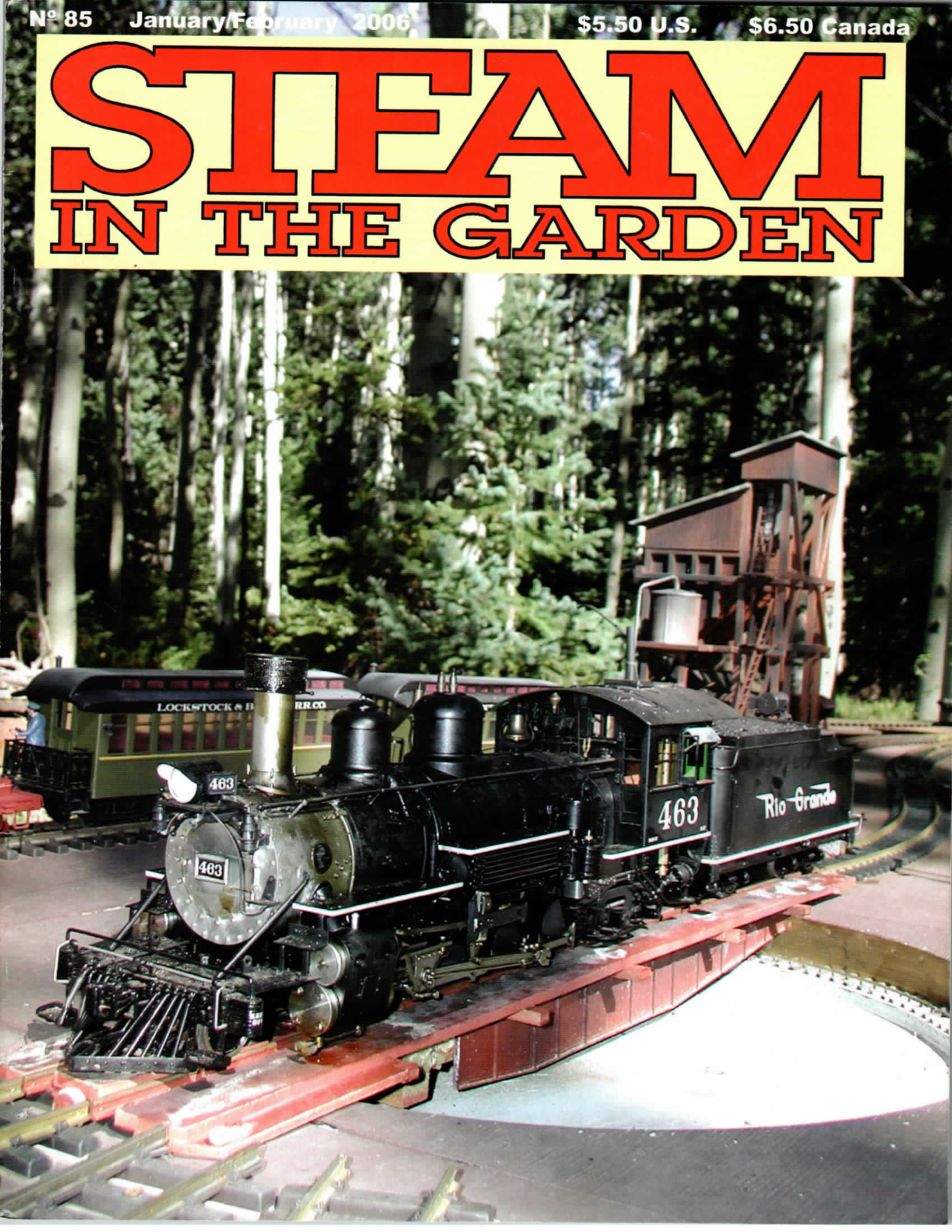
№ 85 January/February 2006 $5.50 U.S. $6.50 Canada

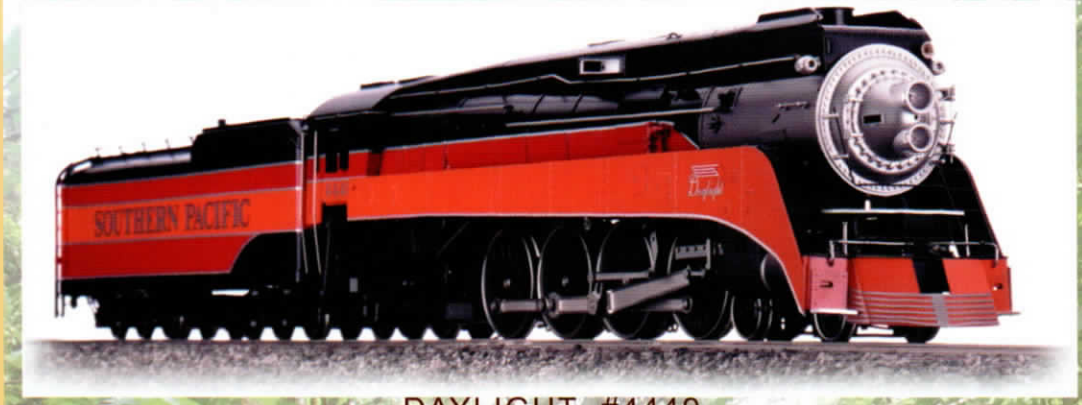
STEAM IN THE GARDEN



ACCUCRAFT LIVE STEAM

ACCUCAT SAYS "YOU CAN'T BEAT THE PRICE OR PRODUCT."

SCALE 1:32 * STANDARD GAUGE * LOCOMOTIVES & CARS



DAYLIGHT #4449

CALL TO RESERVE YOURS NOW ONLY $4,449 !

BLACK GS-4 - DUAL SERVICE - PASSENGER & FREIGHT

CHOICE OF GAS OR ALCOHOL
10' MIN. RADIUS

$4,449 !

GS-4 50/50 #4439

DAYLIGHT
10 CAR SET
HIGH DETAIL
ILLUMINATED

(PHOTOS ONLY TO SHOW PROTOTYPE COLOR VARIATIONS)

7 VERSIONS AVAILABLE
PROTOTYPICALLY CORRECT COLORS
AS USED IN PASSENGER TERMINAL SERVICE

SP S-12 0-6-0 SWITCHER

RESERVE YOURS NOW **ONLY $1,999 !**

D&RGW K-27

MICH-CAL #5 3 CYL

SCALE 1:20.3

COMING - WEST SIDE LUMBER CO.
3 TRUCK SHAY

MANY OTHER MODELS CURRENTLY AVAILABLE

FULL LINE ACCUCRAFT SUPPLIER ⚙ PURCHASE DIRECTLY FROM US

WE BUY ASTER LOCOMOTIVES

2 hour steamup video / DVD $19

HYDE-OUT MOUNTAIN LIVE STEAM

Our Accucraft catalog $5

CALL US FOR INFORMATION

89060 NEW RUMLEY ROAD
JEWETT OH 43986

740-946-6611

www.steamup.com/accucraft

STEAM IN THE GARDEN

Vol. 16, № 1
Issue № 85

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

Articles

Departments

FRONT COVER:

A mighty K-27 rumbles and clanks across the turntable on its way to pick up a train and begin the day's work. The loco is by Accucraft, the railroad is by Don Beach, and the trees are by God.

photo by Chuck Kolinski

Editor
Ron Brown

Faithful Assistant
Marie Brown

CAD & Other Drawings in This Issue
John Bell • Paul Blake
Brian Wilson • Dan Rowe

Regular Contributors
Larry Bangham ..... California
Paul Blake ..... Australia
Tom Bowdler ..... New York
Keith Bucklitch ..... England
Geoff Horne ..... Australia
Jim Crabb ..... Texas
Les Knoll ..... Illinois
Kevin O'Connor ..... California
Jerry Reshew ..... Mississippi
Dan Rowe ..... Texas

Steam in the Garden (USPS 011-885, ISSN 1078-859x) is published bimonthly for $30.00 ($38.00 Canadian or overseas) per year (6 issues) by Steam in the Garden, PO Box 335, 6629 SR 38, Newark Valley NY 13811. New subscriptions please allow 6 - 8 weeks for delivery (overseas via surface mail may take longer). Direct correspondence to PO Box 335, Newark Valley NY 13811. Periodicals postage paid at Newark Valley, NY and additional mailing offices.

POSTMASTER: send form 3579 to Steam in the Garden, P0 Box 335, Newark Valley, NY 13811.

USA, Canadian and overseas subscriptions may be sent to Steam in the Garden, PO Box 335, Newark Valley NY 13811. Phone, fax and e-mail subscriptions gladly accepted. We accept VISA, Discover and MasterCard.

In the U.K., contact Brandbright Ltd., The Old School, Cromer Road, Bodham, Near Holt, Norfolk NR25 6QG — phone 01263 588 755 FAX 01263 588 424

In Australia, contact RCS, PO Box 1118, Bayswater, Victoria 3153 AUSTRALIA — phone/fax (03) 97 62 77 85

Phone, fax, e-mail or write for mailing information on items for review. Questions or comments? Phone us (Mon. - Thurs. - before 8:00 p.m. Eastern time, please) at 607-642-8119 • 24-hr FAX 253-323-2125 • e-mail address: rbrown54@stny.rr.com

CALENDAR OF EVENTS

Southern California Steamers - contact Sonny Wizelman for dates, places and any other pertinent information. 310-558-4872 ● sonnyw04@comcast.net

February 18-20, 2006 - Pennsylvania Garden Railway Society & Warrior Run Loco Works 8th Annual President's Day Weekend Winter Meet. 9 a.m. to 5 p.m.. Live steam & electric. 20 x 50 dual gauge 2-track live steam track. For more info contact Clem O'Jevich Jr., 32 S. Market St., Nanticoke PA 18634. Phone 570-735-5570. E-mail wrunloco@aol.com

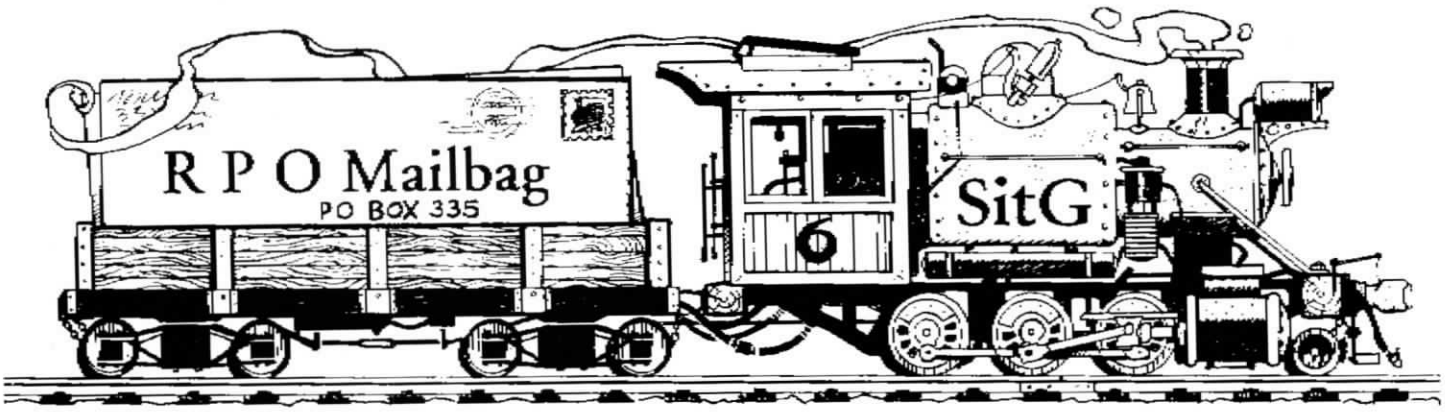
27th - 28th May 2006, Garden Railways In The Hunter. Well, it is on again in 2006. After the great success of last years event we, the organisers felt that it would have been irresponsible for us to just let it go away and never held again. It is a lot of work by all involved to put a show like this on, but the effort is definitely worth it, especially when we receive great feedback like we have. Attendance will be as last year at $55 for the weekend and $35 for a single day. Children and spouses will be $25. Dinner will once again be $20. Lunch and Morning and Afternoon teas supplied. As with last year, the public are not invited as it is only for registered attendees. This show is for YOU and the growing family of Garden Railroaders, so we invite you once again to join us in Newcastle. Contact: Geoff Horne, 29 Kenley Crescent, Macquarie Hills, NSW Australia 2285 or email: geofhorn@bigpond.net.au

June 23 - 25, 2006 - Finger Lakes Live Steamers First Open House of the year. The event includes larger scale (1 1/2" & 2 1/5") "ride on" equipment - Live steam (coal, gas & kerosene fired) plus the diesel / electrics with gasoline and battery operated locomotives. We also have a 1" scale track which is presently undergoing major expansion, including a 28' thru truss bridge. The newest operation is our Gauge One Line which is over 600' of stainless rail (3 loops, 2 of which are interconnected) all with 10' minimum radius curves and # 6 turnouts, a 20 foot dual track wooden trestle (used primarily for steam up), new 6' thru truss steel bridge plus a growing number of other attractions. Bring your trains, we have something for everyone and regularly run steam, battery and track power all at the same time when compatible. If it goes on Gauge One Track, bring it along - we are still waiting for our first "clockwork". Information is available at http://www.fingerlakeslivesteamers.org/ or contact John Spencer (315) 689 - 3402.

July 19-23, 2006 - the 2006 National Summer Steamup will be held at the Lions Gate Hotel in McClellan, Calif., a suburb of Sacramento. The National Summer Steamup gives owners and operators of small-scale (1:13.7-1:32) live steam locomotives the opportunity to meet and run equipment in a secure, indoor, friendly setting. The 2006 event will feature both 45mm and 32mm tracks, a Saturday night BBQ dinner, clinics and workshops, exhibitor displays and swap tables. Because of the cancellation of the 2006 International Small-Scale Steamup in Diamondhead, Miss., the National Summer Steamup will be the only major small-scale steam event this year. The Lions Gate Hotel, on the grounds of the former McClellan Air Force Base in suburban Sacramento, will provide the steamers with a ballroom setting of more than 6400-square-feet. Event organizers have secured the services of the Pacific Coast Live Steamers' "original track," a 110-foot 45mm-32mm dual-gauge layout as well as the new "San Luis Obispo" track; in addition, they are working to bring in even more trackage. The hotel is providing live steamers with the low room rental rate of $85 per night (double-occupancy). Reservations can be made with the Lions Gate toll-free at 1-866-866-7100. For more information on the 2005 National Summer Steamup, please visit the web site at http://www.summersteamup.com/, e-mail steamup@summersteamup.com or call 650-557-9595.

September 22-24, 2006 - Finger Lakes Live Steamers Second Open House of the Year. See listing for June 23-25 for full information.

Because of publication lead time, please send info for Calendar of Events well in advance. Include name of host and location of event, with address and/or phone number to contact for complete information. Some basic info about the site is also useful (i.e., ground level or elevated, minimum curve radius, ruling grade, etc.)



Letters from readers are welcomed and encouraged. Offer advice, encouragement, suggestions or constructive criticism. Tell us about your current project (and don't forget the photos!) or just share live steam experiences. But please keep your letters to a reasonable length so everyone has a chance to use this forum. Letters may be edited for length or clarity. Send your letters & photos to: SitG, Dept. RPO, P.O. Box 335, Newark Valley, NY 13811, USA...or e-mail to <rbrown54@stny.rr.com>.

* * * * * *

England
via e-mail

Ron,

In answer to Mr. Ken Parkinson's letter in SITG #84, you will find that the Accucraft K27 has a simplified Walscherts valve gear, as have Roundhouse locomotives, where fitted, the motion from the Radius Rod is connected directly to the end of the Valve Rod, the Combination Lever and Anchor Link are there as decoration and perform no function, as in the Accucraft K27 & K28.

