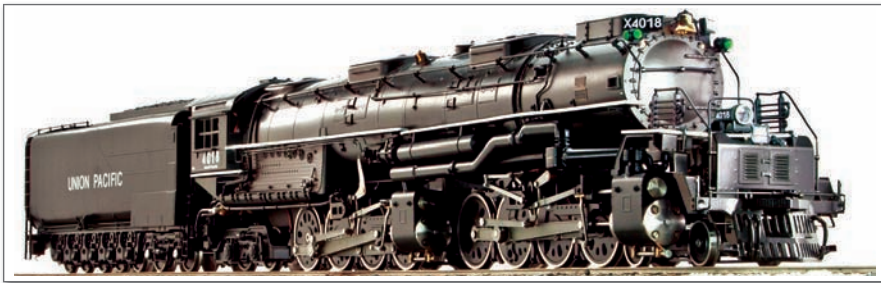

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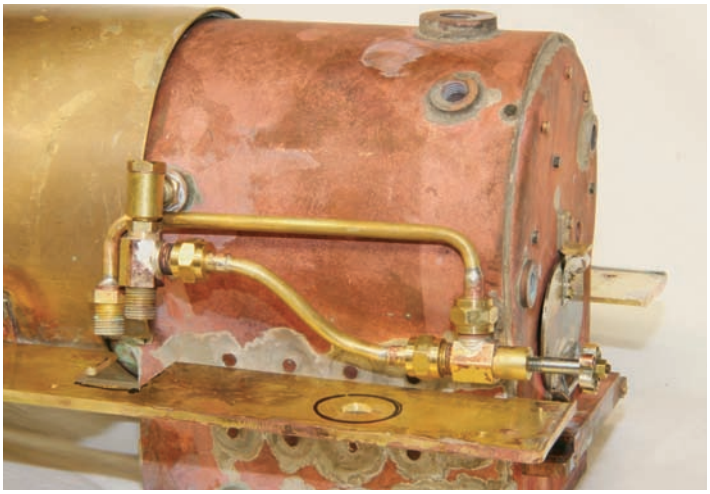

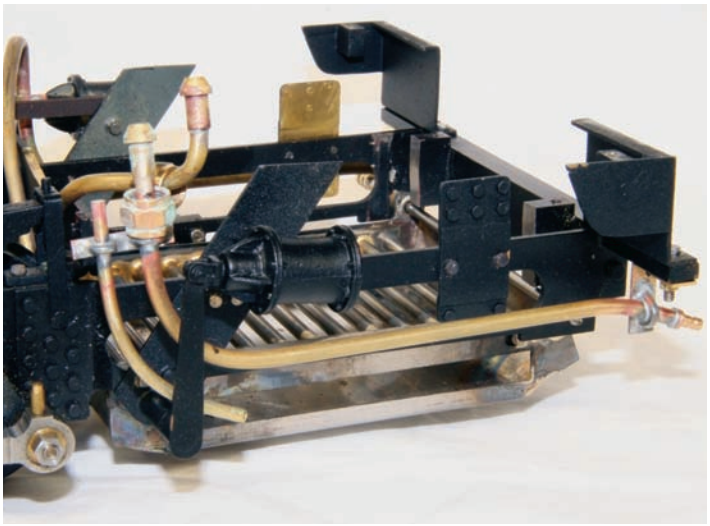

Making hot water: *Top left the 'business end' of the boiler, the fire box; top right, the bypass valve and its connections; bottom right, the valve's corresponding connections on the frame.*

— Continued from Page 23

clearance between the driver journals and the outside driver counterweights to be pretty tight, about .010-inch per side. I found on my first engine that minimizing the clearance in this area would reduce the side-to-side "waddle" aspect of the running gear if the side rods or other axle-related parameters were not exactly right.

The plan was to use Loctite 609 adhesive to attach the counterweights to the axles as this method is effective. What I didn't think about was the need to have a countersink reservoir area at the back of the counterweight which would allow the excess adhesive to pool when the counterweight was pressed on the axle. I belatedly realized this when the journal refused to turn independently of the counterweight after assembly. Time to get out the torch, heat the counterweight up so the Loctite loosens and allows the counterweight removal and the subsequent fix.

I consulted several books for design direction for the boiler and appliances, among them Kozo Hiraoka's books and K.N. Harris' "Model Boilers and Boilermaking." Most people consider the latter the bible of the craft and, after using it, I must agree. Kozo's books are great, too, both as a design reference but even more so as a how-to-build-it reference. If you follow his build practices you will be successful at making the parts you need.

I started with a 3⅛-inch nominal type K copper tube. This has walls 1/16-inch thick which makes the ID three-inches. This is fairly close to the prototype but I also wrapped the boiler with 1/16-inch insulation and a .025-inch boiler wrapper. Found out later that the insulation and wrapper thickness did not allow the full reversing throw for the valve gear and I had to relieve these to get the desired action.

The boiler design pretty much follows Kozo's practices except for the dry back head. In retrospect, a wet back head might be easier to put together: in a dry design the crown sheet mates with the back head on its edge only so the crown sheet must be made precisely to assure a good silver-solder joint. I used stainless steel screws during the assembly to hold things together prior to silver soldering. After everything was together the boiler held pressure at 140psi with only a few small leaks to fix. And, indeed, the fire box is big: more than 2¾-inches long by 2⅛-inches wide.

I'm sure there are exceptions, but most coal boilers in our diminutive scales use an axle pump and a bypass system. I decided I was comfortable with having a serial water injection system starting with a hand pump in the tender which then feeds through the axle pump and into the boiler. This approach needs fewer parts but is a bit more risky because there is no redundancy by way of another clack valve. In my experience, so far so good.

The routing of the water pipes for the delivery and bypass from the tender provided a special challenge.

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Built by Baldwin, redux

With the irony of two recently released models of the Denver & Rio Grande Western No. 375 (albeit the latest a coal-fired scratch build), there are few facts about the 2-8-0 locomotive that haven't already been published here in the last year (see *Steam in the Garden*, May/June 2013, No. 127).

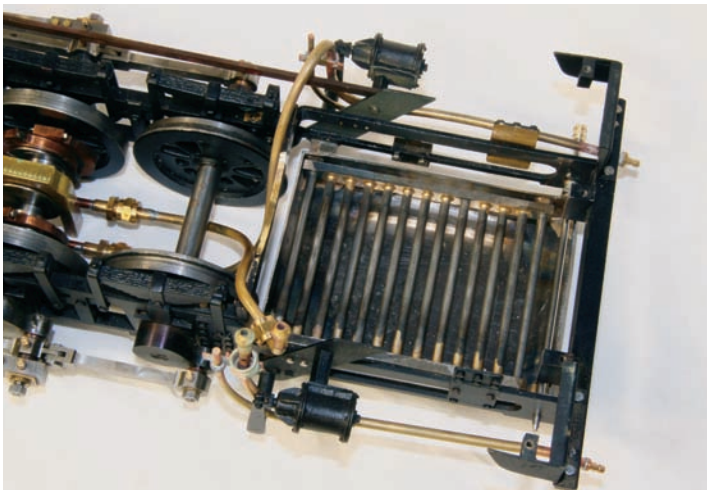
But here are some notes of interest about the locomotive:

- According to a number of railway historians, D&RGW's No. 375 started life as Crystal River No. 103; it was built by Baldwin Locomotive Works in 1903 as a three-foot, narrow-gauge locomotive to the drawings 10 30-E (Serial No. 21757). The Crystal River Railroad was a standard-gauge mainline but No. 103 was used on the Coalbasin Branch, a 12-mile narrow-gauge road that ran to Redstone, Colo. (about midway between Denver and Grand Junction).
- No. 103 had 18-inch diameter cylinders with a 20-inch stroke, while drive wheels were 33-inches in diameter and the boiler's pressure was 160 psi. The locomotive weighed 193,500 pounds and had a tractive effort of 25,000 pounds.

