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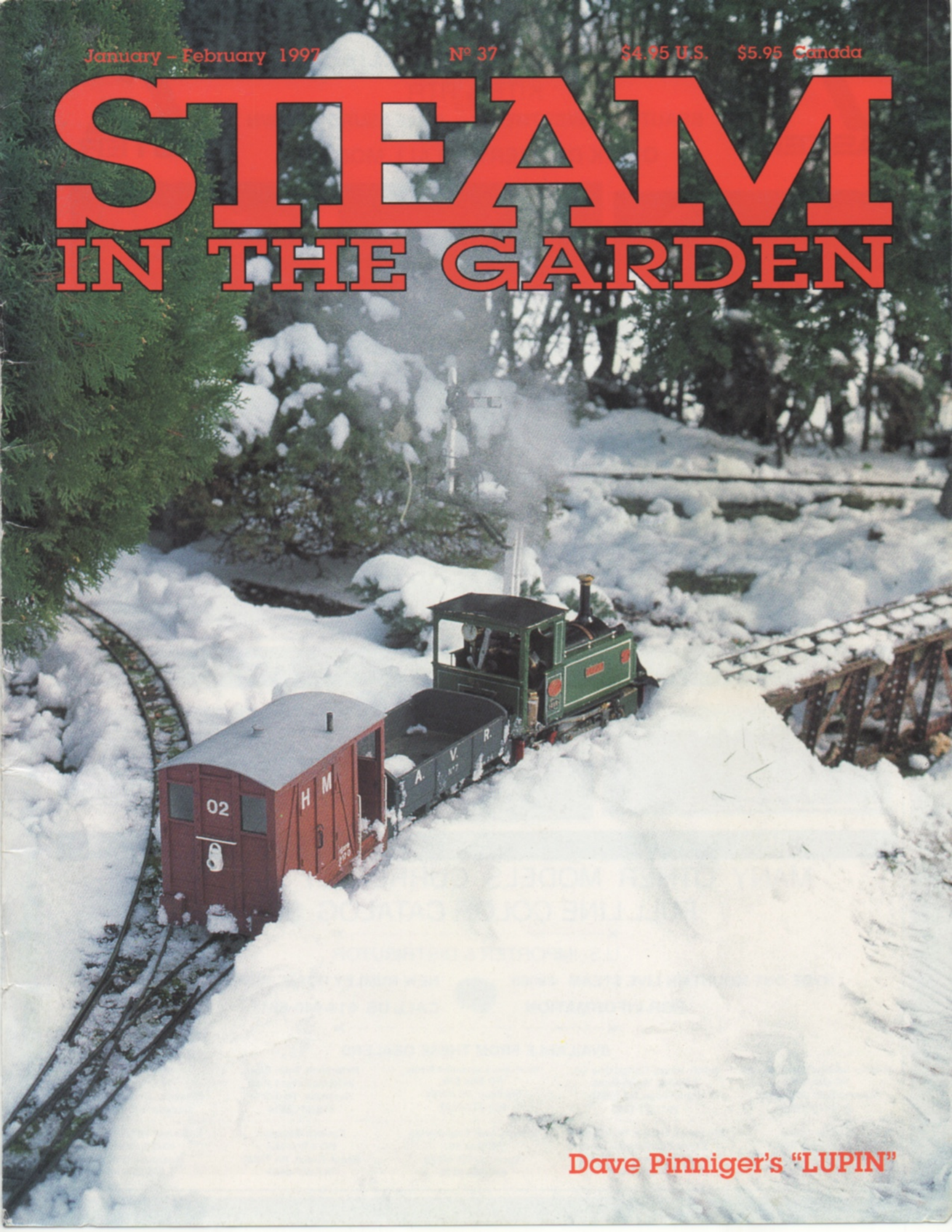