Accucraft also set up their valve gear so that the Radius Rod is in the upper position for forward running, which is incorrect to the prototype, Mr. Parkinson stated that on the BR Southern it was in the upper position for forward, this is not so, it was only on the Maunsell Moguls that had this applied, all other Southern engines I have driven had the Radius Rod at the bottom for forward running, even on the Rebuilt Bullied Pacifics which kept their outside admission piston valves, the rod was down for forward running, but the radius rod was connected to the Combination Lever below the Valve rod.

If the correct Walscherts valve gear is to be used then the Radius Rod is connected to the top of the Combination Lever above the valve rod for piston valve engines and below the valve rod for slidevalve engines, this is to give the required movement to the valve to produce "lead", which is the amount the valve is open at TDC.

On an engine with Walscherts valve gear where the cylinders are piston valve on the prototype and a slide valve is used instead, then either the connection to the combination lever will need to be reversed, or the ports will need to be "crossed"...that is the port at the front of the cylinder feeds the rear and vice versa. I fitted this arrangement to the batch of coal fired K27's that I built, Aster also use this principle on their engines, details of the cross porting can be seen in the "Berkshire" details on their website.

The GS4 appears to have correct valve gear, but again if it is not "Cross ported" then the Radius Rod will be in the upper position for forward running as stated in the review.

David Bailey www.djbengineering.co.uk

* * * * * *

Brooklyn, New York
via e-mail

Ron,

The article on building Hartford's trucks in the Nov./Dec. issue reminded me of an easy way to corral "Flying Springs" when assembling anything that includes small springs. A length of sewing thread or dental floss looped around, not through, the spring will make the spring easier to find; or if the ends of the string are taped to the work top they will keep the spring within reach. After the spring is in place a light pull will remove the string.

Charles F. Hruska

* * * * * *

Williamsport, Pennsylvania
via phone

Dear Ron,

In the article about "Radio Control for Millie" on page 35 in issue #84, the photo is upside down! I couldn't make sense of it until I turned it over, and then it was crystal clear.

Best wishes,
Frank Ulman

* * * * * *

Dripping Springs, Texas
via e-mail

Hi Ron,

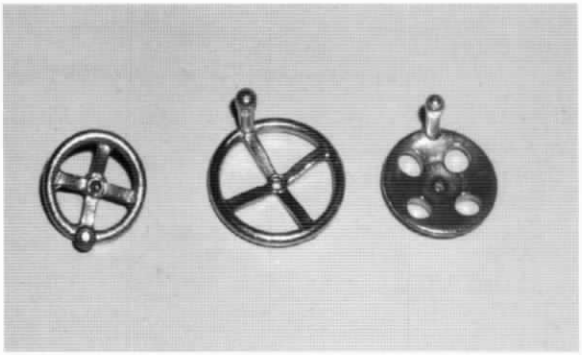
I started a live steam Shay group for all those folks that have a hard time waiting for the next issue. This group has a few Shay experts as members, and a lot of live steam Shay builders and enthusiasts of all scales. Go to:

http://groups.yahoo.com/group/LivesteamShays/

Cheers
Dan Rowe

WHAT'S NEW?

Trackside Details, c/o Valley Brass & Bronze, 7070 N. Harrison Ave., Pinedale CA 93650. Phone 559-439-0419, has released some new brass detail castings. All three are valve wheels with speed turning handles. TD-241 is a Patented disc-type wheel. TD-240 is a Large spoked wheel (16.3mm) and TD-239 is a small spoke wheel (12mm). Our samples are all beautiful castings..... clean and crisp. To the best of my knowledge, these wheels are unique in our hobby. When ordering from TD, please tell David that you saw his products in *Steam in the Garden* magazine.

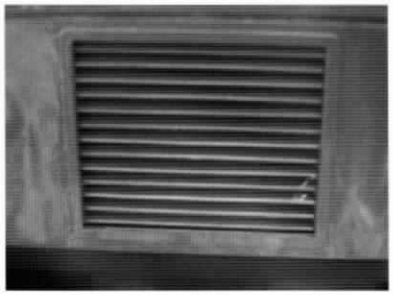


Left: Valve Wheel w/Speed Turning Handle Small - 12mm. ***Center:*** Valve Wheel w/Speed Turning Handle Large - 16.3mm ***Right:*** Pierced Disc Type Wheel w/Speed Turning Handle.

Accucraft Trains, 33268 Central Avenue, Union City, CA 94587 - phone: 510-324-3399 announces Ruby #2, Deluxe 0-4-0. 1:20.3 scale, 45mm gauge, 24 inch minimum radius. Brass construction, butane fired, piston valves and forward/reverse control. Contact your favorite Accucraft dealer for more information and pricing

AMS, a division of Accucraft Trains, 33268 Central Avenue, Union City, CA 94587 - phone: 510-324-3399 has just released a new product package consisting of rail, tie strips and rail joiners. Rail is code 250 solid brass. Ties are UV resistant and are available in narrow gauge or standard gauge configuration, and the rail joiners are solid brass. The detail on the ties is excellent, and they appear to be very robust. Check with your AMS dealer for more information and pricing...and please tell 'em that ***SitG*** sent you.

Doubleheader Productions, 972.247.1208 ● kmatticks@gaugeone.com announces that they are the exclusive USA dealers for DAISY, a battery powered loco in 16mm scale for 32mm gauge track. DAISY features: etched nickel silver chassis and body, 4 wheel drive by enclosed nylon gear train, multi height couplings fitted as standard, "Daisy" nameplates, massive haulage power due to large motor reduction, runs on four standard dry or rechargeable 'AA' type batteries easily changed in moments by removing the bonnet (by unscrewing the radiator cap), speed control and On/Off by twisting exhaust, directional control by switch in cab, louvre detail on bonnet sides, meshed front grill, and a great looking brass radiator cap. Available in yellow, green or red. It may not be steam powered, but it's great for those times when you are busy with other projects and just want the ambiance of a train running without having to spend time servicing it. Call or e-mail Ken Matticks for more information, and for price and availability. And please tell Ken that ***SitG*** sent you!

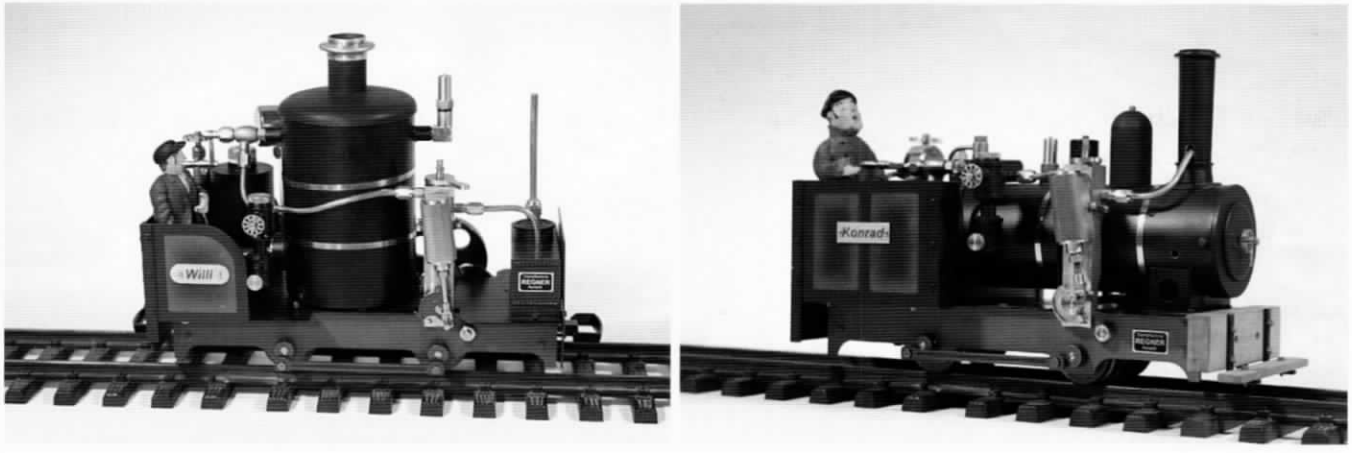


TRAIN DEPARTMENT

YOUR SOURCE FOR **REGNER** IN AMERICA

Introducing REGNER'S new Ready to Run
"EASY LINE" Live Steam Locomotives

"Willi" **and** **"Konrad"**



Butane fired, 0-4-0, Single Cylinder Geared Drive w/Flywheel,
Adjustable 45-32-30mm Track Gauge, In Stock ready to ship.

Only $595.00 Each, plus S&H

Price Includes: Steam Oil, Water Sight Glass, Pressure Gauge, Gas Fill Adaptor, Wheel Gauge, Link & Pin, Metric Tools and a Handpainted Cast Metal Figure

We Accept Checks, VISA and Mastercard

On the Web: www.traindept.com
e-Mail: ken@traindept.com
Phone/Fax: 757-855-6364

Steamup Report

New Year's Eve in the Florida Panhandle

by Mike Simpson

Ringing out the old year in style...

Five of us (myself, Sal Martocci, Bob Pope, Will Davis, and Bill Boyle) gathered at Sal's on New Year's Eve for the last run of the year. Braving 80 degree weather, we fortified ourselves with hot dogs, hamburgers, Italian sausage, and refreshing beverages. Plus good friends, beautiful weather, and lots of steam.

Engines run included Bob's new sand-colored Fowler, his Lady Anne, and the work to date on his gas-electric inter-urban (similar to the Wada Works); Will's open-cab Shay (double headed with mine) and Maxwell Hemmens Porter; Bill's K-27, C-16, and re-worked Ruby (FH&PB cab and pilot & Martocci burner fix); and my Shay and Sammie. Poor Sal has

Doubleheaded Accucraft Shays bringing a string of empty cars back to the mine.

A new Roundhouse Fowler showed off with a perfect performance. I wish we could show you this loco in color.....it's beautiful!

engines a plenty but deferred to his guests. Bah, I wanted to see double headed Fowlers. One train of AMS ore cars and a mixed freight (mostly LGB).

I heard our editor comment, in August, about his need for more yard/storage space. Same thing happened here -- two thirty-foot sidings and both slam full.

As you can see, Bob's Fowler is beautiful (and runs like a Roundhouse, of course). The Accucraft K-27 is pretty, but runs well now only after hours of past burner tweaking by Sal and Bill. Unfortunately I got no photos of the Hemmens Porter -- about the fifth time I've seen Will run it and the best it's ever run -- superb.

A good end to the old year and something to repeat frequently in the new --

Workshop Project

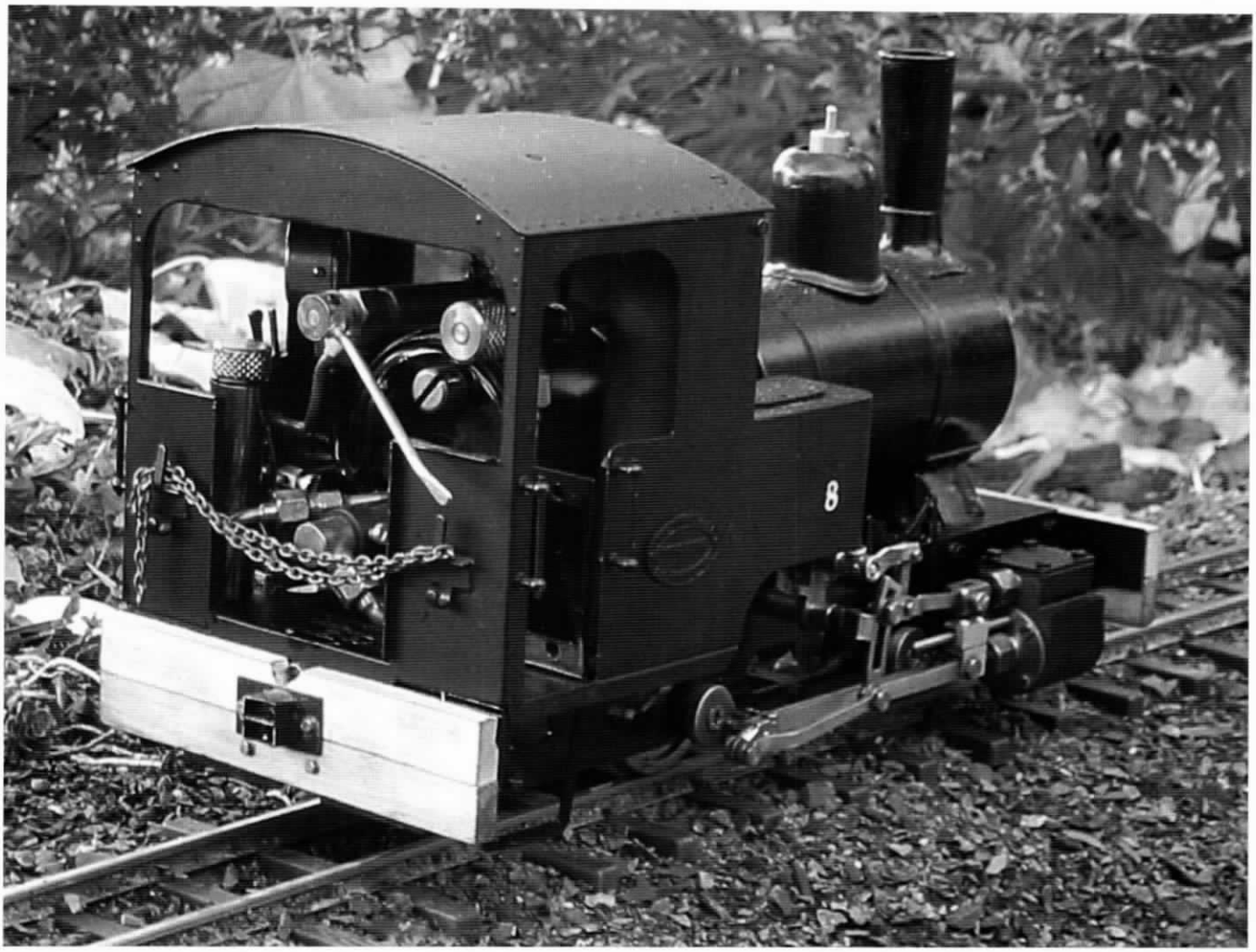
Americanizing the Roundhouse Engineering BILLY

by Rob Kuhlman

Steam in the Garden has featured a pair of articles over the years about 'Americanizing' the Roundhouse LADY ANNE and the FOWLER. To make it a trio, I offer my 'Americanized' BILLY. Roundhouse has a well-deserved reputation for making a high quality trouble-free mechanism; and when a used green BILLY appeared in the SitG Online want ads two summers ago, I jumped at the chance to purchase it. The mechanism is superb, and my loco is an excellent runner. However, I felt I had to do something about the Teutonic appearance to justify its presence on my rusty, dusty Pennsylvania 2 foot gauge mineral line.

The first change was to remove the brass oval surrounds of the front cab windows. I then filed the openings out to a rectangular outline. Someday when I get into the mood for superdetailing, I'll make up some window frames with glazing. The next step was to install the wooden buffer beams that all my locos sport along with homemade link and pin coupler pockets soldered out of K&S brass pieces. Another quick modification was to remove the boiler dart and replace it with a number plate made from a Roundhouse or Mamod (can't remember which) buffer plate.

Roundhouse has done an excellent job in producing a steam dome with a skirt which nicely conforms to the boiler curvature, but the dome comes with a flat top. I turned a piece of brass bar on my Taig lathe to



produce the more typical rounded top profile, drilled a hole in the top to accommodate the safety valve, and epoxied it onto the top of the Roundhouse dome. I filled in the cracks in the seam with melted solder and then filed and polished the seam smooth.