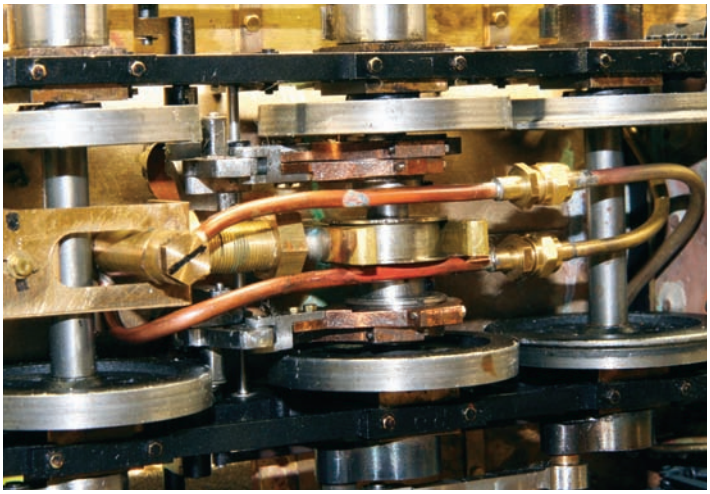
C-25: *A 1940 look at No. 375 in Colorado. Unknown photographer, used with permission of the Mallory Hope Ferrell Collection.*

- Crystal River's narrow-gauge branch was idled in 1909 because of a mine closure and No. 103 was put into storage. The Denver & Rio Grande acquired the locomotive in 1914 or 1916 (historians disagree) numbering it as No. 432. Amateur historians Nathan Holmes and Bruce Metcalf say the locomotive was reclassed as C-25 and renumbered to No. 375 in 1924, three years after the D&RG became the D&RGW.
- According to Baldwin-history buff John Stutz , the D&RGW "rebuilt this engine's cab twice, greatly altering its appearance both times, and [Baldwin's] erection drawing is not correct for either of these later cabs."
- Vance Bass, a live-steamer from New Mexico, started a 1:20.3-scale scratch build of No. 375 in the mid-1990s by doing research, making CAD drawings and building the frame, wheels and cab. "Alas," wrote Bass earlier this year, "I know way more about No. 375 than about how to design and build a complex steam loco from scratch, which is why mine still sits in a drawer, unfinished." Vance's project is at http://www.nmia.com/~vrbass/steam/c25/.
- Historians agree that D&RGW railroaders believed the capabilities of No. 375 were comparable to those of the K-27 locomotives (2-8-2) and since the latter were called "Mudhens," No. 375 was called "Baby Mudhen."
- No. 375 was mothballed by the D&RGW in 1947 and was scrapped in Alamosa, Colo., in mid-1949.

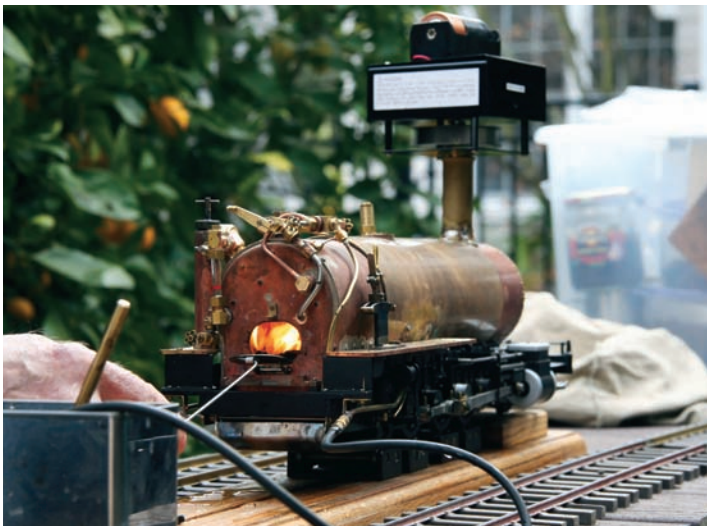
— dmc



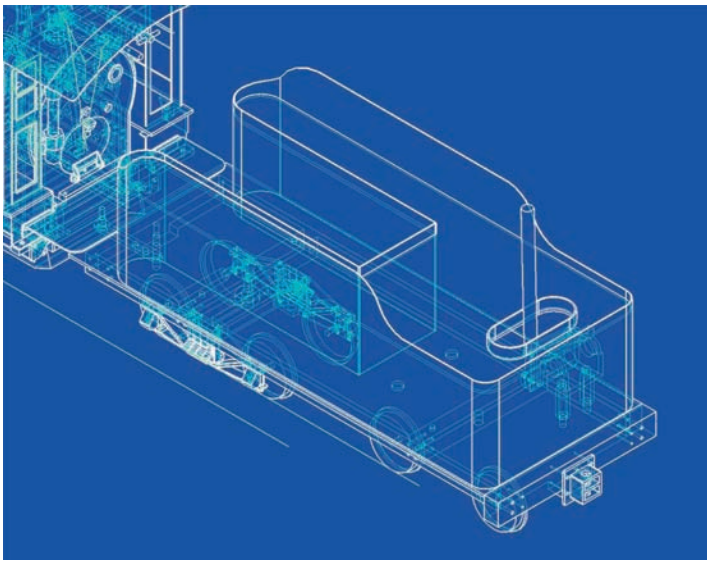
A view from the top: *The fire grate, the delivery (far side), bypass return and lines to the axle pump.*



And from underneath: *The axle pump and its connections.*



Test firing: *The frame and boiler on the author's layout with temporary hoses attached to the tender.*



Tender: *Solidworks 3D view of the back of the engine.*

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I really wanted to simulate the injector piping from the tender, as on the prototype.

Water from the axle or tender pump gets delivered to the check valve. When the bypass valve is opened the water then gets routed back into the tender.

Leaving out a bunch of steps, I was finally ready to mount the boiler to the running gear and give it a test fire. Because I had some help from coal-fired experts Steve Heselton and Steve Shyvers, things went pretty well. (Aside: Later runs proved more problematic. Experienced coal engineers would get a chuckle out of my expectation that I should get safety pop off pressure on charcoal alone. Not true on this engine!)

After some experience behind the wheel, it appeared that I had no further design problems which I needed to address. I discovered at July 2013's National Summer Steamup in Sacramento — where I ran the engine seriously for the first time — that I had a happy predicament: I had to crack the fire box door because there was too much draft on the coal while the engine was running, which created too much pressure. Oh, drat!

I did have to add a layer of insulation underneath the ash pan because it got too hot and actually melted some plastic ties on my layout. I wisely concluded that this would not be appreciated on other layouts. I also had significant problems coming up with a workable safety design which would let out enough steam to control the pressure. Coal builds pressure quickly! With Torry Krutzke's design help I ended up using a safety with a one-quarter-inch ball.

Concluding, one reason we do things which are new to us is to learn and expand our skills. I really learned a bunch from this project and I can't begin to thank all the people who offered help and inspiration when I needed it. We live steamers are members of a skilled, experienced, helpful and caring community. I think that's one reason I like the hobby so much.

Making 1:32-scale heavyweight passenger cars with a clerestory

ROOF

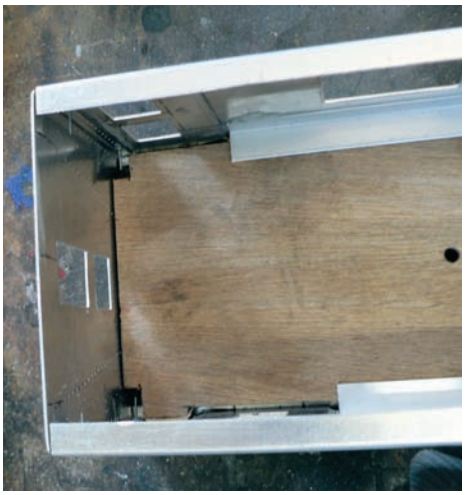
Text, photos and illustration by Simon Duhamel

My methods for building 1:32-scale, Gauge One heavyweight cars for my Pennsylvania Railroad consist — which include forming aluminum sheets over wooden forms and using one-hour and 24-hour epoxy to hold things together — come from my reading of *Model Railroader* magazines from the 1940s, 1950s and 1960s. These techniques were used in those eras in HO-scales because there just weren't commercial models available.