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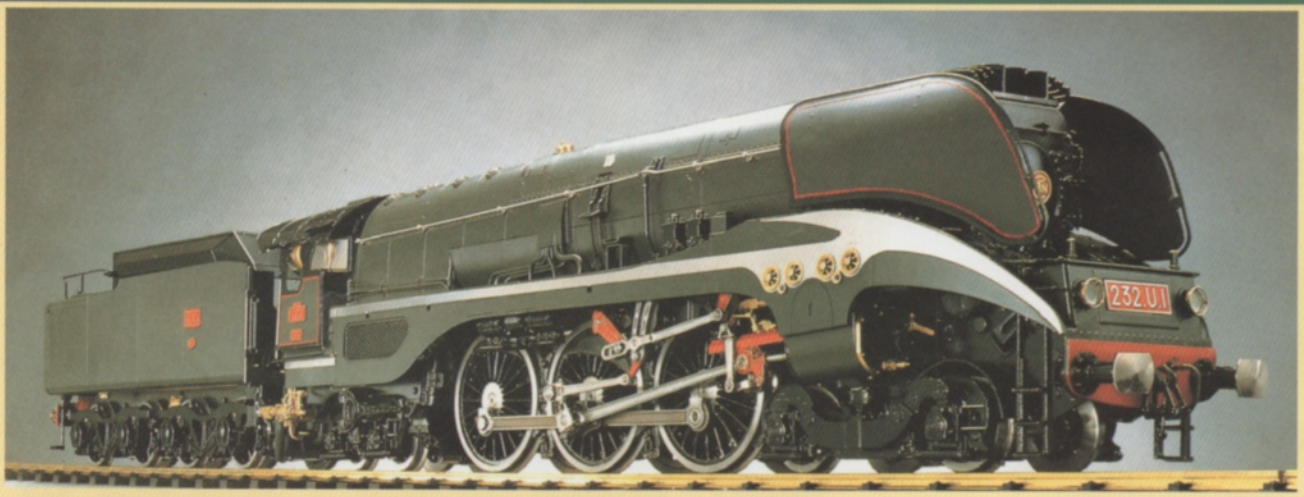

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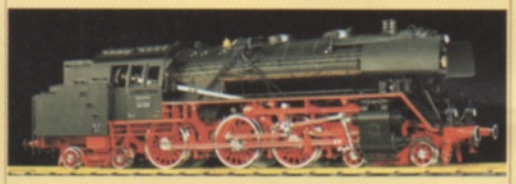

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STEAM IN THE GARDEN

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January/February 1997

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ON THE COVER:

"Lupin" moves past the point and approaches a small trestle on the way out of Bishop's Amble. "Lupin" is a Pooter Class loco, designed and built by the late Jack Wheldon. This was a very stubborn loco that refused to run properly anywhere but on Dave Pinniger's Ambledown Valley Railway, and so it now earns its daily bread hauling AVR stock.

Photo by Dave Pinniger

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Faithful Assistant
Marie Brown

Graphics Director
Harry Wade

CAD (and other) drawings in this issue by:
Harry Wade, Peter Jones & Larry Bangham

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Crankpin	The South
Rich Chiodo	New Hampshire
Tag Gorton	England
Peter Jones	Wales
Joe Leccese	Massachusetts
Kevin O'Connor	California
Mel Ridley	England
John Wenlock	Wales