Now I suppose I could have lived with the flat-topped steam dome, but that square sand dome, really a sand box, had to go. The sand box is screwed into the boiler jacket, and to remove it, you have to remove the boiler from the chassis. Remove the cab and then the gas tank and burner, disconnect the steam line connections at the regulator and the lubricator, and then slide the boiler out of the smoke box. Slip the jacket off the boiler and the sand box can be removed. What I did was take a spare Mamod steam dome and cut about 1/2" out of the middle in order to shorten it. Don't attempt to use a cutoff tool on a lathe to slice it – the dome will collapse (says the voice of experience...). What I did instead was tape two pieces of masking tape around the dome to use as cutting guides and cut the dome with a razor saw. Some minor filing corrected cutting errors to allow the two remaining dome pieces to fit back together in proper alignment. I then took the 1/2" ring cut out of the dome's waist and sliced it axially so it could be compressed a tad to serve as a reinforcing ring when slipped up inside the reassembled dome. The joint was soldered together, and I then went back and used solder as 'body filler' to fill the seams which were subsequently filed and polished smooth.

To finish this sand dome, I filed a flat surface on the top of the dome and soldered on a thin brass disc to represent the lid. A short length of thin brass rod soldered on one edge represented the hinge. I removed the sand lines from the original sand box, soldered them into filed squares of brass, and then soldered these brass squares to the bottom edge of the sand dome. A short piece of brass bar was drilled and tapped to accommodate the attaching screw, then epoxied up inside the dome. When the new sand dome was attached to the boiler jacket, everything was ready to put back together. However, I realized I couldn't live with the John Deere green paint, so I painted everything black before reassembly (though I

did mask off the cab interior to provide a nice color contrast to the black exterior color). When the paint was dry and everything reassembled I attached the original sand valve control rod to the new sand dome, and the job was completed.

This is by no means a superdetailed model, but I think I've obscured the Teutonic design elements sufficiently that my BILLY wouldn't look at all out of place trundling around a North American dusty quarry or smoky industrial site.

Les lecteurs francophones peuvent contacter Guy Ozanne pour obtenir, gratuittement, une tradauction sur un element de texte paru dans SitG. 41 rue Jeanne d'Arc, 94.500 Champigny, France.

tel (33) 01-48-83-62-86
e-mail <Guy.Ozanne@wanadoo.fr>

Second Annual Aspen Gold Steam-in

by Chuck Kolinski, SA #22

Steaming in Colorado's High Country

On August 14, 2005, Don and Peggy Beach hosted their Second Annual Aspen Gold Steam-in held in Arrowhead, Colorado. Arrowhead is a small mountain community located between Gunnison and Montrose, Colorado at an elevation of 9400 feet. This year's steam-in was held in August instead of September like last year, hence no golden aspen leaves. But we also didn't have rain, sleet, and hail like last year's event either.

The day started crisp and clear with engineers and guests starting to show around 8:30 am. Torry Krutzke brought his coal fired K-27 over from Pueblo and the air was soon filled with the unmistakable aroma of coal smoke and hot steam oil. While Torry was firing up the K-27, I made a run with my RCS equipped Mich-Cal #2 shay and 6 car log consist with logging caboose. In the cool morning air the plume from the Shay was absolutely superb.

After backing the Shay onto a siding, Torry brought the K-27 out onto the main line for it's first run of the day. Wow, what a crowd pleaser. If you should ever have the opportunity to see one of these coal conversions operate, by all means, do so. It is a real treat. Rumor has it that the C-16 will be the next coal conversion coming out of Torry's workshop. Stay tuned. I'll keep you posted.

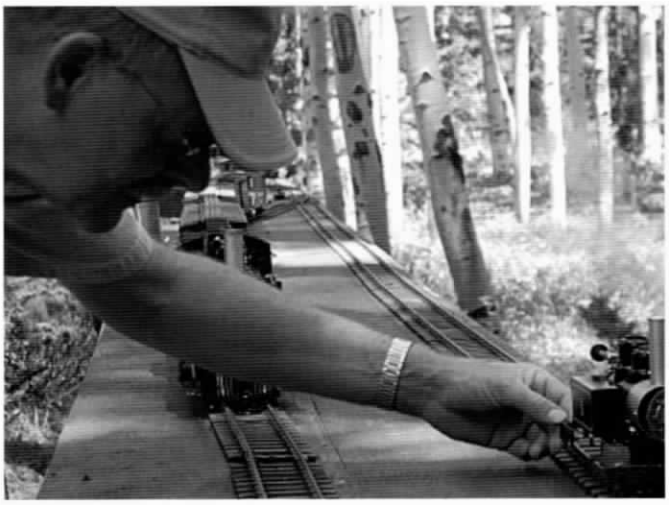
Gregory Posta of RGSRR Hobbies in Ridgeway Colorado showed up with a special surprise guest, Fred Devine of Accucraft. Fred is a great guy and I have no doubt the future is very bright for Accucraft. Fred said more factories will be coming online to speed up delivery time of Accucraft products and this was met with unanimous approval.

Don Beach fired up his K-27 and doubled headed with Torry's K-27 pulling a mixed freight. It was most impressive. The Shay came out for another run, and soon the smell of BBQ was drifting over from neighbors Anthony and Sherrel Riddles, who once again put on a noon time feast fit for a king. Attendees included Don Beach, Fred Devine, Darwin Geeses, Ron Huddleston, Chuck Kolinski, Torry Krutzke, Ron Lindner, Byron McNew, Bob Meyer and Gregory Posta.

After lunch Bob Meyer brought out his Ruby, which he had just built from a kit the week before, for its maiden run. With all the fanfare of a new baby arriving, and plenty of help from the old salts, the engine was fired up. As with all new engines, it was a bit tight, but after a few runs it started to loosen up and even made a few circuits pulling some small cars. With a little more tuning and run-in time it should be a dandy little engine. Bob is already planning on doing a conversion and detailing this winter. Looks like we hooked another one.

As the afternoon progressed visitors came and went on a regular basis, and steam engines took their turns doing what only live steam engines can do. Four o'clock came all too soon and folks were packing up saying their goodbyes until the next steam-in. As if by cue the wind came up, the temperature dropped, and a few rain drops fell on the lone #2 Accucraft Goose that was slowly making it's way around the Lockstock & Barrel Railroad, reminding us that fall will soon be coming to the high country and bringing us aspen gold.

Scenes from the Aspen Gold Steam-in



Regner's WILLI

review and photos by Ron Brown

An affordable jewel

Technical Specifications:

Dimensions: Length - 211mm, Width - 105mm, Height - 175mm, Weight - 2280g

Scale: 1:22.5

Gauge: Adjustable (30, 32, 45mm)

Cylinder: Single, oscillating

Bore: 10mm

Stroke: 14mm

Boiler: Vertical boiler, 130ml capacity, fitted with gauge glass, pressure gauge

Burner: Butane fired

Wheels: 0-4-0, metal, insulated, geared drive w/flywheel

Coupler: Link & pin

Running time: Approximately 20 minutes

Extras: Metal, handpainted driver, steam oil, boiler water filler bottle, gas filler adaptor, gauge adjusting tools, metric wrench, manual

Options: Boiler filler valve (Goodall type) available

Price: $595.00 plus shipping

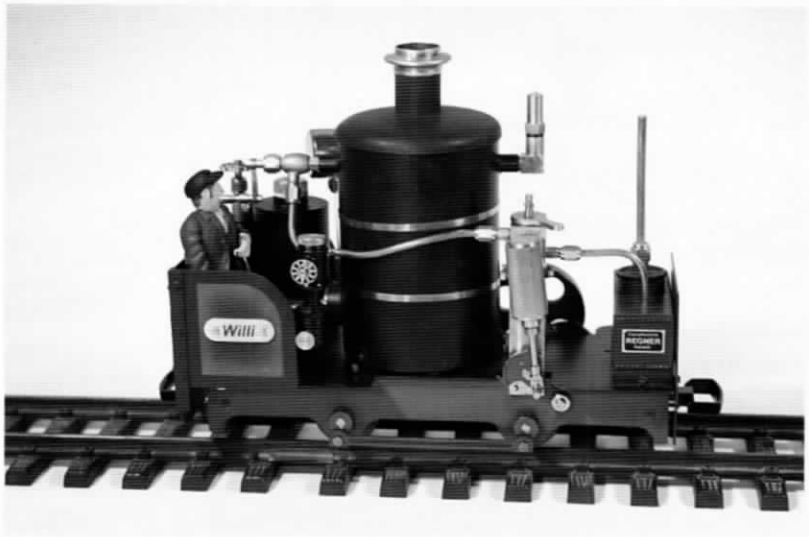
Available from: Train Dept. ● phone: 757-855-6364 ● e-mail: ken@traindept.com ● web site: www.traindept.com

Steam locos from the German firm Regner, while not entirely unknown in the USA, have been as rare as hen's teeth until recently. This has changed with the announcement that Train Dept. in Virginia is the official Regner dealer for this country.

One of Regner's offerings that caught my attention is WILLI, a small, vertical boilered industrial-type loco. WILLI is driven by a single cylinder oscillating steam motor and fitted with a flywheel and reduction gears. The flywheel smooths out the power impulses from the single cylinder, and the gear train multiplies the torque to make WILLI a very powerful little loco.

I arranged to review WILLI for our readers, and as soon as I opened the box I was hooked. It was love at first sight.

WILLI is packed very well and suffered no damage during the long voyage from Germany. I was surprised at the extras included, particularly at the very low entry level price of this loco. Unusual for an entry level loco are a boiler water level gauge glass, a pressure gauge, a hand painted cast metal driver, and more.



Willi just off the production line. Note the LGB-type couplers. The version I received has link & pin couplers, which I prefer. **photo credit to Regner**

The boiler is butane fired, with the fuel tank located in the open cab opposite the driver. By the way....I was pleased to find a locating peg on the cab floor to keep the driver in place on even the roughest trackage.

I was impressed and delighted with the fine quality of the controls, including one of the nicest steam lubricator adjusting valves I've ever seen. The throttle handle is nicely crafted from turned brass, and though it gets hot enough to blister fingers, it's a joy to look at. A small piece of silicone tubing over the handle or a light cotton glove would take care of the blisters.

Overall impression is one of quality and solidity. The little loco has surprising heft and appears that it would easily last a lifetime. Wheels are gauge adjustable and fitted with side rods that are beautifully fluted....another surprise on an entry level loco where one would expect a plain stamping.

The lubricator is fitted with a drain plug as well as the lovely control valve mentioned above.

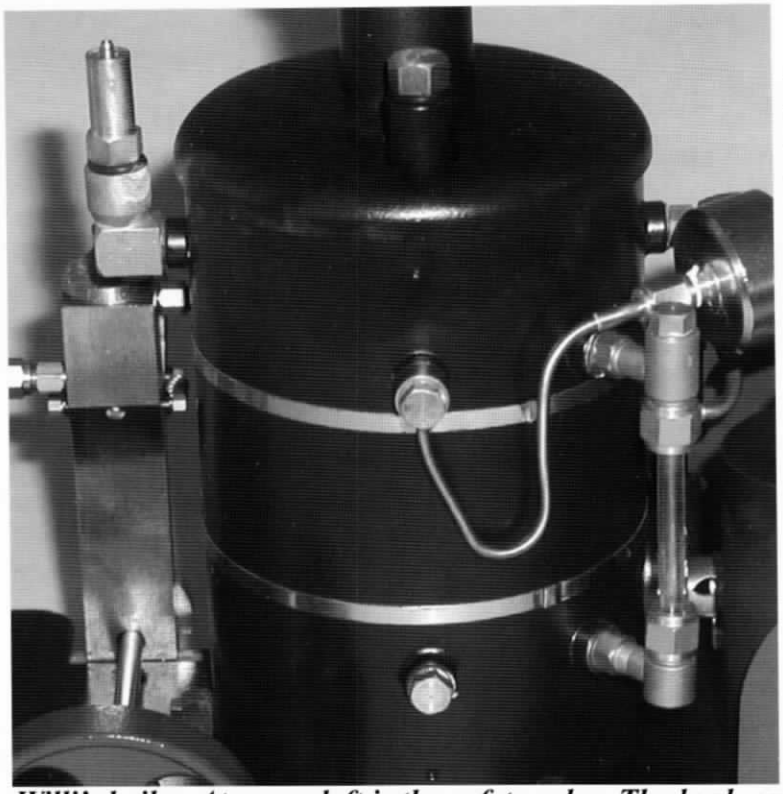
Steam leaves the boiler via the throttle valve and goes directly to the lubricator, then on to the port block that feeds the cylinder. Once converted to power by the oscillating cylinder, the exhaust steam goes to a condensate tank located just inside the front cab panel on the front of the locomotive. This tank traps the condensate while allowing the steam to escape in a surprisingly large plume via the vertical copper tube seen in the photo below.

The condensate tank has a drain fitting on the lower right side. Better drain it after each run! You will be surprised at how quickly it fills up.

Backing up to the drive cylinder, let's follow the power from the cylinder through a jackshaft to a flywheel on the left side of the loco. The flywheel lends a nice visual touch while serving the very practical purpose of smoothing out the drive impulses from the single cylinder to make WILLI a very smooth running loco.

Inboard of the flywheel is a gear that transmits power down through the floor to more gearing on the front axle. Power is transmitted to the rear axle by way of the previously mentioned side rods, making WILLI an all-wheel drive loco with a lot more pulling power than expected. At a train show in Syracuse, New York in November, we added as many small gondola cars as were available and WILLI didn't even break a sweat.

Ken Johnson, owner of the Train Dept., took it further. He said, "I hooked up Willi to the string of thirty two Gauge 1 boxcars they were using that day. Willi pulled them all, though it was obviously working hard. As I did not have a camera with me that day, I did the same test the following weekend and pulled all the cars our host had out that day...twenty nine Gauge 1 boxcars, and I have it on video."



Willi's boiler. At upper left is the safety valve. The bush on top is the cold water filler, and at the bottom is the bush for the optional Goodall-type valve. The gauge glass (right) is easy to read and very accurate.

The fire is lit by opening the gas valve (another work of art like the one on the lubricator), located on the fuel tank, and applying a flame to the top of the stack. It never failed to light instantly and stay lit until the gas was exhausted. Though it doesn't howl like some burners we've heard, the burner on WILLI does roar when the burner valve is opened to raise steam, but when pressure is up and the burner valve is turned down, the burner is almost completely silent. Our loco easily maintained pressure, even at the lower burner setting.

This loco is not a speed demon, nor should it be, but speed is easily controlled over it's range by the easily accessible throttle valve. Reversing is simply done by moving the lever on the top of the cylinder port block from front for forward to rear for reverse. This is another finger burner, but could also be tamed with a small piece of silicone tubing or by wearing light cotton gloves.