Much as today for Gauge One, 1:32-scale heavyweights (admittedly there is some availability, but it's limited). My way may be the hard way to get models of this rolling stock, but it's really easier than you'd think.

In the first part of this series (see *Steam in the Garden*, January/February 2014, No. 131), we built up a Pennsylvania Railroad (PRR) B60 baggage car. After completing the construction, I carefully degreased the entire car with a solvent and then cleaned it and let it dry. I sprayed one coat of gray primer over the entire surface of the car, minus the trucks. Then the under body was removed and sprayed flat black.

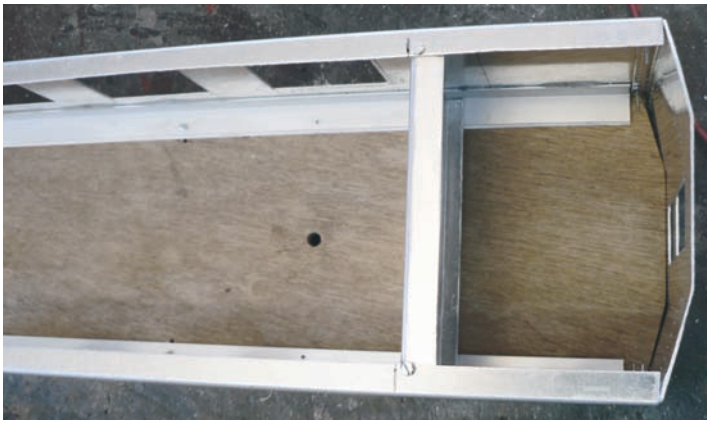
Because I live in rural France, I have no access to hobbyist paints such as Floquil or Poly S, so I mix my own. I have a shop that still supplies cellulosic paint in vermilion, flat black, gloss black and blue. I mixed 3½ teaspoons of vermilion, 1½ of blue and three-quarters teaspoon of gloss black to make Pennsy Tuscan red, but I think my shade is a bit too dark, so one-quarter teaspoon of black should do fine instead.



Vestibule door: *The author cut two holes to represent the end door of the D78 diner rather than build a separate piece.*

But as my cars are supposed to have a few years in service since its last paint job I guess it will do. I thinned the paint and sprayed the car. I used two cardboard rectangles to mask the sides and painted the roof. A card-size piece was made to mask the ends while I sprayed them. I tend to stay away from masking with tape as it more often peels away the under paint than really helping anything. I also painted the trucks flat black at this point.

The result is semi glossy, fine for applying the decals. I obtained my decals from Canadian hobbyist David Leech and they work fine for me. I cut the lettering I want to apply to separate it from the sheet,

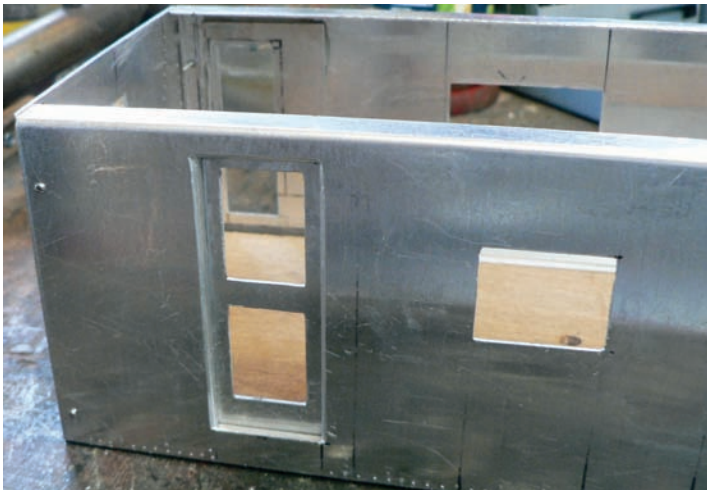


Support: *On the D78 diner, an piece of angled aluminum is placed to provide strength.*

clean off the portion of the car that needs the lettering with a dry brush to take away any dust. Then wet the decal in warm water and apply using a bit of water.

Adjust to the correct position and then blot out any remaining water with tissue paper. I then use Solvaset to soften the decal film and get rid of most defects. Do not blot at this point once Solvaset has been applied. Let the product evaporate naturally.

Once dry, I use some satin varnish (presently my last remaining stock of DDV, but Humbrol satin varnish does just as good a job). On my own car I ran out of the Pennsylvania decals after one side was done, so I hand painted the lettering on one side for fun. I also hand painted the Railway Express Agency logo as well as the car number.



Doors, windows: *Top, the D78's kitchen door has a spacer band to give it a recessed look. Bottom, the author uses his Bokfile (fret saw) to cut windows.*

The D78 diner

The last article covered the construction of an arch-roof car with straight ends; now I will cover the building of a clerestory-roof car with flat and pointed ends. This time I started by making two rectangles from my 6/10mm aluminum sheet (1/32-inch). I am fortunate to have a friend who has a big bending brake and went to see him to bend two 5mm (3/16-inch) edges top and bottom, this serves to rigidify the sides. One may want to rigidify just the top side and leave the bottom one flat as this would make a more esthetically correct car side once the overlays are glued on.

I prefer the rigidifying effect over the esthetic as in the garden my philosophy is that one has to build to sturdy standards for a collector this option might be preferable. The result is a sturdy side sheet reminiscent of those on old Walther's kits.

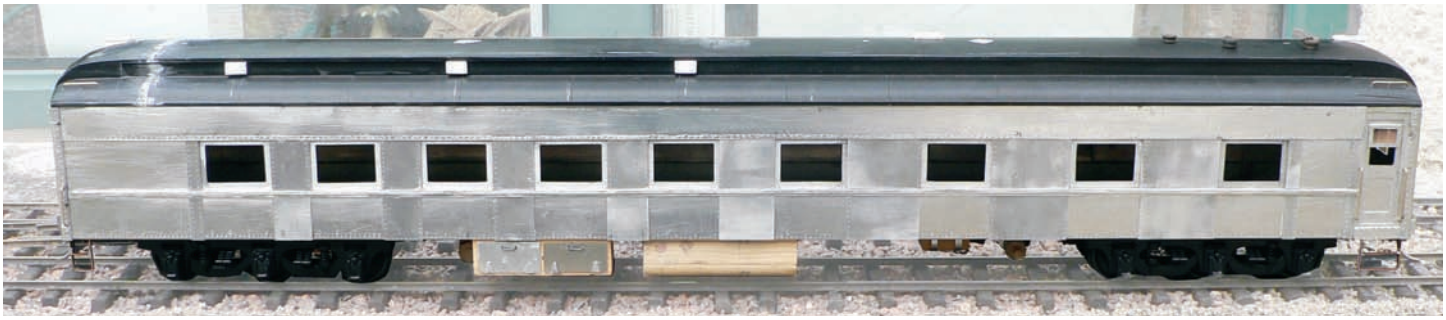
I then marked out the window and door positions and cut them out. I have found that it is easier to do this with the Bokfile (fret saw) as the resulting cut is much more precise and leads to less filing after wards to make the window openings perfect. I simply drill a 3mm-diameter hole (3/32-inch) in every window and cut away the hole. There is much less filing to do and it doesn't spread around the work area all those fine aluminum chips.