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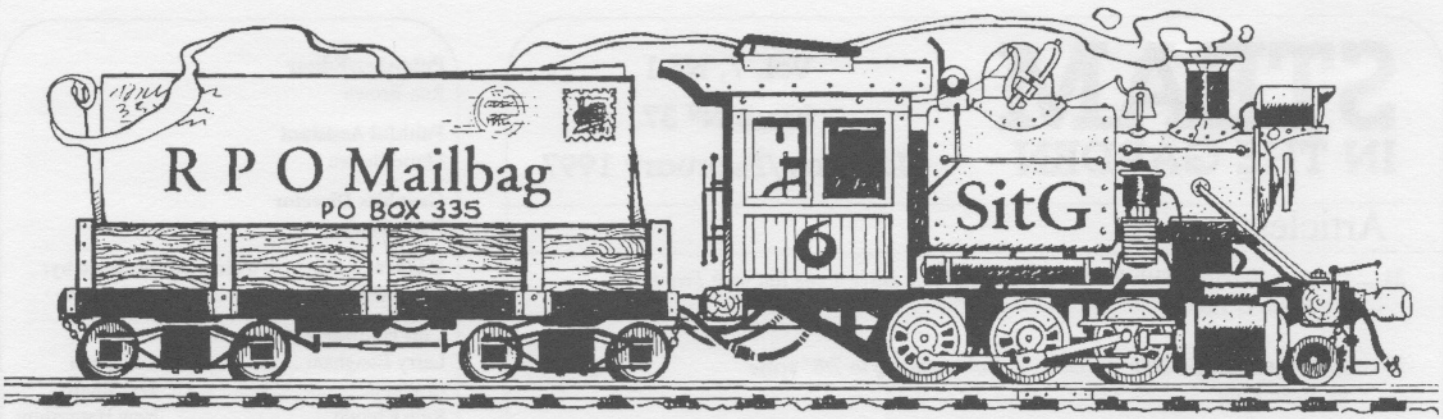


Letters from readers are welcomed and encouraged. Offer advice, encouragement, suggestions or constructive criticism. Tell us about your current project (and don't forget the photos!) or just share live steam experiences. But please keep your letters to a reasonable length so everyone has a chance to use this forum. Some 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.

* * * * * *

Dayton, Ohio

Dear Ron,

Enclosed is the poem I mentioned to you about the SCORPION locomotive, built by Geoff Coldrick of Geoffbilt. Ever since the review of this loco was published in SitG (Vol 2 Nº 3, Oct/Nov 1991) I just had to have one. Finally in June, 1996 I ordered a SCORPION and received it in August. The wait was well worth it. It's a beautiful engine and an excellent runner.

I hope no one will mind if I took a few poetic liberties, and I believe the poem may apply to other little beasties as well.

Sincerely,
Ross V. Doughty Jr.

THE SCORPION

Set the little beastie on the gauge one track
It chugs around the rails, nothing out of whack
Its fat little belly ready to boil
The powerful pistons spitting hot steam oil
Out of the stack a billowing white cloud
The Scorpion is ready to dance for the crowd
The pressure gauge pushing thirty psi
The little scale fireman with soot in his eye
His Engineer holding the throttle down good
Kept yelling at the fireman, more wood, more wood
Suddenly a rabbit got trapped on the track
The engine hit the rabbit, a scary whack
The rabbit was released from where he lay
I smoothed down his fur and he hopped away
The little engine, unmarred, lay on its side
Put back on the track, it chuffed away with pride.

Champaign, Illinois

Hi Ron,

Well I had great success this weekend with my Mogul. I built a new boiler for it. The old one leaked and never did work right. At Larry Herget's house last weekend, the thing was leaking water all over his portable track and could not get above 40 PSI. Needless to say it would not run more than a few feet.

So I bit the bullet and made a new boiler. This sure was easy the second time around (the last one took 6 months to make, this one was built in a day!).

The new one works like some of the Aster boilers I have seen. It stays steamed up until it is out of water. I have increased the flue surface area (I calculated 28 sq. inches of surface for two cups of water), installed cross tubes, added external water tubes in the fire area, and I am heating the outside of the boiler using a heat shield as well as drawing heat through it.

This one was made from a 2 inch copper pipe with two 1/2 inch copper flues. The heat shield is the only weak part, being made out of an old alcohol can. It may melt from the heat.

It only took three minutes to get up to 60 PSI, and than ran for 15 minutes at 25 PSI until it was out of water. I will send a diagram for your readers of the new design. I hope to meet you at Diamondhead.

(via e-mail)
Ernie Noa

* * *

Toronto, Canada

Dear Ron,

Just a short word to tell you what a great issue Nº 35 is! The new Climax series looks like it will be very interesting, and the article by Larry Bangham on steam whistles is the **first** original contribution I have ever seen on that difficult subject. More power to him – can we expect him to come up with a chime whistle next? Way to go!