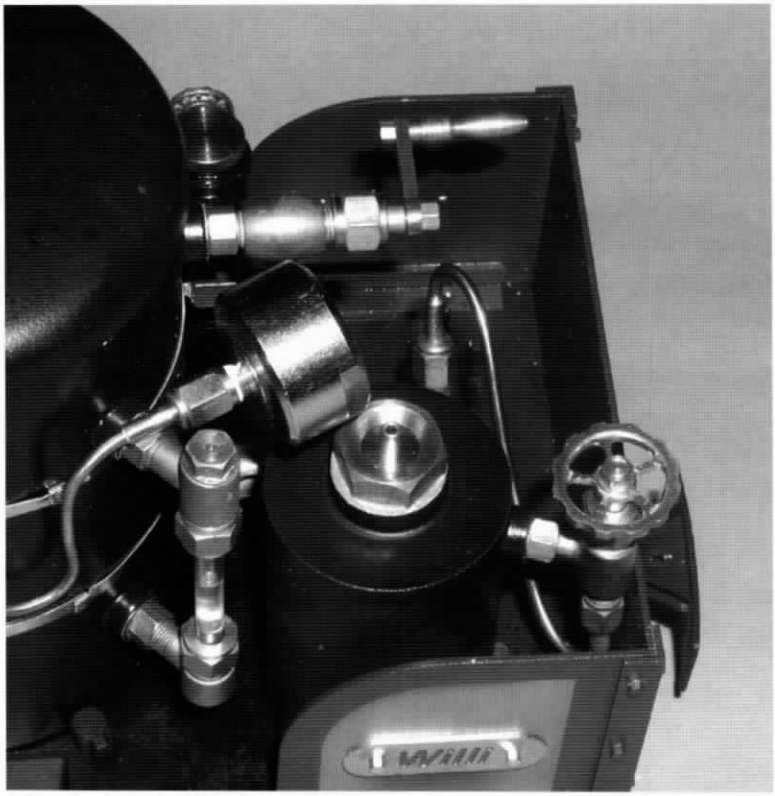
I really like this little loco, but as with all steam locos I've encountered to date, there are things not to like. In the case of WILLI, I can only come up with one thing I don't care for.

The gas filler valve on the tank is a non-venting type. Yes, that can be overcome by cracking the fuel valve open slightly and letting the tank vent through the burner while liquid gas is flowing into the tank. I always worry, though, that this will leave a pool of gas somewhere in or around the engine and cause a flash fire when exposed to flame. I always fill my loco away from the steamup area, and then vigorously blow down the stack and around the cab area to eliminate any residual fumes.

It would be a fairly simple job to remove the filler valve and replace it with a self-venting Ronson valve, as used on Roundhouse and other gas burning steamers.

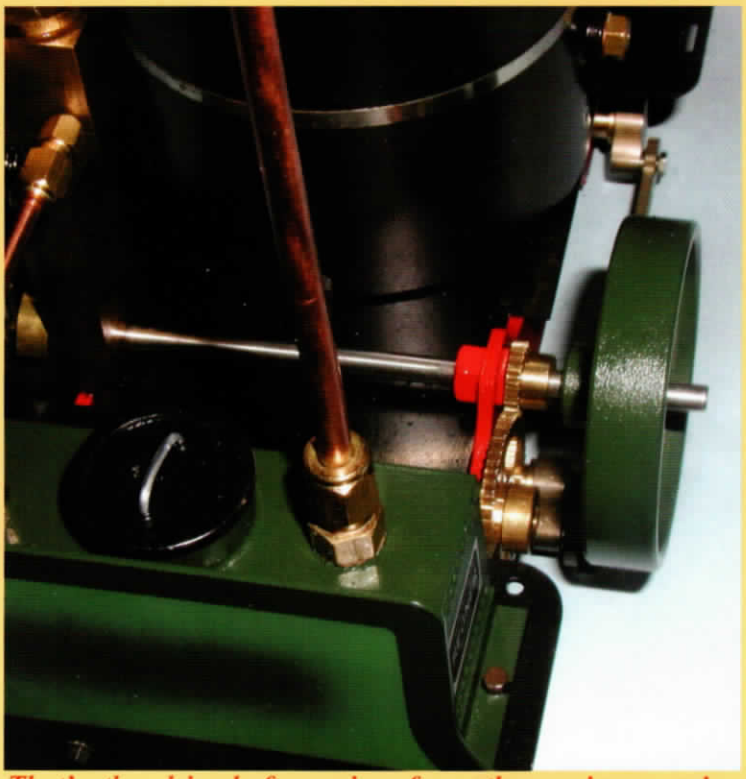
WILLI just cries out for bashing! It has huge potential to be turned into a virtually unlimited number of cute little loggers, industrial shifters, plantation locos, etc. at the hand of a skilled craftsman. Or one can enjoy it just as it is.

I recommend this little gem without reservation.

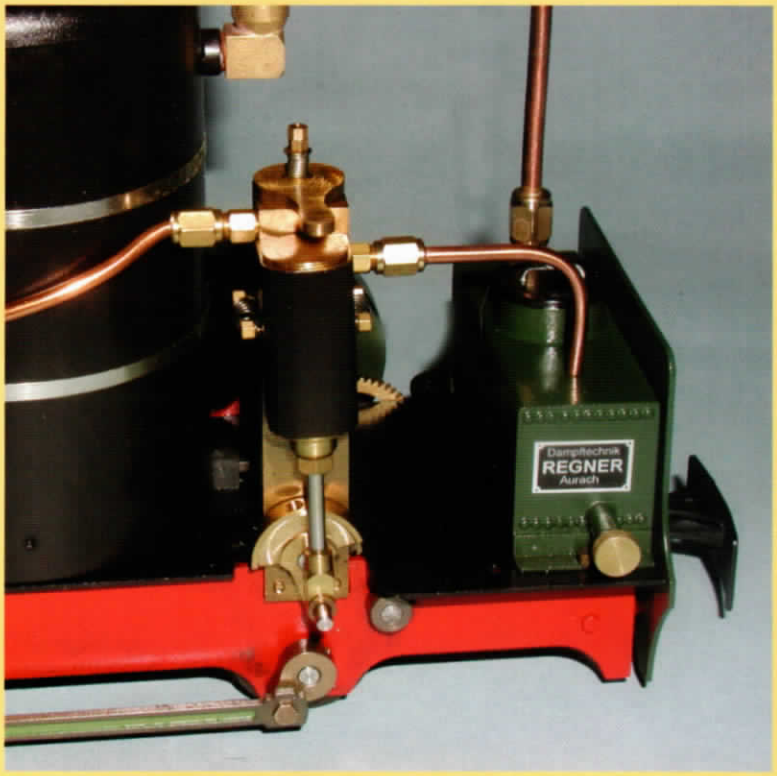


Looking down into the cab. The large nut & tube at dead center is the gas tank filler. Just above it is the throttle valve, and on the lower right is the beautifully detailed burner control valve.

The displacement lubricator, with knurled filler cap, oil flow control valve and drain screw.



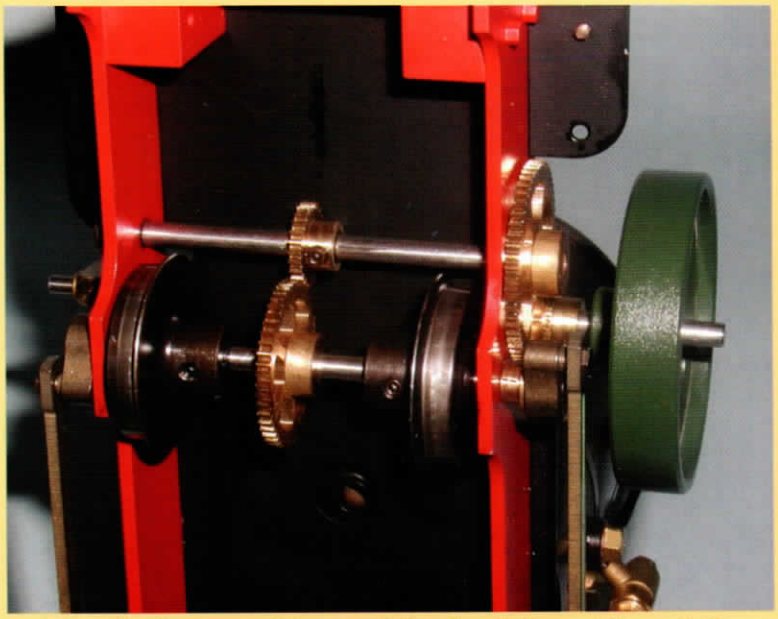
That's the driveshaft coming from the engine, passing through a support bearing, then the drive gear and flywheel. The gears transmitting the drive down to the jackshaft and axle are visible here.



The powerplant is in the center of the photo. Single oscillating cylinder - reversing valve above the cylinder on the port block. Check out the elegant mill work on the side rod at the bottom of the photo!

The condensate tank is on the right. It does a great job of keeping oily, messy splatter off of your loco, while still exhibiting an impressive steam plume. That's the drain plug at the bottom, and the steam exhaust pipe sticking up from the far side of the tank.

Looking into the cab from the rear. Throttle valve at center, with jet carrier and burner just below it.



Axle, shafts, gear drive and flywheel viewed from below.

Tag Gorton is right.....the driver is a homely cuss who could frighten small children! But he's an expert driver, and he has a cheerful personality. I'm confident that he will grow on you like the old VW Bugs...

SEE END OF THE LINE FOR AN ANNOUNCEMENT ABOUT THE WILLI BASHING CONTEST !

ARISTO-TECH PRESENTS

LIVE STEAM FOR EVERYONE

ARISTO CRAFT TRAINS

G 45 mm

#1 GAUGE

1:29 SCALE

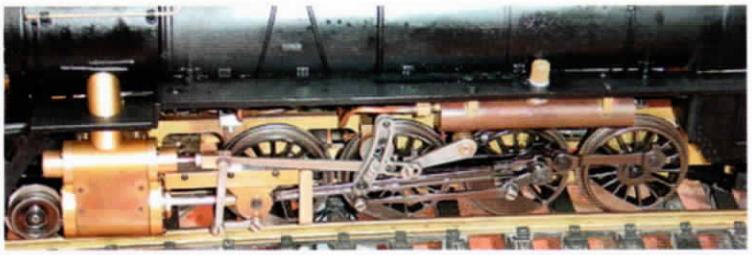
LESS TINKERING & MORE OPERATING

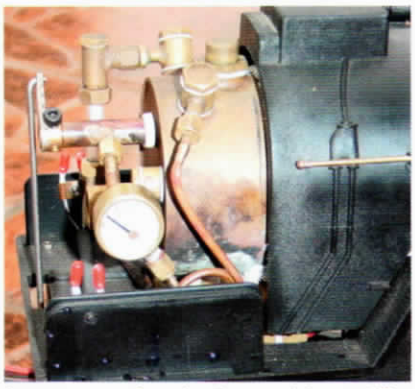
THE MIKADO W/RC, SOUND AND ELECTRONIC AUTO-START

Ready to run! Just add lube oil, fuel and water.

- Factory installed Radio Control.
- Butane fired with built in Piezzo igniter.
- Reversing and speed control servo motors.
- Rechargeable loco batteries w/charger.**
- Transmitter controlled bell, whistle, & chuff sounds.
- Large mouth lubricator.
- Locomotive boiler with large water capacity.
- Drain cock & pressure valve.
- Sight glass & pressure gauge.
- Butane tank pre-heater bath with drain valve.
- On-board control panel in tender under coal load.
- Metal carrying case with wheels & handle.
- Pulls 10 freight cars or 4 Std.Hvy.Wht. cars.
- Capable of 10' diameter curves & 3% grades.
- Running time 40 minutes or better.
- Goodall Valve available separately.
- Roadnames: ART84100 Undecorated
  ART84101 Pennsylvania
  ART84102 Santa Fe
  ART84103 Rio Grande

**Transmitter batteries not included





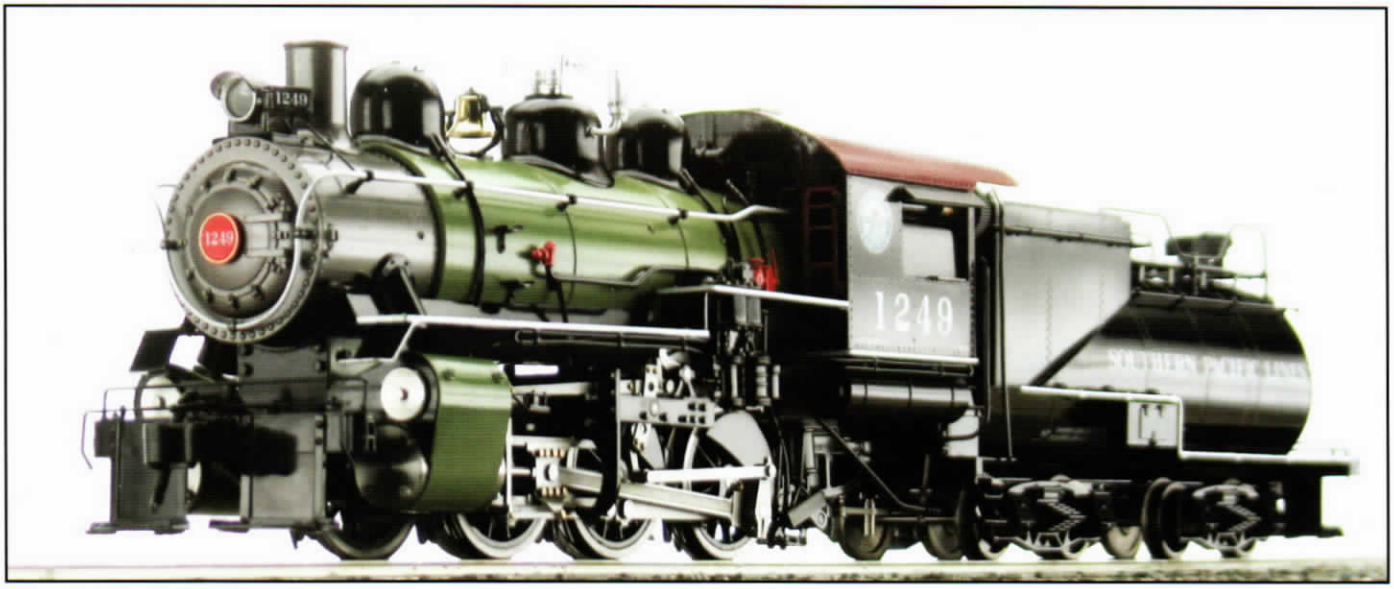
Photos are of Engineering Sample. Appearance of production model may differ. Cylinders, under frame & many other metal components will be blackened.

Here's your chance to operate Live Steam in G-Gauge and not need a mechanic next to you because Aristo-Craft has made Live Steam simple with the Aristo-Tech Live Steam Mikado! Factory installed R/C gives you locomotive speed and direction control without chasing after it. Smooth locomotive operation allows delicate control and even switching enhancing realism for all senses. This is fun guys! The Aristo-Tech Live Steam Mikado by Aristo-Craft is something new you will want and treasure!

ORDER DIRECT OR SEE YOUR FAVORITE ARISTO-CRAFT DEALER!