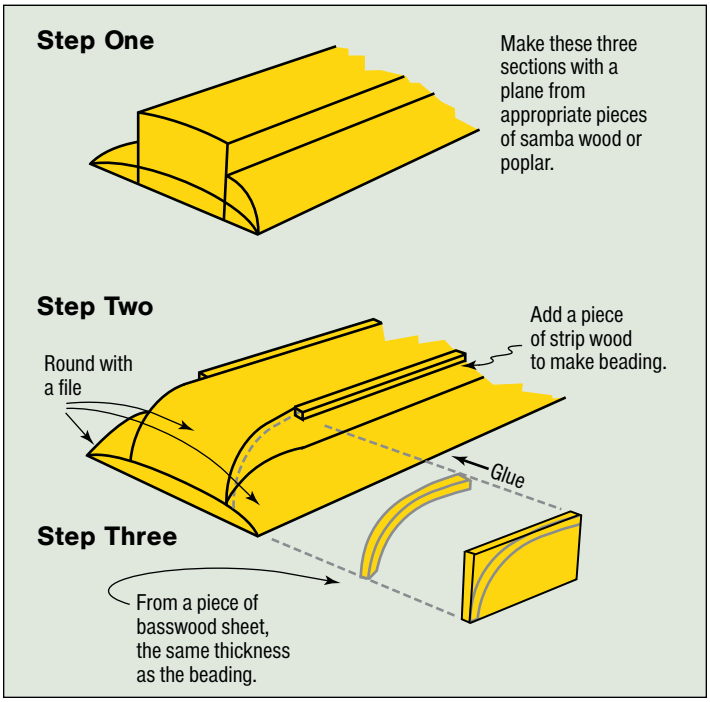
The process is quick. The rigidifying is a big help at this point. I also do the rivets along the

Making heavyweights

A three-part series that follows steamer Simon Duhamel of France as he builds two 1:32-scale heavyweight cars for his Pennsylvania Railroad consist.

- **Part One — Shaping aluminum.** Some background on the process of building the model cars and starting the B60 baggage car (*Steam in the Garden*, January/February 2014, No. 131).
- **Part Two — A clerestory roof.** Painting the baggage car and then on to building the diner car, with its unique roof.
- **Part Three — Origami and diaphragms.** A technique to replicate the end-of-car vestibules used on passenger trains.





Roof: *Top, the aisle side of the D78 with underbody details added; bottom, a guide to forming the clerestory roof.*

bottom of the sides near the fold between the overlap pieces to be added later (if you did too many it's no big deal to file them off when applying the overlays later).

Then I make the two ends. These function just like the ones on the B60 baggage car except that they are of two different types this time. One is recessed for the hand brake wheel, just like the ones on the B60, the other is V-shaped like on standard heavyweight coaches and Pullmans. I make all the bends for these in the vise quite simply.

Be sure that you have obtained right angles between the bottom and the sides as this would obtain a car that rides askew. Cut out the window and lower panel for the vestibule door. I opted for not making a separate piece for the door to save time, as it won't really be visible, but of course you can suit yourself. Do the rivet embossing on these, now

Bolt these to the sides carefully aligning everything as you go. I now glue an aluminum 1cm-by-1-cm (3/8-inch by 3/8-inch) angle inside the sides to bolt the plywood floor into just like on the baggage car. In this case, the angle is with the vertical wing above the horizontal one (on the B60 it was the opposite). I then made the floor out of one-quarter-inch (5mm) plywood. And marked the center, drilled the bogie pivot holes and placed the cotter pins.

It is good to check at this point just how square everything is when fitted on the bogies. I put a transverse shim on one bogie and adjust the verticality with shims if necessary on that one and use an equivalent washer on the other truck in order to get a three point suspension. The coupler and end beam assembly is made exactly as in the B60 baggage car on the straight end; for the other pointed end, it was bolted to the floor in a more classic way.

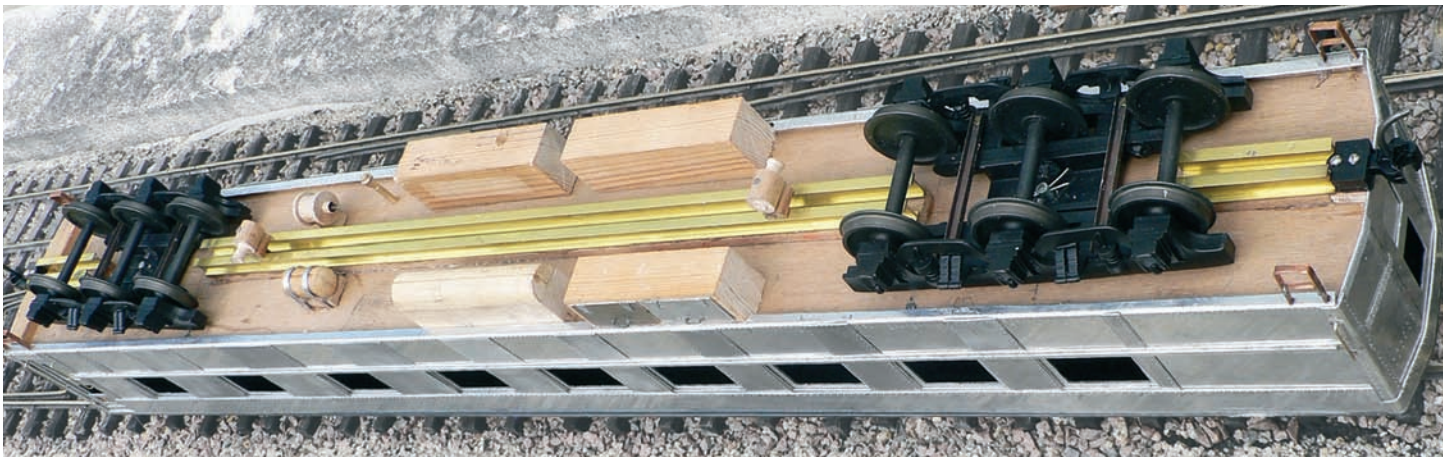
I then place a rectangle of 6/10mm aluminum (1/32-inch) behind the window strip and mark out the windows with my fine point permanent marker. I then trace the window frames out according to drawings and drill and fret out the openings like we did in the sides with my trusty Bokfile. I glued the frames into the sides with epoxy. I must add that the kitchen door seemed quite recessed from the side so I put a spacer band around it to reproduce this recess. I also had to notch the frame there. Note rivets on the lower part of sides.

At this point it became obvious that some kind of partitions were needed to make the complete assembly sturdier. As there were some on the real car, I folded some rectangular bulkheads. To make them I put a top and a bottom fold so as to be able to bolt them to the fold on the sides (I was copying J&M Models' construction technique for those who have some and can see where I got the idea).

I thought it best to copy J&M's technique, especially because I needed to bolt its roof to this body. If you affix a wooden roof to your car, it will have to be done differently. You could then use plywood partitions and long wood screws to attach the roof from under the floor. This is how I do it on my cars with wooden roofs.

Now about the roof: I happened to know Bram Hengerfeld, the businessman who acquired the J&M Models business. I asked him if he could make some U.S. cars and he declined, but he said he still had

Details: *Left, note the clerestory windows in the dining car's roof, the grab irons and steps; right, the roof's hatch on the end and the door.*



Underbody details: *Battery boxes, ice boxes, water tanks, brake cylinder, air tanks and generators.*

a few roofs. So I bought some from him. For those who won't have this convenience available, here is how to do it:

Make a template of the roof to scale. From this you evaluate what size basswood (poplar or samba wood) to buy for, respectively, the two side portions of the roof and the central portion or clerestory. You then screw from underneath appropriate length of these to a plywood base that can be screwed or pressed to your workbench. Then with a sharp plane, plane the section (in a regular movement from one end to the other of the block) to correspond to your template one piece at a time, the left side, then the right one and then the clerestory.

As this wood does not have knots and is of a regular grain and of medium hardness it planes neatly, as you will see. Once you have achieved the correct profile (which for a PRR passenger car, the J&M one is not, by the way) you can form the ends using the belt sander like I did on the B60 (piece by piece, of course).

You can then assemble the three pieces and glue on a 2mm-by-2mm square (1/16-inch square) section of basswood along the clerestory edge to make the beading along the straight portions. Then you have to cut and file out of some 2mm thick sheet of basswood (1/16-inch), the turn under of the beading along the ends. I simply copied the technique published in old Walthers catalogues back when I was a teenager, just enlarged to 1:32 scale

Then the roof is done. You can add details to suit yourself. You should seal it using model airplane sealer ("dope"), putty up defects and sand it to obtain a near plastic quality and aspect.

Now we come to the hardest parts to make: four parallel bands for the waist bands, which I did with my hand nibbler. I do not have a guillotine for cutting large metal sheets parallel, so I had to trace them 2mm wide and 4mm wide (1/16-inch and one-eighth-inch), cut them with the hand nibbler as carefully as possible, then straighten them out and make them as parallel and clean as I could with file and vice.