Regards,
Peter Trounce

Albuquerque, New Mexico

Ron,

Kevin O'Connor's series on the "Frank S." has turned out to be an unexpected pleasure. I read it last, since I don't have a Frank and don't expect to, but I found that the information he's including and his whole approach to steaming are eye-opening.

I hope there aren't other readers who are skipping these articles because they don't have Franks, either. They'd be missing out on some really good writing about small-scale steamers in general.

Thanks for mentioning the web site in the latest SitG. Unfortunately, though the change of e-mail address was correctly noted, the corresponding change in the URL was missed. So, the URL you printed is now disconnected. The proper URL is now:

<http://www.nmia.com/~vrbass/steam/steamfaq.htm>

Regards,
Vance Bass

* * *

La Mirada, California

Dear Ron,

I would like to thank Murray Wilson for taking enough interest to point out my reinvention of the Helmholtz Resonator. There is nothing like being 150 years too late. However, the factors determining pitch are no quite as simple as Murray suggests. I checked the pitch of three different size whistles, along with their alternate supply tube lengths, against the equation he submitted and the results were generally within two or three half tones of the actuals. Some low, some high. However, with the supply tube (neck) removed, the results were within one half tone. That is very close. I think that due to the small volumes that are involved, the location of the supply tube inside of the resonator alters the acoustic qualities of the resonator cavity, changing the pitch and imposing the need for 1/4 multiples in the supply tube length. Whew! I have been massaging this problem so long that it almost sounds like I know what I'm talking about.

Anyway, I feel honored to be able to utilize the principles of the well known physiologist Hermann Von Helmholtz (1821-1894) in such a noble application. It sort of adds an air of legitimacy to the project. Perhaps I should rename the whistle the "Helmholtz-Bangham Harmonic Resonator". Wouldn't that be a mouthful!!

One cannot help but wonder why this well known principle was never applied, at some time in the past, to the development of a small whistle, and if it was, why it has been kept such a successful secret all these years. Could it be that my somewhat facetious reference to the development of small scale steam in Europe was correct? Maybe we will catch up yet.

Respectfully yours,
Larry Bangham

Necton near Swaffham,
Norfolk, United Kingdom

Dear Ron,

Today is the 21st of December – the shortest day of the year. The lack of sunshine here at the Lockstock and Barrel at this time of year tends to make me wonder why we choose to live in England rather than staying "back home" in Colorado. Peggy keeps reminding me that this is where we just happen to earn our livelihood. She's such a stabilizing factor in my life!

Anyway, just as I was slipping even deeper into despair I discovered the latest two issues of SitG in our mailbox! They have brought a little sunshine back into my life!

I think you need to know that you and all of the contributors are doing a really fine job. The cover photos are superb and the articles and drawings are even better. Harry Wade's drawings of the Climax are wonderful, and Mel Ridley's series looks like a winner. I'm not too sure about this Rich Chiodo guy though, with all his talk about turtles in supermarkets and such. Oh well, he seems to have good sense when it comes to naming railroads!

I have subscribed to a great number of train magazines over the years, but I have to say that SitG does more to excite my imagination than any of them – thank you all. I wish that I could join you at Diamondhead, but that will have to wait until another year.

Best wishes for the holidays,
Don Beach

* * *

Royersford, Pennsylvania

Hi Ron,

I am really enjoying the construction articles on the Vest Pocket Climax. I am giving serious thought to building one, but I would not begin until the series is complete, mostly due to time constraints with my profession (what pays the bills or somesuch).

An interesting and educational thing happened to my ASTER Reno – 3 of the 4 machine screws that hold in the throttle and blower valve failed completely. They apparently were not stainless, but seemed to be only ordinary steel. Only 1 could be removed and replaced. The other 3 were partially or fully rusted through and the heads snapped off. (1 of the 3 had completely disintegrated.)