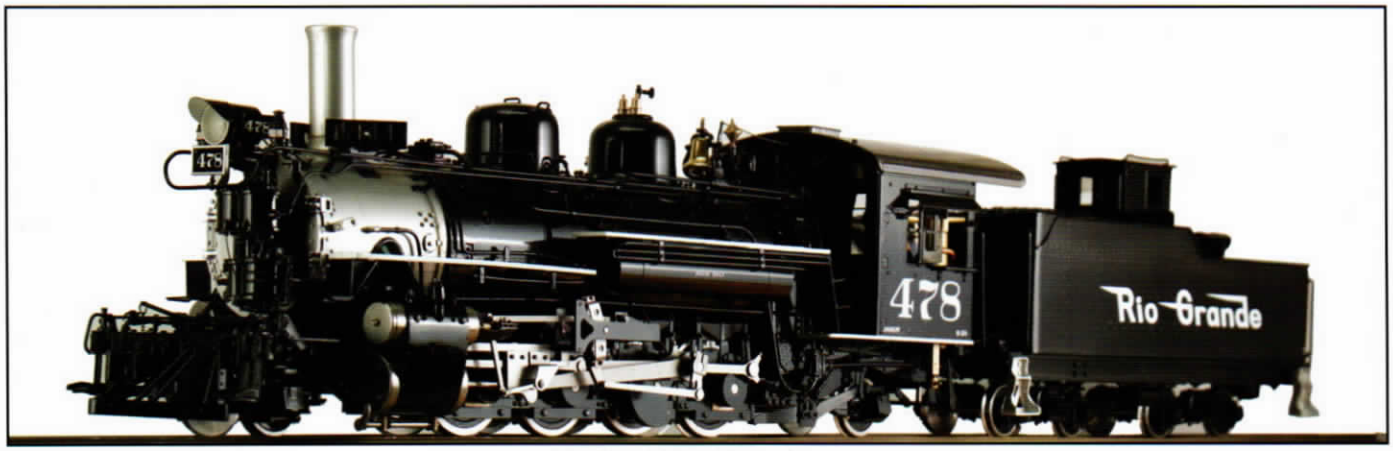
Aristo-Craft Trains 698 S. 21st Street, Irvington, NJ 07111 Phone: 973-351-9800 Fax: 973-351-9700
www.aristocraft.com aristo@mindspring.com

Timeless Beauties



Southern Pacific S-12 0-6-0 Switcher Live Steam
1:32 Scale, 45mm Gauge
Available Summer 2006

SP GS-4 Daylight Live Steam (Butane & Alcohol Fueled)
1:32 Scale, 45mm Gauge
Delivery in Progress



D&RGW K-28 2-8-2 Live Steam
1:20.3 Scale, 45mm Gauge
Available Fall 2006

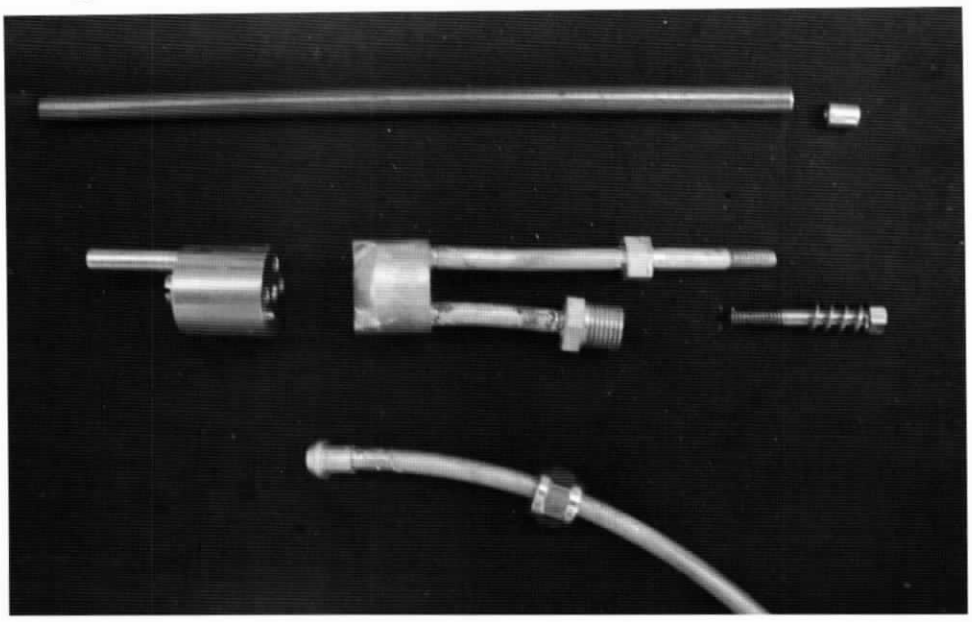
ACCUCRAFT TRAINS
MUSEUM QUALITY BRASS MODELS

33268 Central Avenue, Union City, CA 94587 Tel: (510) 324-3399 * Fax: (510) 324-3366
info@accucraft.com www.accucraft.com

An Exhaust Diverter for the Accucraft Mortimer

by John Bell (Townsville, Australia)

The recent ***Vale of Rheidol*** offering from Roundhouse features a radio controlled device to simulate drain cocks by diverting exhaust steam. In a recent review of the Finescale Hunslet, I read that these locomotives feature a manually controlled device to prevent water and oil spraying over the operator and stock when warming up the cylinders.



This set me thinking about whether such a device could easily be added to other locomotives, and the Accucraft Mortimer, with its capacious smokebox, seemed an ideal candidate for such a conversion. No doubt Mortimer's close relatives such as Caradoc and Superior would also be very similar in the smokebox region.

Description of Operation

The exhaust diverter consists of two main parts. The lower body has two ports; one to pass exhaust steam from the cylinders into the upper body, and the other to accept steam diverted in the upper body and pipe it under the smokebox. The upper body rotates about 90 degrees about the centre and has three ports, one for straight through steam to the chuff pipe and stack, and the other two for diverting steam from the inlet port, making it do a "U" turn and sending it back down through the diverted steam pipe and onto the track.

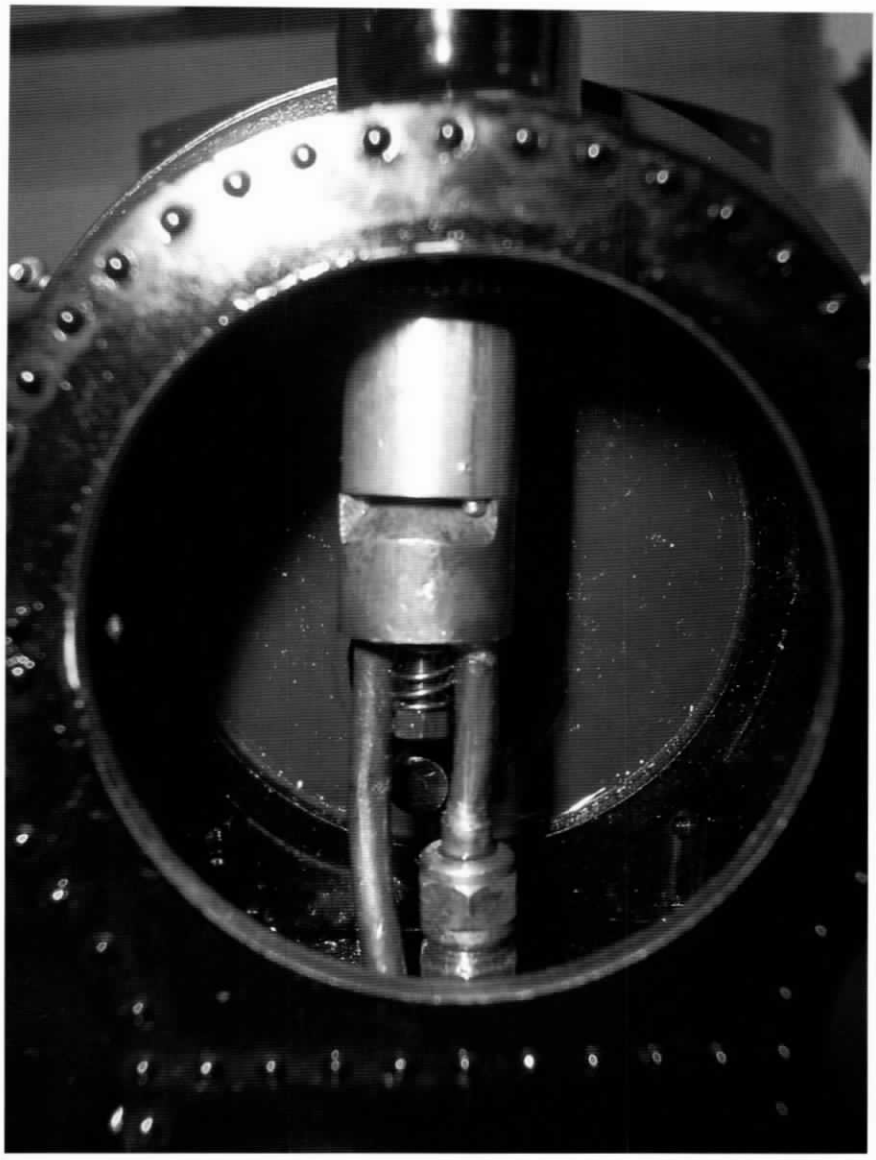
The chuff pipe is fitted with a screwdriver slot and rotating the chuff pipe anti-clockwise sets the ports so that steam from the cylinders reverses direction in the diverter and exits through a pipe to under the smokebox, creating an effect of drain cock operation, and preventing water and oil from exhausting through the stack. Once the cylinders are nice and warm, the chuff pipe is rotated clockwise and steam exits through the chuff pipe in the conventional manner.

Construction

I have not provided technical drawings or machining instructions as the photos, sketches and general description below should, subject to a bit of deduction, provide ample information to build one of these devices for a Mortimer or similar loco. None of the dimensions are critical in themselves, but consideration must be made for the space available and the plumbing arrangements of the subject locomotive. Ports and piping should be sized to suit the cylinder capacity of the loco, and the internal diameter of the original exhaust pipe is a good guide as to how generous you need to be to avoid inadvertently adding an exhaust brake to your pride and joy.

Construction begins with the lower body. I used a piece of 1⁄2" round brass, 10mm long, with one end faced off square and smooth as this will become the upper port face ("A" in the sketch). Drill through the

centre 6BA clear for the bolt to attach the upper half of the diverter. Next drill the two ports right through. I used 1/32" dia for mine, placing these in line with the centre hole and positioning them so as to leave about the same amount of meat both side of the holes. De-burr. These will become ports P1 and P2 in the sketch, which is which doesn't matter at this stage.



The next step is to make the blank for the upper, rotating, body. This is also made from the same 1⁄2" round brass, this time 12 mm long, and also with one true face identified as the port face. Tap 6BA blind about 5.0 mm deep from the face end and de-bur.

The stops that limit the rotation to within an arc of about 90 degrees should now be made as they will be needed for spotting the port holes on the upper part.

There are a number of ways the stop could be made, and no doubt there are better ways than the approach I took as it reduces the surface area of the port face. I cut a 45 degree chamfer around the edge of the lower port face for an arc of just over 90 degrees. See the sketch. The stop itself is a small length of 1/16" stainless rod positioned as close to the edge of the upper port face as possible, so as to have clearance running in the chamfer but to come to a positive stop at each end of the chamfer. I didn't think about this at the time, but I recommend fixing the 1/16" stop temporarily at this point so it can be removed for final lapping of the port face.

With the 1/16" stop in place, the holes for the upper port face may now be spot drilled. Before you begin, identify which of the two lower ports is going to be the exhaust-in from the cylinders (P1) and mark it so it can be seen when the port face is covered. Take a 6BA screw of a suitable length and fit this through the lower body and screw it loosely into the blind hole in the upper port face.

If you wish your diverter exhaust-to-stack function to be at the clockwise stop position, turn your top component clockwise until it reaches the stop and then tighten the 6BA screw. Spot drill through the hole in the lower body that will connect to the cylinders (P1), and mark this on the upper body so you can see which port is the one to attach the chuff pipe to (This port will become P3).

Remove the screw, deburr, reassemble and rotate anti-clockwise until it reaches the opposite stop and then tighten the screw again. Spot drill again through the same exhaust-in (P1) hole, and mark on the upper body so you can tell this is the port that will accept the incoming steam in the "divert position" (P4). Keeping everything in place, also spot drill through the exhaust-out hole (P2) and this will mark the position of the steam-out in the "divert position" (P5).

At the end of this exercise you have three spotted holes on the top port face. One being the one that the exhaust-in will enter if the diverter is in the clockwise (normal) position (P3), another being the one that the

Figure 1
Port Faces

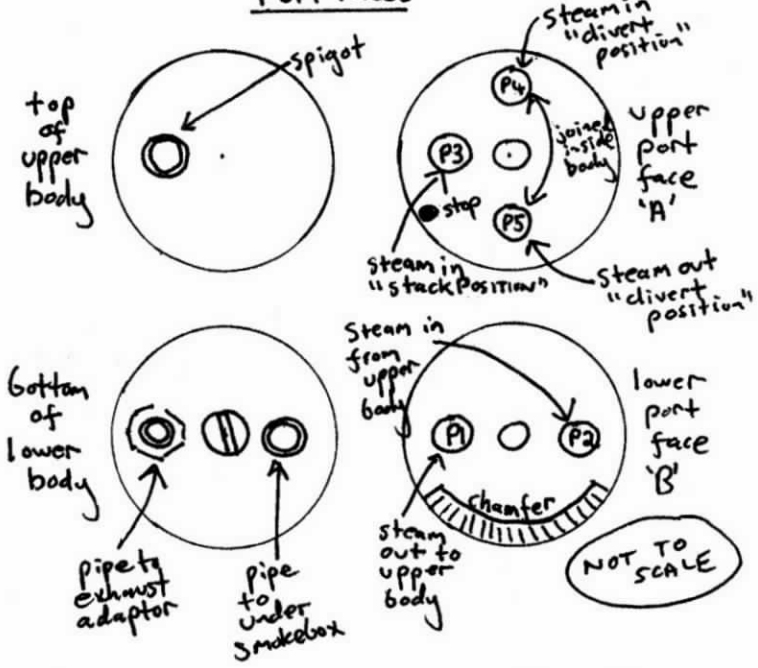
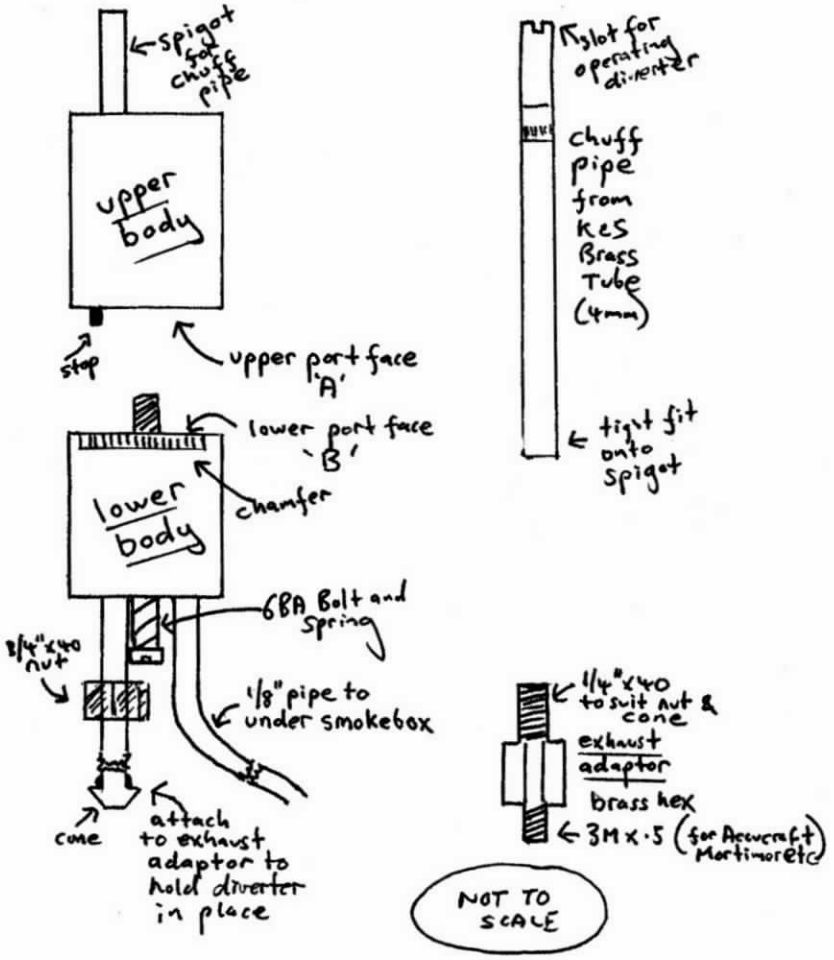


Figure 2
General Arrangement



exhaust-in will enter when it is in the anti-clockwise (divert) position (P4), and the last one being the outflow to the lower body when in the anti-clockwise (divert) position (P5). Dismantle.