This, I must admit, took me the better part of a day

Completed car: *From the kitchen side, with paint and decals.*

and I am looking for a shop that can at least cut them for me neatly, I can straighten them out myself.

I had previously tried gluing plastic bands to aluminum bodies but the different expansion ratios made a mess of it, so it had to be aluminum. Trains often sit out in the afternoon sun and the metal can get quite hot, so it's better to anticipate trouble than fix it afterward.

These were glued in place after finishing and do look the part. While I was at it, I also cut the band that goes over the windows and covers the old top lights; it was riveted on the lower edge and glued in place with weights to clamp it down. I also made four corner brackets similar to the ones on the B60 (the only difference is the angle of the fold for the V-shaped end).

Five months later I picked up where I had left off: Mainly all the overlap joint sheets made from recycled offset sheets (see the precautions in the part on the B60) — this was relaxing work as I had access to a metal cutter to make the bands. These were then glued in place with epoxy. By the way, it is good to clean up all excess glue just after the bond has cured, I use an old, large X-Acto hobbyist knife for this; after the glue hardens it is much more difficult to remove.

I then made some underbody detail: battery boxes, ice boxes, water tanks (made from a rectangular section, plus a half round), turned wood brake cylinder and air tanks and generators (apparently these diners had two). I turned a piece of brass rod to make a steam trap that is screwed on from over the floor.

I have kept all this detail voluntarily quite simple and robust, as I don't want to pick up fallen parts on the ballast and have to repair them all the time. A pair of brass channels were glued under the middle of the frame following Pennsy practice. Steps could conveniently be glued with epoxy into holes drilled in the lower fold.

For the roof I made the choice to not fit this model with air conditioning ducts — although the plans feature them — because I saw plenty of photos of cars without it, I wanted this car to be compatible with a pre-war, heavyweight-era consist and sheer laziness: I wanted to finish this car that summer.

Also, without those convenient Walthers HO-scale air conditioning ducts, it would have been quite a job to fit one. There are three box-shaped air vents along the clerestory, a long, three-part grill over the kitchen clerestory (made from styrene with inlaid copper mesh) and three stacks turned from steel bar.

I couldn't resist putting an air vane on one of them this was fitted into a slot I carefully sawed into one of the turnings and soft soldered. I then chemically blackened them, as they are quite exposed and I felt it better to blacken them under the paint. I also made the grabs irons on the roof. And three hatches on the roof (were they for coal or for ice?) made from styrene as my roof is styrene.

Next I made the grab irons and the screens on the two kitchen doors so the cooks can get some fresh air. I placed the brake wheel on the end from Trackside Details of Pinedale, Calif. After this, the car was painted and lettered in the same way described for the B60 baggage car.

An L-shaped partition was made for the interior to separate the kitchen from the aisle. One interesting feature of this car is that it doesn't have a vestibule and passengers can only access through the diaphragms. Vestibule diaphragms, by the way, will be covered in the next installment of this series. I personally did not make an interior for this car, but there is no reason one should not be done.

Who says you can't have heavyweight cars in 1:32 scale on a budget?

Make your own tool for adding quality metal details

Rivet Divot

Text, photos and illustrations by Rick Weber

For those scratch building or kit bashing small-scale live steam locomotives and rolling stock, rivets can add realism and spiffy up plain sheet metal parts, such as cabs, side tanks and tenders. The Rivet Divot tool is a simple, accurate tool for creating faux — a fancy word for "fake" — rivet heads in thin sheet brass. This tool can produce rivet heads identical to actual rivets in much less time and without the hassle of drilling and heading over rivets.

The tool does require a vertical mill or drill press (though the machines are never powered during the process).

The Rivet Divot tool is shown in **Photo 1** in the process of punching out 1/16-inch diameter domed rivet heads in a .020-inch thick sheet of brass. **Figure 1** is an assembly drawing of the tool, with the six components called out.

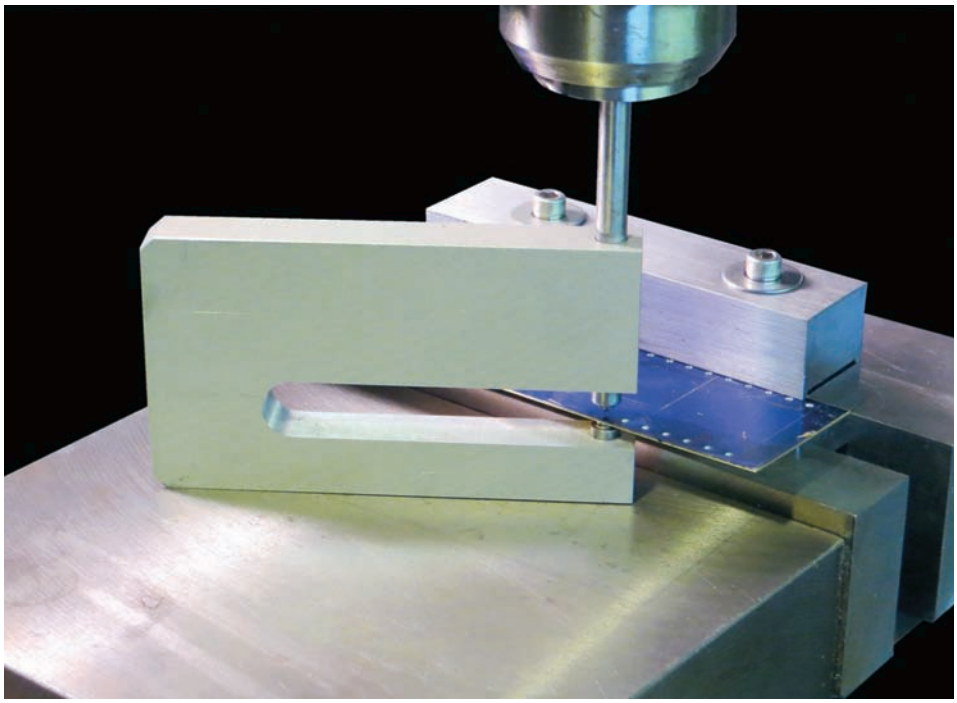


Photo 1: *The Rivet Divot tool at work in the author's shop.*

It is important to note that, one particular design that works with my Bridgeport mill is shown here, the dimensions can be tweaked to create a tool that will work with any vertical mill or drill press' x-y table. The key features are:

- A fixture that accurately positions a punch over a convex die that is shaped like a rivet head.
- A milling machine or drill press fitted with an x-y table that can be indexed to identical steps to space out the rivet heads evenly.
- A means to clamp a piece of sheet brass to the mill or drill press' x-y table.
- A punch, gripped in a non-rotating collet or chuck in a mill or drill press, which pushes metal into a die to form the rivet head.

An assembly drawing in **Figure 1** shows the components of this tool. A means to hold a brass sheet in which rivet heads are to be formed, consists of matching top and bottom clamps from hard aluminum (6061 or 6063). The clamps are held together with two 10-32 by one-inch socket head cap screws with washers, and this assembly is held in the jaws