The first step was consultation with some of the great oracles of steam (Rudy Kouhoupt, Paul and Harry Quirk, among others). After complete removal of the boiler, the boiler was mounted upright in a milling machine and a small end mill was used to clear out the old debris. A twist drill would not work since it tends to wander away from the steel in favor of the softer copper on the backhead. Next, we drilled and tapped to replace the screws with stainless steel 4-40 hex heads. These steps were accomplished in the shop of a friend and fellow member of the Pennsylvania Live Steamers - Lee Nonnamacher.

After a thorough cleaning I'll reassemble the engine, but I'm replacing ALL machine screws related to the boiler with new stain-

less steel metric screws.

I related this story to Richard Finlayson, and he notes that the latest ASTER kits that he built do have stainless steel screws, so this may be a problem unique to older equipment, or perhaps just to this individual locomotive.

I learned a great deal from this little adventure, but it also reinforces something that you have commented on about this hobby – the people in it are among the best.

Ed Kabak

* * *

Portsmouth, New Hampshire

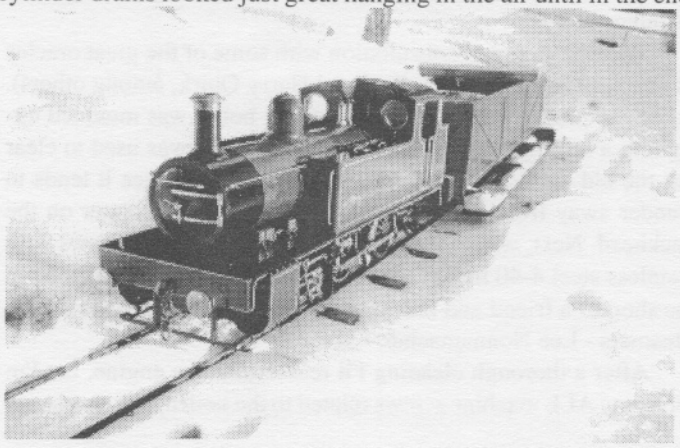
Dear Ron,

Over the past year I have done almost zero to my 16mm steam railway other than occasionally lay some track in my basement and run the train up and down a temporary 20 foot length. Because my loco is regaugeable to gauge 1, I have run it a couple of times on friend's tracks, too. My loco is made from Roundhouse cylinders, wheels and motion under a chassis, boiler and superstructure built by myself, and it is capable, I discovered when running it round Paul Huntington's line, of covering 1/3 mile with five or six box cars behind on one filling of gas and water.

You may remember I first contacted you some time ago about 5" gauge railroads and if you knew of any in the U.S. to run my British tank loco. Well, I checked it out with every other live steamer I met and didn't find any. They are all 4-3/4" gauge. So I embarked upon building a suitable track around my house, and this has been occupying my spare time. When completed I will have about 575 feet of continuous running in the shape of a dogbone.

I have built one passenger trolley from plywood and bought trucks from a manufacturer here. I get my coal locally at $10 per 100 lb. bag. It's anthracite and I have to be careful to always have the blower on hard when coasting or stationary or the fire dies down very quickly, taking a long time to get back up to full strength again. This I believe is an inherent problem with hard coal.

We've had a cold winter with lots of snow but it didn't stop me steaming. Just shovel off the track, light up the loco and warm my hands on the boiler cleading while I wait for steam. On one occasion it was so cold the injector water pipe froze up, but the mechanical pump just kept working. The steam from the stack and cylinder drains looked just great hanging in the air until in the end I couldn't stand the cold myself and withdrew inside.



I know this is a different kind of garden railwaying to the type generally discussed in the magazine, but it's good fun. I enclose a photo of my Simplex in the snow.

Regards,
Jon Guilbert

* * *

Ontario, Canada

Dear Ron,

I'll try to pull together a letter or short note on Kevin O'Connor's theory (SitG Nº 35) as to what goes wrong when fuel pressure is too low. He's absolutely right, and our data (taken for other reasons) shows why.

An article on modifying the Frank S. for narrow gauge or early 1900's branch line service on a North American railroad would be much appreciated.