P4 and P5 are joined by a steam passage within the upper body, and making this is the next job. Before doing anything more, it would be wise to recheck the depth of the 6BA tapped blind hole, as you will have to make sure the cross passage is drilled above that hole. Start cutting metal by drilling the diverter steam-in port (P4) to a depth where it clears the 6BA hole plus half the drill diameter, plus about 1.5mm - in mine that added up to 7.7 mm. Also drill the steam-out in the divert position port (P5) the same depth. These two holes now need to be connected by a cross drilled passage that is then plugged with a short piece of suitable brass rod – fixed with high temperature loctite or solder. This completes the diverter ports.

The exhaust-to-stack port (P3) now needs drilling through, but first think about how you will attach your chuff pipe. It needs to be able to be added after assembly into the loco through the top of the stack, so I chose to fix this by making a spigot with an outside diameter such that it is a nice tight push fit into your chosen size of K&S brass tubing (I used 4mm). As the spigot was a larger diameter than the port size (3/32) I drilled the port passage right through, then opened up for the spigot from the top to a depth of about 5mm. Silver solder or high temperature loctite the spigot in place.

This is a good time to carefully deburr the port faces on both upper and lower parts, and then gently lap the port faces. Do this as best you are able, remembering that this is a low pressure device and some leakage does assist port face lubrication! After you are satisfied with the seal you will get between the two port faces, permanently fix the stop in place.

It is now time to turn you attention to the plumbing in the lower part and the installation. The first consideration is the connection to the standard exhaust "T". First gently unscrew the Accucraft copper blast pipe and retain this in case you want to restore the loco to original condition. Don't cut it up and try to use it to save buying a 3M x 0.5 die like I did, it's not man enough for the job. Buy the die if you don't have one and make the adapter from brass.

This will need to be replaced by a brass fitting made from brass hex that is at least 1/4" across the flats (5/16 is good) and about 23mm long, which is threaded M3 x 0.5 for about 5mm on one end to fit the Accucraft exhaust "T" and 1/4"x40 to accept a cone and nut to suit 1/8" pipe. Drill through 3/32 from the 1/4"x40 end but don't drill all the way through...you will need to step down the hole size a little to avoid the wall thickness being too thin at the 3mm threaded end. This part can now be screwed into the loco's exhaust "T", noting that it will need to be tight enough so it doesn't turn when the diverter is being operated (or fix it with some thread-lock).

The pipe from under the lower body to the adapter is made from a short length of 1/8" copper pipe. The connection between the pipe and the adapter is the fixing point for the diverter to the loco. The pipe length is best measured from the job. Open up the hole that leads to the exhaust–in port (P1) to 1/8" for about 5mm to accept the pipe. Silver solder the pipe and also the cone (not forgetting the nut first!).

The pipe that takes the diverted exhaust steam from port P2 down under the smokebox and between the frames is made from a well annealed length of 1/8" pipe, this being silver soldered into a 1/8" hole drilled about 5mm from under the body into the 3/32 hole that becomes port P2 . More complex options are possible, such as splitting the pipe (using a removable connection) under the smokebox into two 3/32 pipes and bending these so they point forward under each cylinder, enhancing the drain cock effect.

The unit may now be assembled. Give everything a good wash through with fresh water and smear some steam oil on the port faces. A 6BA bolt and spring arrangement will be needed to hold the port faces together. The bolt is fitted with a small washer and spring and then passed up through the lower part and screwed into the upper part with some thread-lock to secure. It just needs to be tight enough for the spring to maintain a light but firm pressure on the port faces.

The unit may now be fitted in the smokebox. Be warned, this could be fiddly, and will require some trial and error to position so that the chuff pipe does not foul the stack when the diverter is being rotated.

I found the best way to insert the diverter was to bend the pipe that goes under the smokebox into a gentle curve and poke this through the gap at the lower front of the smokebox. The spigot for the chuff pipe can then be fed up into the stack to allow the cone and nut to be fitted to the union. To tighten the nut, I made a special spanner out of a piece of 1.5mm brass sheet to get in from behind. It can be seen in the photos. Depending on your final positioning and how you made yours, you may not need the special spanner to tighten the nut.

The chuff pipe itself is made from 4mm K&S brass tube. It needs to be measured with the diverter

installed so that when it is fitted onto the spigot it is about 5mm below the top of the stack. Your favourite "chuff" shape can then be cut into the tube, or if you don't have a special design, just file a slot like a whistle so that the steam blows over the sharp edge. The end of the chuff pipe is fitted with a plug that may be soldered or loctited in place, and the plug is slotted for a screwdriver. Painting the top of the chuff pipe makes it less visible.

Press the chuff pipe onto the spigot, and test that the diverter moves to the full stop in both directions without obstruction. Some more easing and fiddling may be needed to find the optimum position.

If everything goes according to plan, you should now be able to enjoy a draincock steam display whilst getting rid of all that water and oil from cold cylinders. Happy steaming!

The "Beast"... a Portable Rail Cleaner

by Larry Bangham

Portable tracks spend their lives being set up, heavily used, wiped off, torn down and stored. As a result the rail never acquires the surface patina that nature provides on permanent outdoor installations. The result is that traction is always 'iffy', being proportional to the effort spent on wiping rails.

This situation bothers me particularly because I enjoy slow speed heavy hauling which is not really compatible with slippery rail.

The idea of using high velocity steam to blow steam oil off the tracks came to me during a sleep time think session a couple of years ago. I remembered it the next day and proceeded to modify a Ruby to test the idea. With a very small steam jet blasting away, the Ruby could provide about 40 pounds of steam initially but would then drop off to around 15 PSI steady output. But it was enough to convince me that the idea would work if a large, good steaming boiler, providing at least 40 PSI of pressure could be found.

Torry Krutzke's generosity started me on this project. After learning of his K27 coal fired boiler conversions, I approached him with the idea and he graciously donated an Accucraft stock K27 boiler, burners, and steam valve to the cause.

David Bailey kindly contributed a K27 smoke

The "Beast", with Spray Foreman Mario in his seat.

box front and door, thus instituting a marriage between the gas fired and coal fired versions.

Then Jerry Hyde gave me a good price on an Accucraft flat car, which I soon proceeded to cut up.

The basic look of the car was inspired by a picture of a weed abatement car that Clark Lord sent me.

Engineer R. Stanton...sportsman, part time insurance agent. Figures by Little Railways.

It showed the end of the car with the operator, spray bar controls in hand, sitting in a cloud of poison vapor...Perfect!

To achieve a realistic look, the boiler was insulated and then clad with brass sheets imitating the look of an unjacketed locomotive boiler with lots of simulated rivets and bolts. It has a functional steam dome with safety's and a whistle. It sports a sight glass, pressure gauge, nozzle control valve, Goodall type valve, commercial fuel canister with heater and control valves, and even an electric feed water pump.

Sheet steel acts as an insulator under the boiler, and the train crew figures have magnets in their shoes to keep them in place.

Some of the design challenges have involved mounting this huge boiler on a plastic car, providing the strength, with reliable tracking, and trying to keep the weight down. The completed car weighs over 14 pounds in running order, and has 16 wheels.

The car was lengthened by splicing in two 3 inch sections, saving the end detail and the center truss rod section. Aluminum and oak doublers back up the joined frame members and the outside truss rods are functional, limiting the deflection. The length is 28 inches over the coupler faces.

The four trucks are mounted on two double bogeys allowing good articulation and a 7 foot minimum track radius. The car is exceptionally free running, being mounted on Gary Raymond ball bearing wheels. Gary very generously donated two wheel sets to the project.

The first real test was running the car at the 2005 National Summer Steamup in Sacramento. It did pretty well as I was able to pull the Beast behind a drag car with my SP Mikado. After the first lap it was chugging along slowly under heavy throttle with minimum driver slippage...something it normally cannot do on portable tracks without first wiping down.

However, the event pointed out three major shortcomings in the concept, two of which have been corrected.

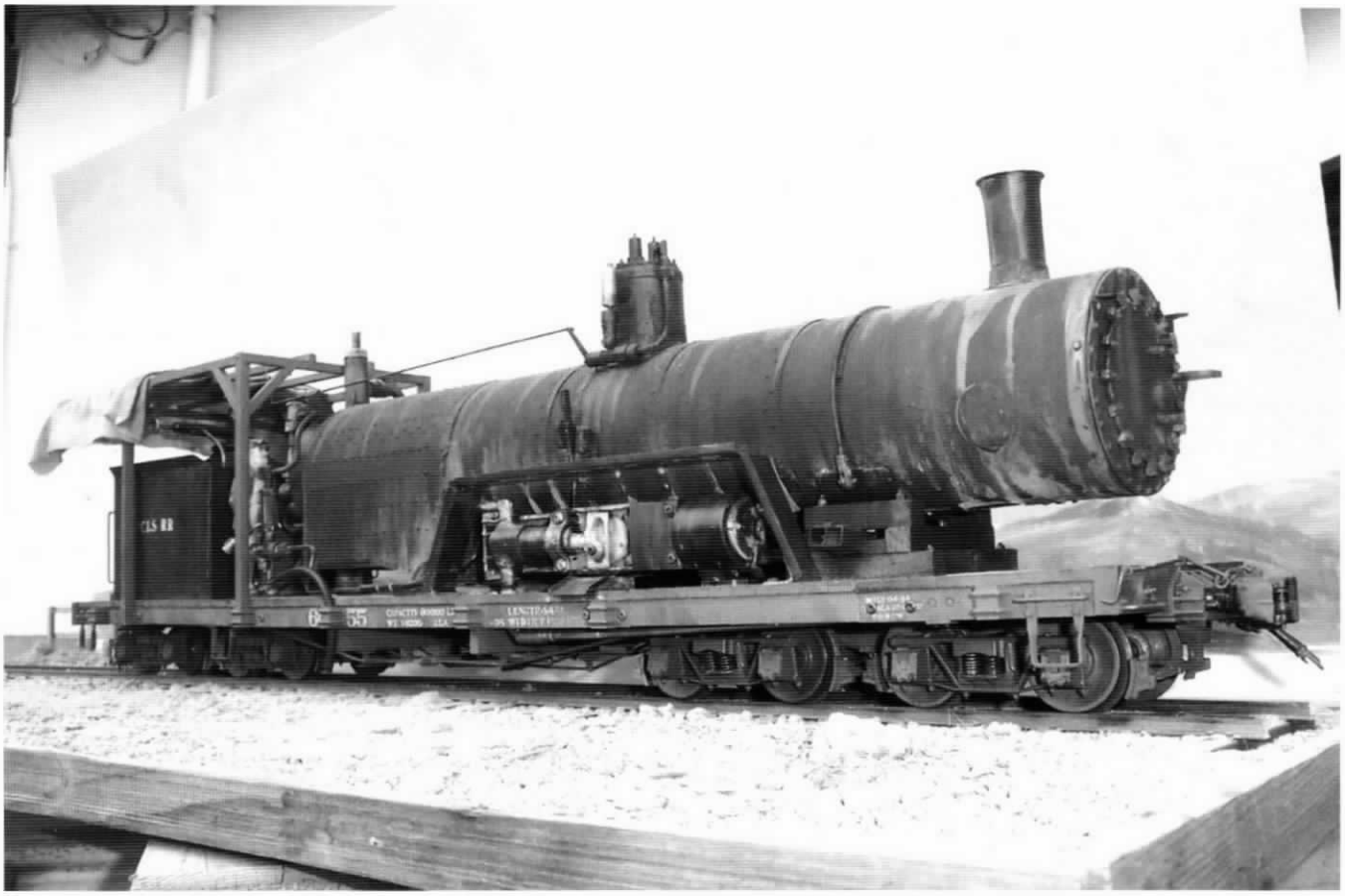
The first was not being able to produce quite enough steam to maintain adequate velocity at the nozzles. To improve this situation the nozzle slots were reduced in width from .015 to .010. The slot length which is transverse to the rail remains at about .050. The small size of the nozzles causes the steam to cool very rapidly. Holding your hand two inches away actually produces a cooling sensation.

In addition, ni-chrome radiant screens were added over the gas burners. The largest radius tents that would fit were used with the anticipation that the larger burner / tent gap would result in increased radiation at higher gas velocities. A cross section of the tent resembles the shape of a fan. This change required enlarging the burner mounting holes in the backhead. The boiler now maintains the target pressure of 40 PSI minimum with the nozzle control valve full open.

The second problem was keeping the steam nozzles centered over the top of the rails. The nozzle assembly is mounted on the trailing truck and is indexed to the trailing axle. Unfortunately the standard wheel profile provides lots of side to side excursion which allows the nozzles to drift off center, especially on curves. This problem was solved by modifying a set of Dean Lowe wheels to fit into the truck housing the nozzle assembly. These wheels have a large radius between the tire and flange which cancels out the side to side motion.

The car is designed to be pulled with the nozzle assembly trailing in the rear. This is a protective measure that prevents the nozzles from getting hung up on uneven track. When trailing, the spring loaded nozzle assembly will lift up and pass over an obstruction. There are twin nozzles on each track which gives the effect of a wash and rinse cycle. Only one complete circuit is required for normal cleaning.

A track loading type of transporter has been built so that the Beast can be fired up at a table, carried to the track and off loaded onto the rear of a departing train. This frees up valuable siding space. After one or two circuits the burners can be shut off and the car pulled to the end of the run, or it can be cut out and picked up on the transporter. This will help conserve fuel and water.



The mammoth boiler provides plenty of steam for the job.

The third problem, pointed out at the summer steamup, is one that brings up the practicality of the whole project. It seemed like there was considerable reluctance on the part of steamers to participate in the track cleaning operation. However, there was much enthusiasm while observing it in action, as it presents quite a dramatic sight. When it goes by a string of cars, steam is shot under the cars, coming out the far side. I remember this sight as a kid when an engine

would be blowing down on an adjacent track as it moved along on the far side of a train. Kind of a scary when you are walking through a yard.

It may be just a matter of education. To be effective the car should be run say, about every 5th train or so. If there are multiple tracks this means that it will get considerable use. Maybe that is more trouble than it is worth. It is not difficult to operate but it does require the attention of an engineer to monitor its vital signs. So that means that a duty roster would have to be displayed on the steamup board. It is much easier to just grab a rag and start wiping but not near as much fun and a lot more laborious!

After the above improvements were made, I pulled a weight using a gram scale on my aluminum test track, to measure the difference in friction between a track wiped down with naptha and wiped dry, and the same section of track, smeared with steam oil, then blown clean with the track cleaner. After the condensation dried there was no measurable difference between the two. This involved no wiping after using the Beast. What little residue there might have been was probably mostly solids which, when combined with the oxidation, may have added to the adhesion factor.

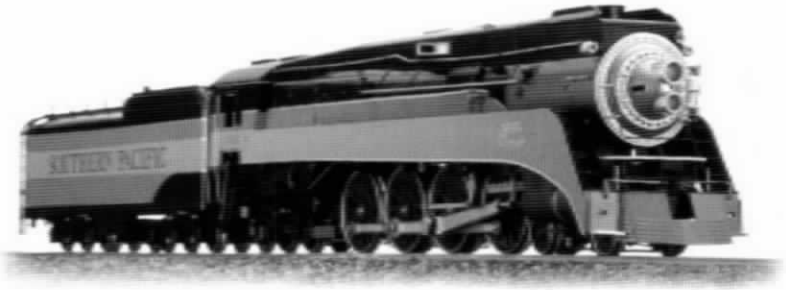
So, although there may be occasional bugs that show up, I feel that the original objective has been achieved. This has been an interesting project. One that turned out to be feasible, but maybe not practical. Time will tell.