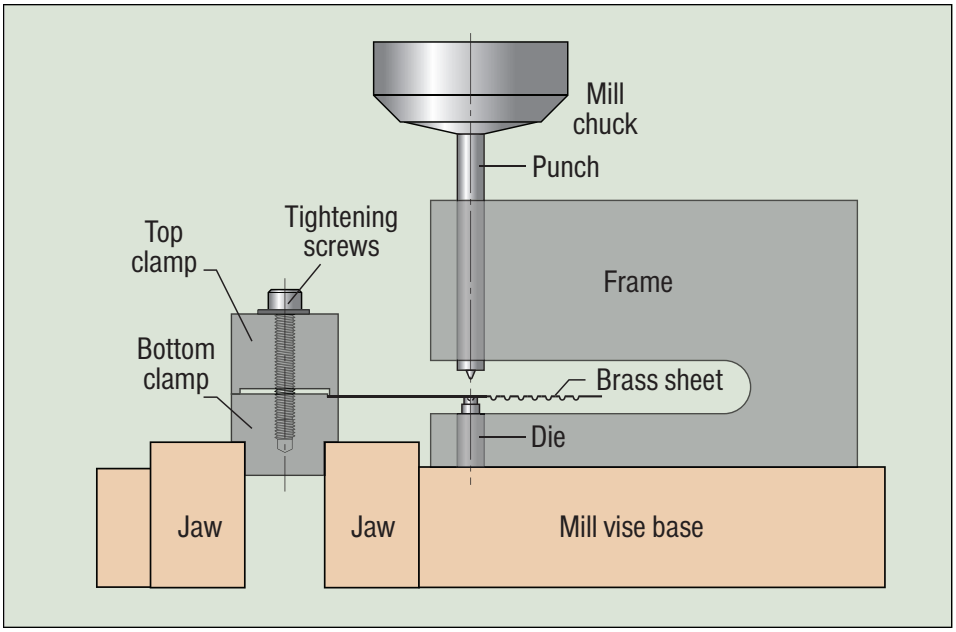


Figure 1

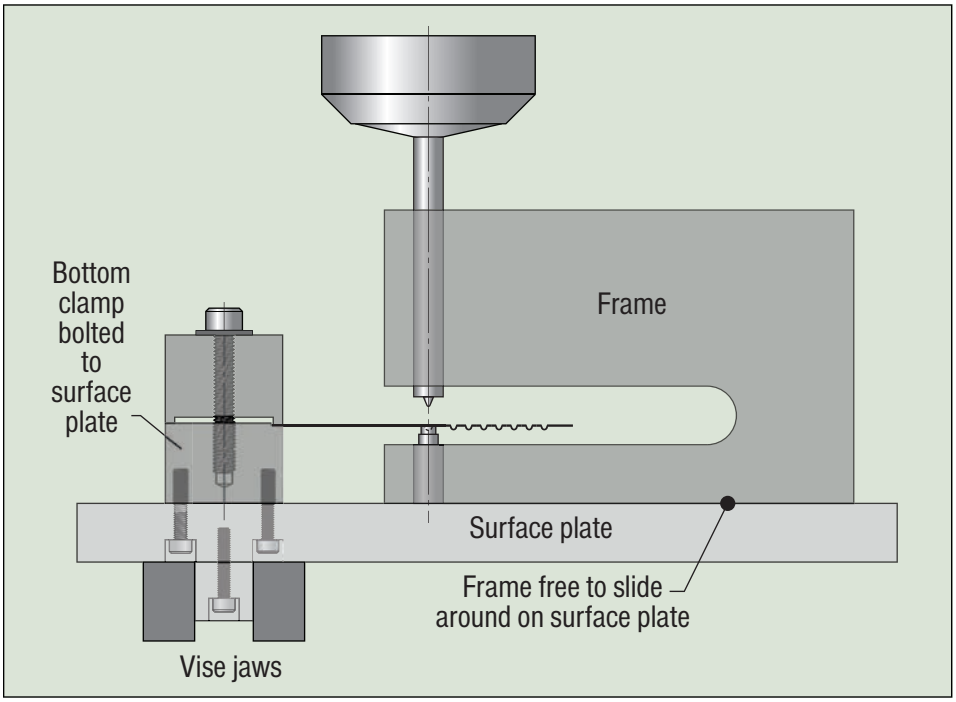


Figure 2

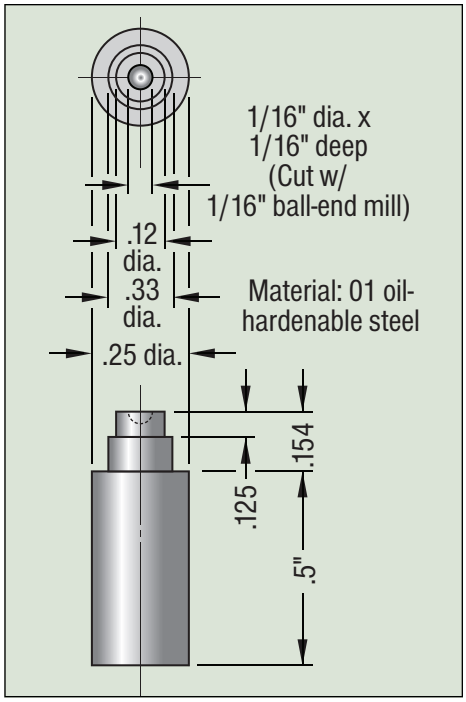


Figure 3

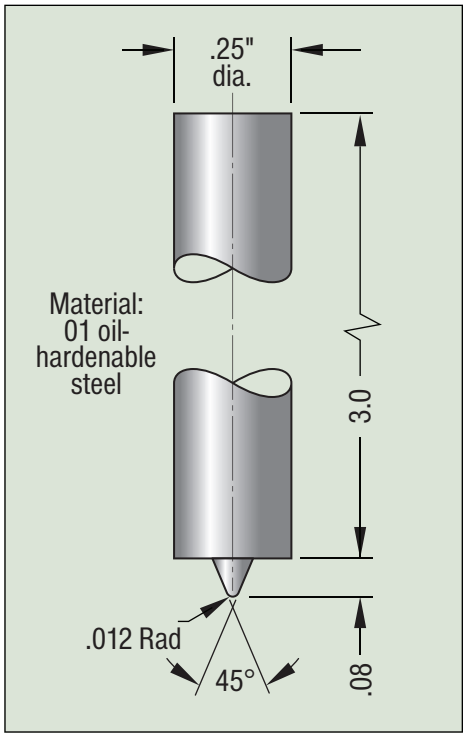


Figure 4

of the mill vise on your mill or drill press.

A U-shaped frame holds the die, which is pressed into one leg of the frame. In the other leg, and aligned with the die, is a freely sliding punch. The punch is gripped by the collet or chuck of your mill or drill press. This Frame is allowed to slide freely over the surface of the mill or drill press vise as the x-y table is indexed.

It is important to note that at no time during the rivet forming is your mill or drill press powered up. It is simply used as a very light duty punch press. Each time, after the x-y table is indexed a distance equal to the desired rivet spacing, the z-axis handle is moved to lower the punch into the brass sheet, which compresses metal into the die to form the rivet head.

For those with tiny vises for their mills or drill presses, a larger surface plate — say eight inches square by one-half-inch thick — can be fitted to the vise with the clamping assembly bolted to it. This will provide a nice roomy surface on which the frame can slide around for smaller machines. See **Figure 2** for such an arrangement.

Both the die and punch, shown in **Figures 3 and**

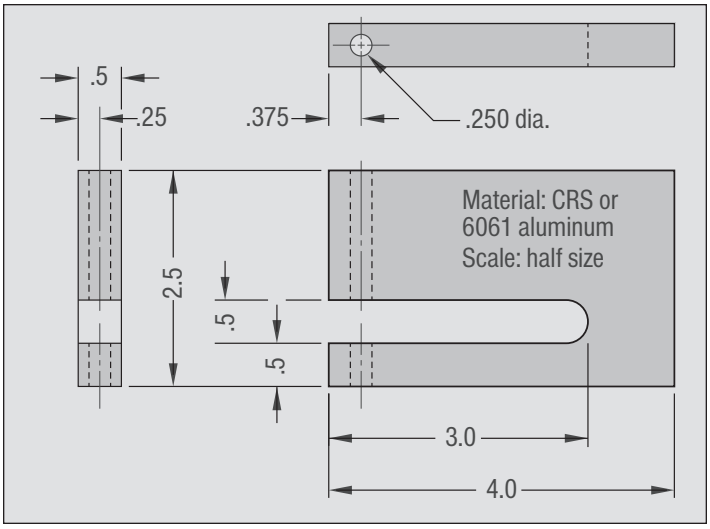


Figure 5

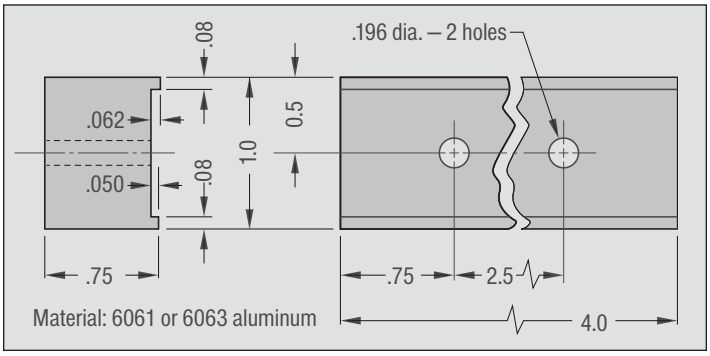


Figure 6

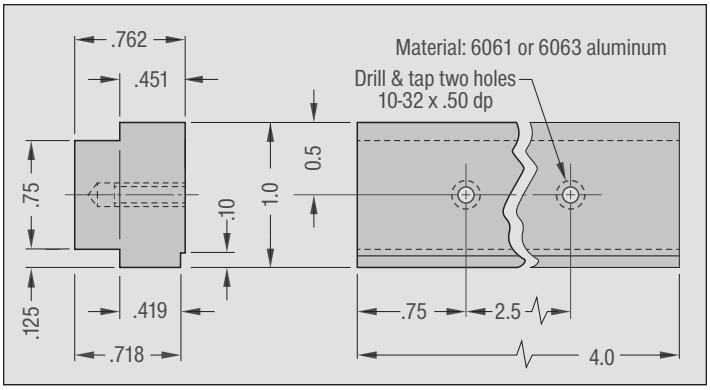


Figure 7

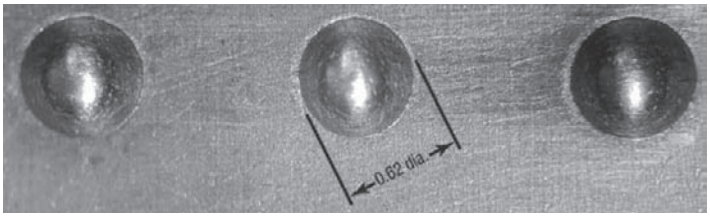


Photo 2

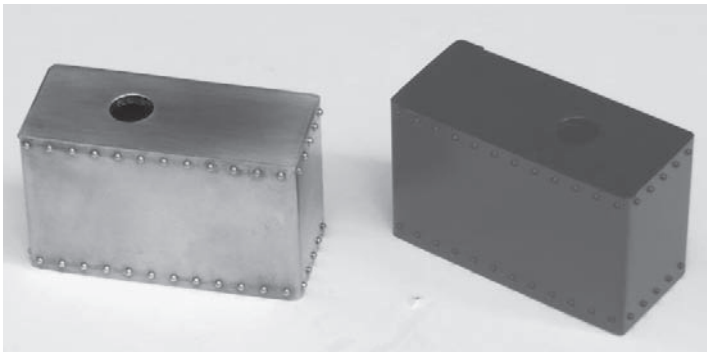


Photo 3

4 respectively, are made from one-quarter-inch diameter 01 oil-hardening tool steel. And, both are hardened after machining by heating them to a dull cherry red color, then quenching in oil. As these parts do not receive impacts, it is OK to leave them glass hard. It is not necessary to draw the temper back.

The tool described here forms 1/16-inch diameter rivet heads. However, you can create heads of other diameters by using different sized ball end mills. The die is a simple turning with the cavity for the rivet head machined into the end with a 1/16-inch diameter ball end mill to a depth of 1/32-inch. For those wishing to form smaller rivet heads, ball end mills are also available from McMaster Carr in 1/32- and 3/64-inch diameters.

The purpose of the punch is to push brass into and completely fill the cavity of the die. The tip of the punch should be machined as close as possible to the dimensions shown. If too pointed it can pierce through the sheet brass. And, if too obtuse, the brass will not completely form to the cavity. The punch should slide smoothly—but with no side play—in the one-quarter-inch diameter hole in the frame.

The frame, shown in **Figure 5**, is fabricated from one-half-inch thick hard aluminum (6061 or 6063) with quarter-inch holes drilled through for both the punch and die at the same time to ensure their alignment. The die is pressed into the bottom hole with thread locking compound, and the upper hole is reamed a half thousandth larger to provide a sliding fit for the punch.

The top and bottom clamps for this tool, shown in **Figures 6 and 7** respectively, are dimensioned to hold .020-inch thick brass sheet. But, of course, these dimensions can be tweaked for other thicknesses, such as .015-inch. It is not recommended going below .015 or above .025.

Regardless of the thickness of brass used, it is important to do some experimenting on scrap brass of the same thickness as your good work piece to get a good feel for the amount of downward pressure needed to make the rivets look nice under a magnifier (see **Photo 2**). Once you get the hang of it, a nice line of rivet heads can be formed with this tool. **Photo 3** shows two side tanks for my in-progress "Cricket"-style loco that were "riveted" using this Rivet Divot tool.

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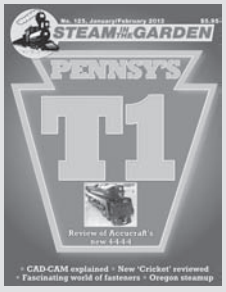

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THE CUPOLA VIEW

Railroad librarian: The horror

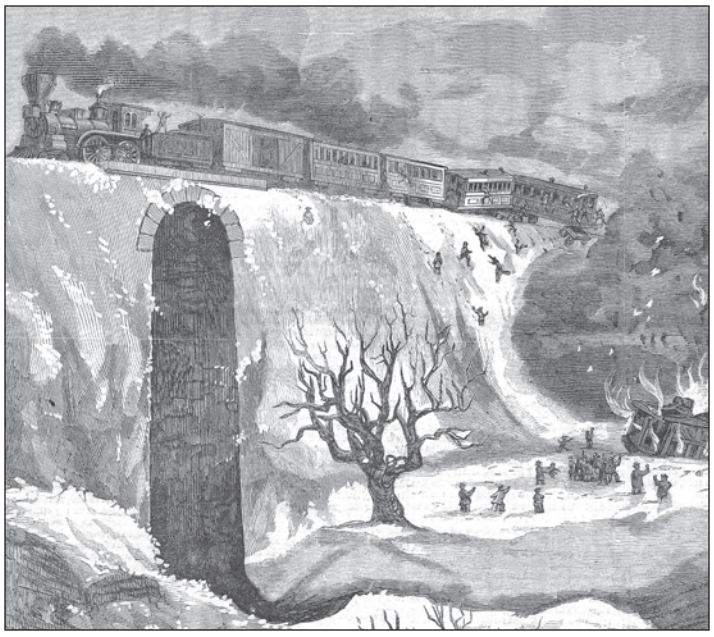
If, in early 2014, one were to search for the term "July 6 Quebec train wreck" in Google Images, one would pull up more than 300 photographs of twisted metal, carnage and remnants of fire from the 2013 train derailment and explosion in Lac-Mégantic in which 47 people lost their lives.

And that's just the first screen load. At the bottom of those 300 images Google helpfully says, "Show more results."

In 1867, photography was still in its infancy. Which is why, in no small part, you have probably never heard of the "Angola horror," a post-Civil War train wreck on the late Buffalo and Erie Railroad in which 50 lost their lives and 100 were injured. With no photography — and only limited illustrations — to preserve the frightfulness of the last two cars of the Dec. 16, 1867, New York Express derailing and falling off a bridge just outside of the village of Angola, N.Y., one of the first (and worst) train wrecks in rail history has, heretofore, been lost to the ages.

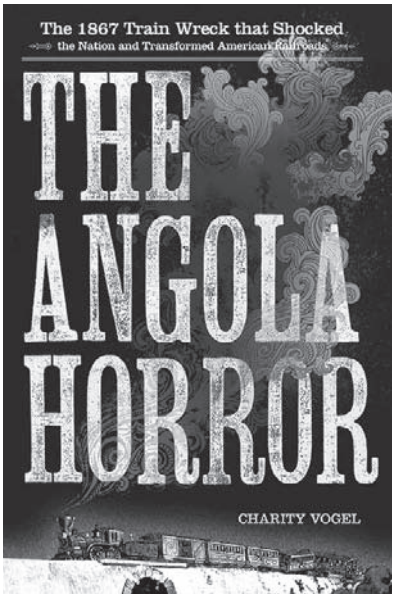
Enter newspaper reporter, journalism instructor and historian Charity Vogel, who became fascinated with what the public prints in the 1860s called "The Angola Horror" (which ultimately became the title of her book). Vogel ended up spending more than six years on a quest to root out the contemporary writings about that western New York wreck — both published and unpublished — speaking to hundreds of librarians, historians and everyday people who had the preserved letters of relatives on the ill-fated train.