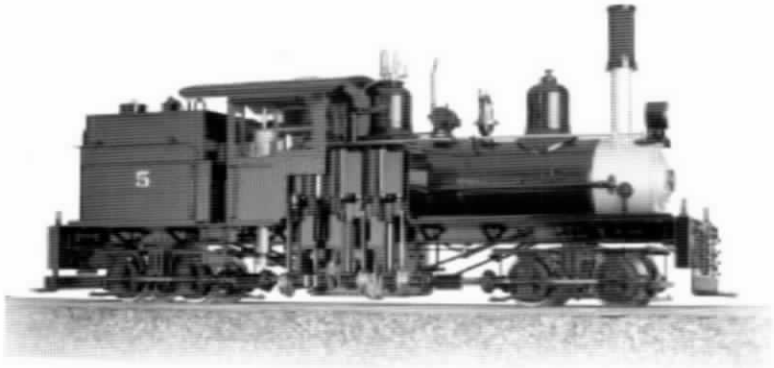
When I first started this project I decided that if it worked, I would donate it to the Pacific Coast Live Steamers to use at their events. When Jerry Reshew saw it he asked if it could be brought to Diamond Head for a demo. This sounded like a good idea, but who would care to transport it? This started a discussion with Sonny Wizelman and it was tentatively decided that a shipping container could be built for the Beast and its transporter. This would allow different organizations to share in its use by having it shipped to their steamup for a trial. Dwight Ennis was approached by Sonny on this matter and has very generously offered to build a shipping container.

There are details that need to be worked out, but if this sounds like it may be of interest to those of you organizing steamup events, a call to Sonny Wizelman will more than likely provide the status and availability of this wonderful beast.

Fireman Big John...logger, philosopher and former clarinet player.

Accucraft's exciting new SP Daylight (GS-4) in Live Steam, priced at just $4449.99! Now taking orders...don't miss out on this one! Call for order forms. A small deposit will be required to secure a place in line. ("Built to order" engines - C-21, K-27 Daylight require deposits)





Accucraft 3-Cylinder Shays....

We've got 'em in stock!

We are one of only a handful of Accucraft dealers authorized to sell the magnificent new K-27 in live steam. Call now to reserve yours!

We have the popular and smooth running Accucraft Mich-Cal Shay. (see the review of this loco in SitG № 68)

IN STOCK

We've got Aster Mikado kits with both pumps....call for our price.

- *Aster Locomotives*
- HARTFORD CAR KITS
- DELTON CARS
- ACCUCRAFT DEALER
- KADEE COUPLERS & GAUGES
- DEL-AIRE PRODUCTS
- SPLIT JAW RAIL CLAMPS
- 70%/30% Butane/Propane, 15.9 oz. (800ML), $5.50 each in boxes of 12. Twice the gas per can - a 27% savings!

CROSS CREEK ENGINEERING

P.O. BOX 369
SPENCER, OH 44275
PHONE 1-800-664-3226
e-mail: crosscreektrains@direcway.com

The Nuts and Bolts of Shays Boilers, Part 1: Vertical and Boot

By Dan Rowe

The vast majority of Shay boilers were made with riveted steel plate construction. Some welding was used on the fire door hole and other locations on boilers built after the mid 1920s. Starting in 1880 through the early 1890s, most boilermakers were switching from wrought iron to steel for boiler plate, so wrought iron plates and tubes might have been used on early Lima boilers.

The introduction of cheap steel made it the logical choice of material, because it has a greater tensile strength than wrought iron. Internal parts of the boiler, including stays, braces, rivets, the fire door ring, and the mud ring were forged from wrought iron, because it is more ductile than steel. The 1891 catalog specifies homogeneous steel for boiler plates. Copper was used on some early inner firebox sheets, and brass was sometimes used for tubes on boilers made for foreign countries. All of the boilers used for Shays are very similar to industrial or locomotive boilers of the time

Boilers built by the Lima Machine Works and its successors were classified in the records according to the form of the boiler. The five forms listed in Lima records are: vertical or upright, boot or tee, straight or horizontal, wagon top or locomotive and extended wagon top. The boiler size given for vertical and boot boilers in Lima records is the outer diameter of the vertical section. The other three types (which will be covered in detail in the next issue) have rectangular fire boxes with a cylindrical horizontal shell built in telescopic sections or courses. The sizes of these three types of boilers are listed in Lima records as the diameter of the smallest course at the smoke box end.

The types of fuel used were wood, oil and three grades of coal; soft, anthracite, and lignite. Only a few Shays were designed to burn anthracite or lignite. One of the more interesting anthracite Shay designs (S/N 3235-3239) had enclosed cabs. They were built for the New York Central Railroad. Lignite was burned by Shays located at Thoreau (S/N 2027 & 2321) and Perea, New Mexico (S/N 2582 & 2773) and Dawson, Yukon Territory (S/N 2190).

Some boilers were designed for easy conversion between two fuels such as coal/wood, or wood/oil. The fuel type was changed to suit the local conditions, sometimes changing for the season or to use a lower price fuel source. This was simple on early engines built for wood or coal. The smoke box arrangement on these early locomotives was the same. The only difference was the grates. Wood-only locomotives were built with plain grates, which are flat bars fitted in slots. Coal burning engines needed the more expensive rocker grates to break up slag formation. The early Shays equipped with rocker grates did not need modification to burn wood. The conversion of wood-only engines to coal required switching to rocker grates.

The first Shay to burn oil was S/N 718, shipped 08/15/1902. Oil tanks were designed to fit in the fuel bunker. The oil heater, burner, and controls were added to standard boiler designs. The less obvious change to burn oil was a new ash pan strong enough to support the fire brick used to keep the intense oil flame from impinging on the inner firebox plates. Sometime around 1900, the design of the smoke box diverged for different fuels. The main difference was the size and shape of the petticoat pipe. This pipe is a venturi tube, which uses the exhaust nozzle to create a vacuum in the smoke box. The same smoke box parts are used for oil and wood. The petticoat pipe for coal has a smaller diameter. A completely different boiler design was used to burn anthracite. Dual fuel boilers were shipped with all the parts needed for conversion.

Vertical Boilers

Vertical boilers (Figure 1) were first used as locomotive boilers in the United States on the Baltimore and Ohio Railroad for the Tom Thumb, and the early four-wheel rod locomotives known as Grasshoppers. In 1842 the last vertical boiler to be built for a main line railroad was a 0-8-0 built by Ross Winans for the Western Railroad.[1] The simple cylindrical form of the vertical boiler makes manufacturing and repairing this type the least expensive of all boiler types used for locomotives. This made it the logical choice to power the early 1880-1884 Shays. Vertical boilers only found use on class A Shays with a cylinder size of 8"x8" bore and stroke or smaller.

All of these drawings except the vertical boiler are based on actual Lima drawings, and use their nomenclature. A Lima drawing of the vertical boiler could not be located, so a drawing of the submerged tube type of vertical boiler found in a boiler textbook was modified to fit the existing data.[2]

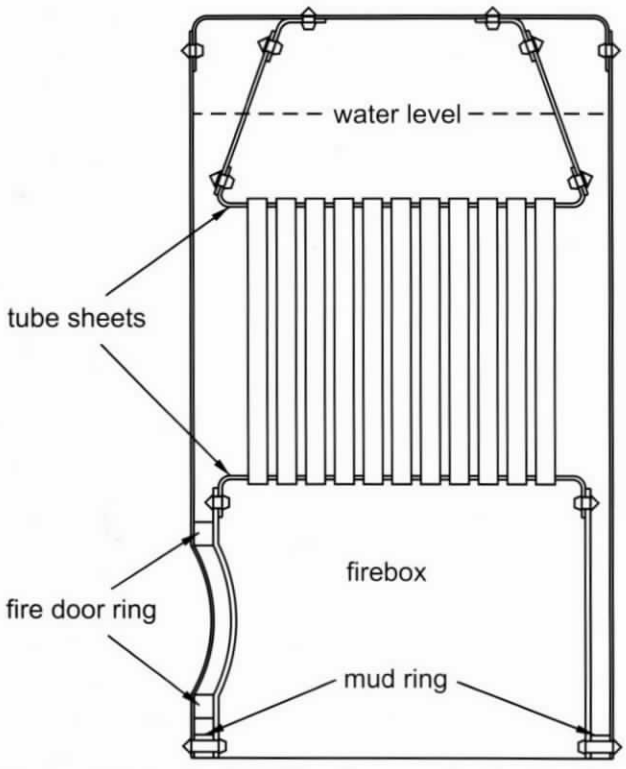


Figure 1 A typical 1880 submerged tube vertical boiler

The most common type of vertical boiler had the upper ends of the tubes above the water line. Over-firing this type of boiler is very dangerous practice because the exposed section of tube will overheat, leading to boiler failure. The vertical boilers used on Shays were the submerged tube type, also known as the submerged head type. The upper tube sheet and the entire length of the tubes are always below the normal water line, allowing safe transfer of the combustion gas heat to the boiler water.

The advantage of a vertical boiler, besides being easy to make, is a small footprint allowing the water tank and fuel bunker to be on the same platform. The most significant advantage from the crew's point of view is safety. The distance from the normal water line to the top of the firebox is greater than on any other type of locomotive boiler. This allows the boiler to operate safely on any grade where the locomotive still has traction.

The cylindrical form of this boiler with very few openings makes it the strongest type of boiler used for Shay locomotives. These boilers were made in two sizes: 44" diameter by 78" high (44"D x 76"H) and the larger 48"D x 90"H. The disadvantages of a vertical boiler include a small grate size and a short tube length of 30 or 34 inches.

Despite these disadvantages, vertical boilers were used for a lot of applications, including Dolbeer steam donkeys, Best traction engines, road rollers, and fire engines. Vertical boilers are still used for auxiliary steam in port on modern diesel ships. The short length of the vertical tubes lets the hot combustion gases rise rapidly and a large portion of the heat goes right up the stack. Forcing the fire on this type of boiler will cause it to throws sparks and become a fire hazard. Less than 2% of all Shays built used vertical boilers. The last Shay with a vertical boiler was S/N 239, shipped 06/06/1889.

Boot or Tee Boilers

The first Shay positively known to have a boot or tee boiler (as Lima commonly referred to them) was S/N 62, shipped 02/10/1883. The boot boiler is best described in the 1884 catalog:

> "This boiler is new in form and construction, being a union or combination of what is known as the upright and horizontal form, or two cylinders joined together at right angles,

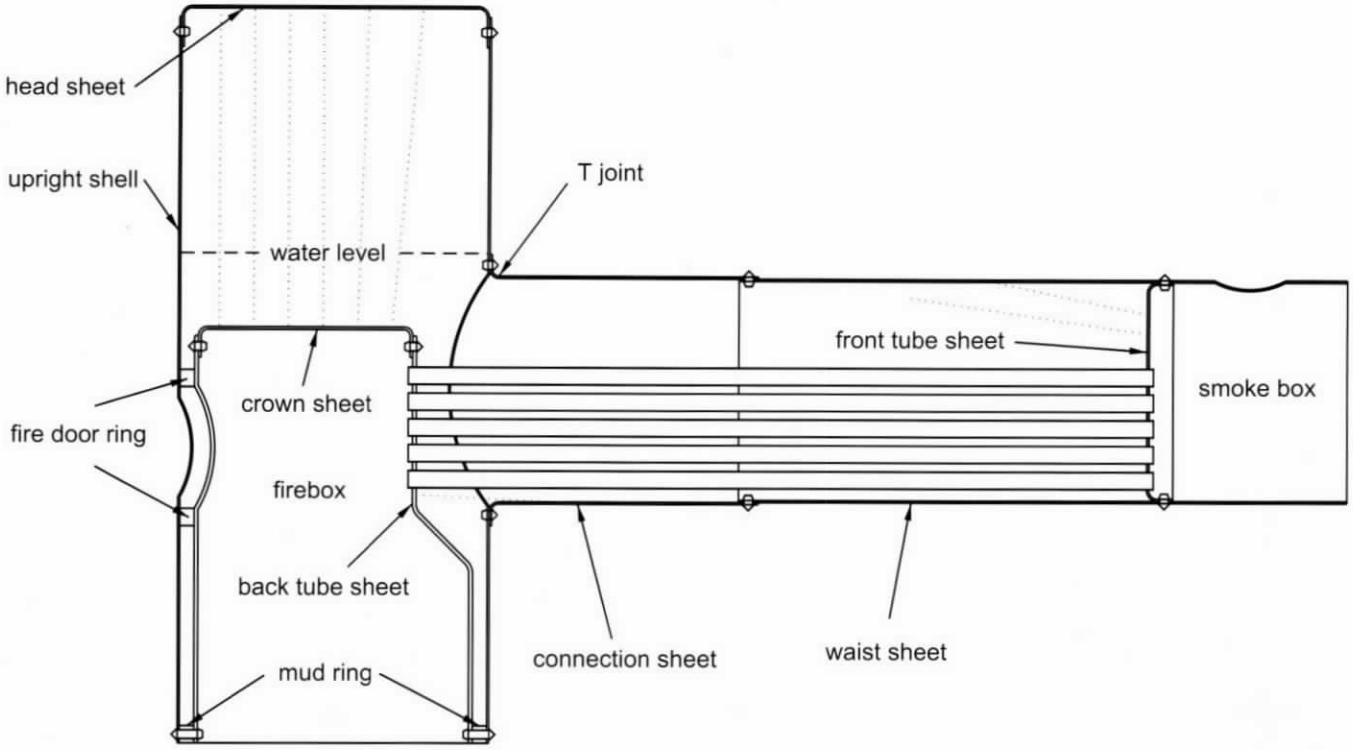


Figure 2 Boot or Tee Boiler

> combining all their strength and steaming properties…The steam generating power of this boiler is about double that of either the plain upright or horizontal."

The two sizes listed in this catalog had vertical sections the exact size of the vertical boilers already mentioned. The horizontal section for the 11-ton class with two 8"x8" cylinders is given as 30" diameter and 90" long. The horizontal section for the 15-ton class with two 8"x10" cylinders is 36" diameter and 96" long.

A smaller version of this boiler, with a 36"D x 90"H vertical section, and a 26" diameter horizontal section, was introduced in 1885 with S/N 132, a 13-ton model with two 7"x12" cylinders. In 1891, the smallest size of boot boiler was used on S/N 341, which had two 6"x10" cylinders. The vertical section of this boiler was 30"D x 72"H with a horizontal section 22 inches in diameter. These two small class A Shays were the main use of boot boilers. A few other engine sizes used boot boilers, including two-cylinder 8"x8", 8"x12", 8"x10", 10"x10", and 10"x12" engines. S/N 444 and S/N 684 are the only known class B Shays to use boot boilers. S/N 117 and S/N 119, the only known three-truck two-cylinder Shays also had boot boilers. Boot boilers were also used on Climax locomotives and Star oil-drilling rigs.

The advantage of the boot boiler over the vertical boiler was that the combustion gasses are forced to pass through horizontal tubes before reaching the smoke box, resulting in a much more efficient use of the heat. The circular form of the boot boiler did not require the extensive use of internal stays and braces. The circular section of the firebox is connected to the upright shell with stay bolts. Dotted lines on the drawings indicate the locations of the braces.