Vogel has woven a strong story out of her research into the hours leading up to the Angola wreck and the days, weeks and months following it. At times, a bit



Derailment: *An illustration in Charity Vogel's 'The Angola Horror' of the 1867 train wreck, from* Kelley's Weekly *of Jan. 11, 1868. Used with permission.*

'Cupola View' is written by Editor Dave Cole; you can contact him at dmcole@steamup.com or P.O. Box 719, Pacifica, Calif. 94044-0719.



tedious; at times, a bit stark, but a strong story nonetheless.

Additionally, Vogel has a thorough command of railroad history and operating procedure. In a couple of instances, this reviewer did some of his own research and found Vogel spot on.

Key to her findings (which concur with those of the coroner's inquest) is an important piece of railroad history: while today we take for granted that "standard gauge" is four-feet, 8½ inches (56½ inches or 1.435 meters), in the years leading up to the Civil War and for a decade thereafter, such a sweeping statement could not be made.

Some railroads did choose the British standard of 56½-inches, but others chose gauges anywhere from five feet to six feet (or perhaps more or perhaps less). In the 1840s and 1850s, a "Gauge War" raged in the Lake Erie region of the United States, where — according to Vogel and her research — the 183-mile trip from Buffalo to Cleveland required changing trains three times because of the differences in gauges.

As railroad companies began to see the folly of this particular practice they began to standardize, but in 1867 there were still some outliers, including the Cleveland & Toledo Railroad, which had rails and equipment set for 55¾-inches. The New York Express of that December day, though operated by the Buffalo and Erie, included "interchange" passenger cars from the Cleveland & Toledo, one of which was the penultimate car on the ill-fated train.

Using 55¾-inch equipment on the 56½-inch railway was called a "compromise."

And it was this three-quarter-inch compromise — coupled with a bent axle, icy rails and (perhaps) a late train exceeding speed and (maybe) an improperly installed frog and points — that caused the last two passenger cars of the Dec. 16 New York Express to go over the side of the Angola bridge onto the frozen-solid Big Sister Creek, where hot coals from the pot-belly stoves used to heat the cars torched the wood-framed vehicles, burning those alive who weren't killed by careening off a 50-foot bridge at 25mph.

(As an aside, in order to communicate the horror of the "horror," Vogel is obliged to provide some pretty gruesome details regarding the injuries of the train's passengers. While this reviewer doesn't believe himself to be squeamish, the details are — sorry — horrific and readers should be prepared.)

Vogel also highlights the heroism of some Angola residents, who without a local hospital, cared for the injured in their homes.

In addition to the railroad minutiae that Vogel provides, she also gives insight into the workings of the 1860s popular press, so much different from today. For example, she cites the seven daily newspapers in Buffalo (which today barely supports a sin-

gle title), the limited use of photography in publications (newspapers didn't start to use photography until the 1870s-1880s) and the reliance on sketch artists.

Vogel also provides special cameo appearances by John D. Rockefeller Sr., an up-and-coming young businessman from Cleveland who was on his way to New York City, by way of Buffalo, that December day (and probably avoided death), and George Westinghouse Jr., whose work on the automatic railcar air brake, she postulates, certainly must have been influenced by the Angola wreck, which occurred a mere 290 miles to the west of his hometown, Schenectady, N.Y.

The author provides extensive details in the book — though a reporter at the *Buffalo News* by trade, she has a Ph.D. and included full footnotes and cited bibliography — and, perhaps in describing the scenes of destruction and loss of life in the minutes and hours following the wreck, possibly too many details. If one is not too squeamish and one has an interest in railroad history, "The Angola Horror" is a fine read.

"The Angola Horror," by Charity Vogel. Cornell University Press, 2013, 296 pages, with index. $26.95.

March 21-22, 2014 — East Coast Large Scale Train Show, York Fairgrounds, York, Pa. Aikenback Live Steamers will set up 54-foot layout. Info: mike@aikenback.net.

April 11-13, 2014 — Cabin Fever Model Engineering Expo, Toyota Arena, York Fairgrounds, York, Pa. Gas and steam engines, hot air engines, steam boats, cars, live-steam Gauge One model trains. Info: http://www.cabinfeverexpo.com.

April 24-27, 2014 — Spring Steamup, Staver Locomotive, Portland, Ore. Info: http://www.staverlocomotive.com.

May 5-10, 2014 — National Garden Railway Convention, Embassy Suites USF, Tampa, Fla. Clinics, demonstrations, tours of local garden railways, dealer room. Info: http://on.fb.me/1dInmUg.

June 20-22, 2014 — West Coast Regional Meet, Sacramento Valley Garden Railway Society. Garden railroad tours. Info: http://www.svgrs.org.

July 16-20, 2014 — National Summer Steamup, Lions Gate Hotel, McClellan, Calif. Multiple layouts, more than a dozen loops, 38,000-square-foot steamup hall; open 7 a.m.-1 a.m. Clinics, dealers' room, door prizes, swap tables, Saturday night BBQ. Lions Gate room reservations: (866) 258-5651. Info: http://www.summersteamup.com or (702) 431-3568.

Sept. 3-6, 2014 — Thirty-fourth Narrow Gauge Convention, Overland Park Convention Center, Kansas City, Mo. Layout tours, modular layouts, clinics, contests, dealers' exhibit area. Info: http://www.kansascity2014.com.

Jan. 11-18, 2015 — International Small Scale Steamup and Arts Festival, Diamondhead Inn and Suites, Diamondhead, Miss. Includes 24-hour steaming, a "flea market," seminars and dealer room. Info: Patrick Darby, k5pat@bellsouth.net, (985) 867-8695; http://www.diamondhead.org; Diamondhead Inn & Suites: (228) 255-1300.

Regular steamups

Puget Sound Garden Railway Society. Two steamups per month, one at the Georgetown Powerplant in Seattle on the second Saturday and a steamup at a member's track on the fourth Saturday. Info: http://psgrs.org/livesteamtimetable.html.

Michigan Small Scale Live Steamers (MSSLS). Info: http://www.mssls.info/.

Greater Baton Rouge Model Railroad Club Open House and Gauge One Steamup. Info: Ted Powell, (225) 236-2718 (cell), (225) 654-3615 (home), powell876@hotmail.com.

Upstate N.Y. Steamers. Several steamups per year in various locations around Western New York. Info: http://www.tinyurl.com/upstatesteamers.

Southern California Steamers. Contact Jim Gabelich for dates, places and other pertinent information. (310) 373-3096. jfgabelich@msn.com.

On the Brink Live Steamers. Weekly Wednesday, and occasional weekend, greater Sacramento, Calif., steamups on elevated live-steam only tracks at two locations. Info: Paul Brink (916) 635-1559, paulbr@aol.com.

Pacific Coast Live Steamers. Irregularly scheduled backyard steamups, mostly in S.F. Bay Area. Info: http://www.p-c-l-s.org/.

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Small-scale live-steam railroading — using models that are anywhere from 1:13.7 scale to 1:32 scale and run on 32mm or 45mm track — is a fun hobby that has room for rivet counters and freelancers, prototype purists and lovers of whimsy.

Steam in the Garden is the only magazine devoted entirely to covering the small-scale live-steam hobby. Since 1990 the magazine has taken readers inside the railroads and inside the workshops of the leading modelers and shown how fun and easy live steam model railroading can be. Six times a year, *Steam in the Garden* gives subscribers a look at the current trends in the hobby and reviews the latest products available.

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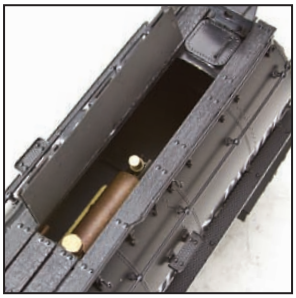

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