The weakest point of this form of boiler is the T joint. Early drawings show only the flanged connection sheet riveted to the upright shell. Lima added an internal reinforcing ring to strengthen the joint. The grate area for a 48-inch diameter firebox is only 10.5 square feet. This small grate area was only sufficient for two-cylinder and small three-cylinder engines. The last Shay built with a boot boiler was S/N 1977, which shipped 07/17/1907.

[1] White, John H. "American Locomotives" revised edition pg. 95 (1997)
[2] "Boilers Types and Designs" pg. 16 International Correspondence Schools (1907)

Workshop Project

The Black Art of Butane Burners

by Paul Blake and Brian Wilson

This article was published in an earlier form in the Australian Model Engineering magazine

Any enthusiast who has worked with small scale live steam has probably come across the butane burner. This is a wonderful invention which breathes life into our tiny locos and has many advantages. It is clean, reliable and easily controllable. More importantly, the fuel is as cheap as chips down at the local Asian Supermarket.

We see these devices burning beautifully and reliably in commercial locomotives such as the Roundhouse brand and we marvel at the efficiency of them and their simplicity. But those of us who have attempted the building of one often find that they are not as simple as they look, and achieving an easy lighting and efficient burner is sometimes frustratingly difficult. Anyone who doubts this to be the case should scan through the various small scale live steam web boards and discussion pages to see how many times problems with butane burners are mentioned.

Well, we have studied them in great detail during our journey building small scale live steam and we have concluded - Butane Burners are indeed a Black Art. But like all Black Arts they do give up their mysterious secrets from time to time and we have decided to write down what we know or have learned.

Our starting point was the Argyle Philadelphia design. We both built one of these locomotives as our introduction to live steam when Gordon Watson of Argyle Locomotive Works was offering them as a 'machinists kit'. Gordon's original design used 1/4" heavy wall tube 55mm long with 16 slots at 3mm centers using 0.010" (0.254mm) saw width (note that this is a very narrow saw width like a razor saw- by comparison a junior hacksaw will cut a slot about 0.7mm and a normal hacksaw about 1mm).

The thick wall tube recommended for that design was found to have an ID of 1/8". We found that in our experience the Philadelphia burner as built lit easily and burned well but did not create enough steam for continuous running, particularly with a load. This is where the Black Art bit starts as some builders have used this design and had no problems, and Gordon Watson built literally hundreds of this model.

Extensive testing and talking suggested that the burner tube was not large enough in diameter, resulting in restricted availability of oxygen.

Subsequent experimentation led to drilling out the ID of the tube to 3/16" and opening up the slots with a junior hacksaw blade with the "set" ground off, giving a slot width of about 0.6mm. It should be noted that the 3/16" ID must be drilled before cutting the slots, otherwise you will end up with a tangled mess. Please don't ask how we know this!

This size of burner held steam and was just adequate in a 5/8" flue tube, but for locomotives we subsequently built with a 3/4" flue tube something larger was needed.

In all this experimentation we learned some other basic rules for the Black Art of Butane Burner Design:

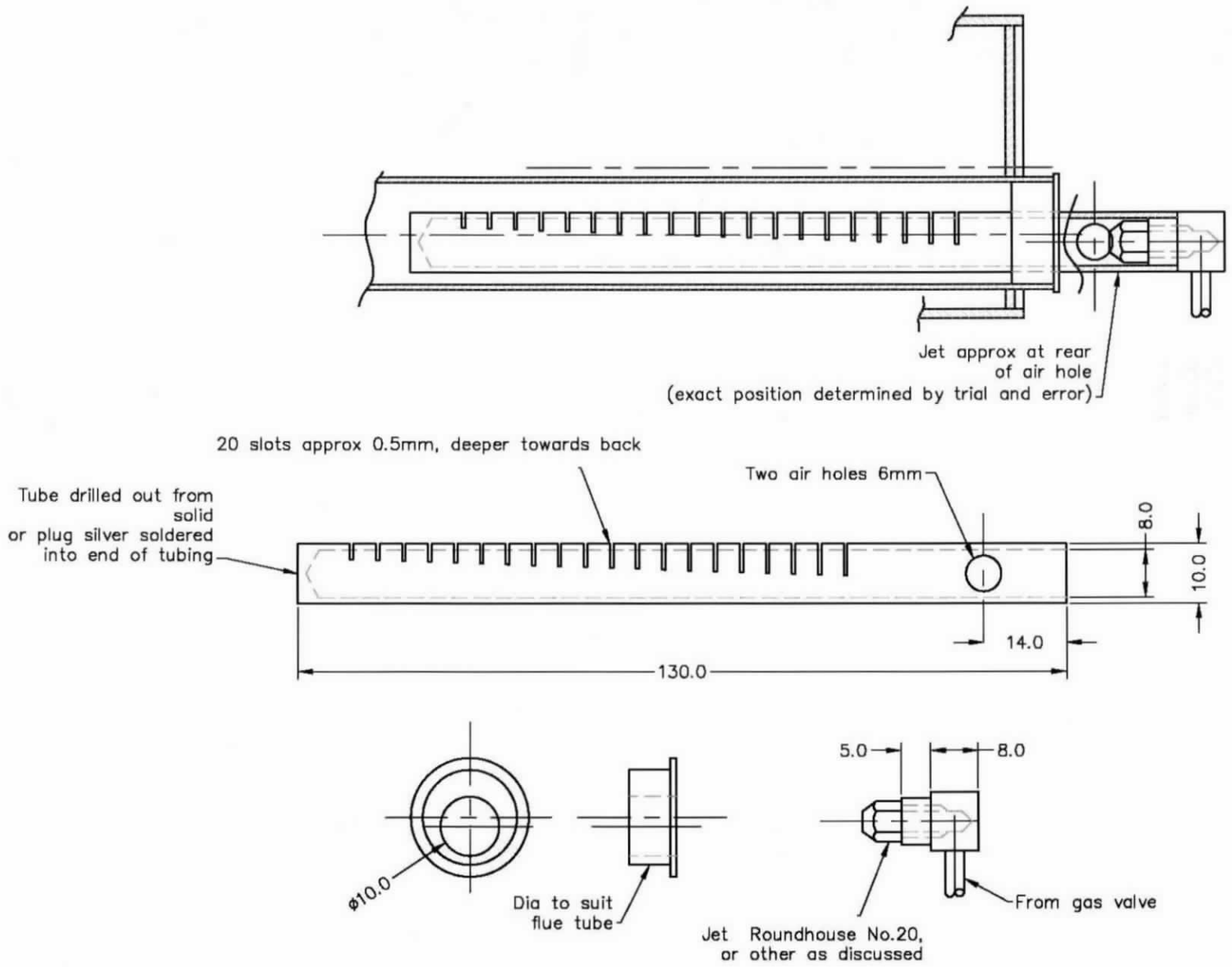
- The gas jet must point directly down the center of the burner tube. To achieve this you need a close fit of the jet holder in the mixing chamber housing.

- Generally the burner slots should taper from just cutting through the burner tube at the front end to approximately half way through the tube diameter at the back. This encourages a more even flame.

- Generally the burner should light easily through the chimney or from the smokebox (i.e. "pop back") with the face of the gas jet positioned about 1/3rd into the air breather hole from the rear.

- A larger burner tube ID provides a more efficient burner.

- 'Termimesh' (a fine stainless steel mesh readily available in Australia) either inserted inside the burner tube or wrapped around the outside can



BURNER FOR 2" BOILER (Brass)
with 19mm FLUE TUBE

quiet noisy burners (but not always).

- If at first the burner does not light or burn efficiently replace the jet. If this does not work try another jet. In other words have a small supply of jets (they are cheap) and try several before you call your burner a failure. We cannot explain this except by suspecting poor quality control (to be fair it must be hard to achieve such accurate tiny orifices).

- A blocked jet can be cleaned by blowing butane back through it from the face.

- No idea why this works, but a recalcitrant burner has been coaxed into working by first lighting it out of the boiler.

After building many live steam locos between us and studying burners in several factory locos we have arrived at the following formula:-

- Outside Diameter 3/8" - Inside Diameter 1/4" (at least).

- Length of burner tube 80mm to 100mm depending on boiler size.

- About 24 slots at 4mm centers cut with a junior hacksaw with the set ground off.

- Within this burner design we have used the following jets depending on how much heat is needed: G, GN or HM. These jets are readily available in Australia from larger camping stores. They have a M4.5x0.5 thread

This burner design fitted to a number of locos provides more than adequate steam and has to be turned down so far when steam has been raised that it operates very quietly.

The above mentioned jets are part of a range with the following specifications:-

- E 0.10mm x 3.32mj/hr .004
- FM 0.13mm x 5.28mj/hr .005
- G 0.15mm x 6.80mj/hr .006
- GN 0.17mm x 7.72mj/hr .007
- HM 0.18mm x 9.08mj/hr

The first figure is the diameter of the jet orifice and it is presumed the second figure is the gas usage and potential heat output.

It is noted that the standard Roundhouse jet is 0.20mm (with a 1BA thread), but in practice the HM jet provides a significant amount of heat.

The next common issue is 'burner howl'. This afflicts some locos very badly and even varies from run to run. Our advice is to firstly ensure that the burner is assembled carefully and all the components lined up accurately. Make sure all surfaces are smooth and free of burrs. Next try some stainless steel mesh rolled up and inserted inside the burner tube.

The burner howl problem seems to arise from harmonics in the air flow and we know that this can sometimes be solved by blanking of part of the air holes with a sleeve or collar. The burner survives on oxygen, however, so don't go overboard with the blanking off – the objective is to change the nature of one air hole relative to the other. In reality when using the burner design principles we have outlined here we find that our burners are reasonably quiet and produce so much heat that they can be turned right down when running.

The final critical issue is the temperature of the butane gas. On cold days (which are rare in most parts of Australia) butane gas loses pressure as it gets colder. Occasionally this becomes so severe that the burner will not function properly and like the "watched pot" will not boil.

Several remedies are available, the first of which is to use butane with a small amount of propane added (commonly about 20%). This is available in most camping stores. Propane is not as susceptible to the lowering of pressure effect and therefore these mixes perform better. Please note that pure propane or propane in higher percentages must not be used under any circumstances in standard locomotive gas tanks.

The second remedy is to ensure that your gas tank is located close to the boiler so that some warmth is transferred into the gas tank as the boiler temperature rises. This of course does not overcome the problem at first light up. Other more radical solutions include locating the tank in a water bath in the tender. This technique is commonly used in colder countries but we have not found such requirements necessary in our climate.

A quick fix that works is to simply wrap your fingers around the tank for a couple of minutes to transfer some body heat. This is usually effective enough until some heat builds up in the boiler.

If you follow these guidelines in the building of a butane burner and its operation you should find that the black art is mastered and you will have an efficient and reliable firing system for your small scale locomotive.

SWAP SHOP

For Sale: Back issues of ***SitG*** for sale. Starting with Oct/Nov 1991 [72 magazines in all]. Most are in mint or near mint condition. Contact me for list, condition, and price. Robert Nowell, 41 Sam Brooke Circle, Lehighton PA 18235 or e-mail me at coalportrr@aol.com (84)

Wanted: Aster Grasshopper, kit or built. Contact Alex Azary at 734-769-9898 or e-mail shaysteam05@comcast.net (85)

For Sale: COLORADO & SOUTHERN # 22 Gauge #1 ASTER Live Steam Locomotive. Runs well. Has FM radio control of throttle, reverse, and the whistle by Larry Bangman. Fuel system reworked so that it works. Also has electric drive on pump with onboard batteries. LED in headlight, also fitted carrying case. $2500 or might consider trades. Dave Conroy 239-283-8323 or LIBERTYBOAT@JUNO.COM (85)

For Sale: ACCUCRAFT RUBY 1 in original box, never steamed - 2 gondola cars and caboose - $275 all - I pay shipping (lower 48). Robert Mayer, 5307 E Corkery Rd., Spokane, WA 99223 e-mail: mayerville@msn.com phone: 509-4438034 (85)

Swap Shop listings are offered at no charge as space permits. No dealers and no phone-in ads, please! Send your listings to SitG, PO Box 335, Newark Valley NY 13811 ● fax to 253-323-2125 ● e-mail to <rbrown54@stny.rr.com>. Ads must contain sellers name, plus address and/or phone number. Ads will be run one time only unless previous arrangements are made.

END OF THE LINE

Contest!

Regner's Willi just cries out to be bashed into an endless variety of neat little creations, so we're going to have a **Willi Bashing contest, co-sponsored by *Steam in the Garden*** and the **Train Dept.** Send us your best photos (preferably digital hi-rez, but we can use glossy prints) and a write up about what you did and how you did it. At the end of the year we'll have a panel of unbiased judges select the best, and we will award prizes of **$100 for First Place, $50 for Second Place and $25 for Third Place.** All winners will also receive a one-year subscription to ***Steam in the Garden.***

Photos of the winners will be published in SitG, as well as the best write ups. *Steam in the Garden* and the Train Dept. will retain the rights to all entries, and the right to use them in articles, advertising, promotions, etc.

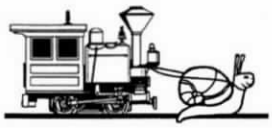
So get out your bashing tools and get busy! We can't wait to see what you're going to create....

Happy Steaming!

Ron

ADVERTISERS INDEX

Please tell our advertisers,



Aster Hobby USA LLC

101 Theiler Rd. Spartanburg SC 29301 USA
Tel: 864 587 7999 Fax: 864 587 2299
Web: asterhobbyusa.com Email: asterhobbyusa@teleplex.net

--------- Exclusive US importer and distributor for Aster live steam locomotives and accessories ----------

If your passion demands 1/32 scale live steam models of highest precision, aesthetic presentation and prototypical functionality, look no further than Aster. All locomotives are designed and manufactured by Aster hobby Co. Inc. of Yokohama Japan.

Delivery of the new NKP Berkshire #779 is now in progress. Do not wait any longer!

Aster Hobby USA LLC would like to express a sincere thank you for your enthusiastic response to this latest US prototype locomotive. At the time of this writing almost 70% of the production has sold out. Please contact Aster Hobby USA LLC or your authorized Aster dealer concerning availability.

Now under development at Aster Hobby Co. Inc. Japan

Southern Railway "Bullied Light Pacific", also known as "Spam Can"

Also known as the "Spam Can", this West Country Class Light Pacific is projected in two versions, Malachite green as shown, and in later British Railways livery. Projected production release is Summer 2006. Reserve your preferred version early. Check our website for more detail.

Southern Steam Trains LLC Travelers Rest SC 29690 Tel. 864 834 3954 Web: southernsteamtrains.com	Sunset Valley Railroad Sumner, WA 98390 Tel./Fax 253 862 6748 Email: sales@svrronline.com	Cross Creek Engineering Spencer, OH 44275 Tel. 800 664 3226 Email: crosscreektrains@direcway.com	North Jersey Gauge One Park Ridge NJ 07656 Tel. 201 391 1493 Email: Bob1027Jane@aol.com
Quisenberry Station Alexandria VA 22309 Tel. 703 799 9643 Web: quisenberrystation.com	Gauge One Lines Stittsville Ontario Canada Tel. 613 836 6455 Email: gaugeonelines@yahoo.com	Bear Creek Railroad Surrey British Columbia Canada Tel. 604 594 8695 Email: pantages@telus.net	The Train Depot Winter Park FL 32789 Tel. 407 647 2244 Email: mykal54@att.net

Aster Hobby USA LLC has in stock for immediate delivery USRA Mikado, BR 52, BR 38, BR 89, KPEV P8, LMS Jumbo, L&M LION, Thunderbolt, JNR 9600 Hokkaido or regular version, as well as JNR rolling stock and all popular accessories.