Yours sincerely,
Barry French

I know that some of you steamers out there (Jim Hadden and Gary Lyons come to mind) have done North American appearance mods to the Frank S. – how about an article and some photos? - ed.

* * *

West Coast Steamup

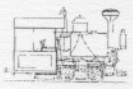
Crowds of people with smiling faces, a full roster of engineers, perfect weather and a great facility all added up to a successful weekend for the First Annual West Coast Gauge 1 Steamup, November 2-3 at the County Fairgrounds in Paso Robles, California. This event was part of a bigger train show that was very well organized by Jim and Lee Fitzgerald and the North County Model Railroader Club. It covered all gauges and associated products, and was well attended by fans from all over the state. Arnold Hoffman of Atascadero was our gracious host for the steam event. He and the Fitzgeralds also coordinated an excellent dinner on Saturday night for the show participants.

The success of the steamup was due in large measure to John & Jeanette Weiland of J & J Trains, who brought their portable double loop track for all to run on. Thanks are also extended to Gary Broeder of Llagas Creek, who brought his portable track on Sunday. Al Kramer of San Val Trains was very gracious and opened his fantastic Hog Canyon Line for guests on Sunday.

Due to the layout of the steaming area at the fairgrounds, there was considerable mixing between participants and spectators. This was great for the spectators, who had practically a hands on experience and could interrogate the engineers to their hearts content, but it was a concern for the drivers who were trying to concentrate and needed quick access to their steeds. Arnold assures us that this situation will be corrected next year.

I believe that this could be an important event for west coast steam. Its central location, excellent facilities and relaxed rural atmosphere make it a great place to bring the north and south...and maybe the east, together to enjoy this wonderful hobby of ours. I'm looking forward to next year.

submitted by Larry Bangham



1997 CALENDAR OF EVENTS

March 22-23, 1997 – East Coast Hobby Show, Ft. Washington, Pennsylvania, USA. Over 200 of the largest manufacturers, distributors and publishers will be displaying the latest and greatest products that the industry has to offer. Exit #26 off the PA Turnpike in Ft. Washington, PA (suburban Philadelphia). For more info, call 1-800-252-4757, or check the web site at http://www.hobbyshow.com.

May 30 - June 1, 1997 – National Spring Steamup, San Jose, California, USA. Come enjoy three days of live steam action as live steamers from around the world converge on Silicon Valley. Gauge 1 and gauge 0 tracks in abundance amid the unbeatable climate and surroundings of Northern California. The Bay Area is unequaled for easy access, exciting atmosphere and predictably great weather. For information see our ad in this issue, or contact Richard Finlayson, 2408 Grandby Dr., San Jose CA 95130 - phone 408/871-0318 (evenings) - e-mail: richardf@steamup.com - On the Web: http://www.steamup.com/steamup

June 20-22, 1997 – 4th Annual Hobo Gathering,"A Large Scale Narrow Gauge Symposium", in Durango, Colorado. Come to the narrow gauge capitol of the world and enjoy a 3-day extravaganza of large scale model displays, how-to seminars, layout tours, tradeshow and much, much more. For more information contact Renee Varble, Co-Chairman, 32496 Highway 550, Durango, Colorado 81301 – phone 970-259-5233 or fax 970-247-5715.

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.)

Start the Steamup Season!

May 30-June 1 1997

National Spring Steamup

San Francisco Bay Area

Northern California

Come enjoy three days of live steam action as live steamers from around the world converge on Silicon Valley. 45mm (Gauge One) and 32mm (Gauge O) tracks in abundance amid the unbeatable climate and surroundings of Northern California. The Bay Area is unequaled for easy access, exciting atmosphere, and predictably great weather. An outdoor steamup track is planned!

Friday May 30th - Sunday June 1, 1997

Tracks available 24 hours a day from Friday 8:00 AM through Sunday 7:00 PM
Sunnyvale Hilton, Sunnyvale California (408) 738-4888 or 1-800-HILTONS.
10 minutes from San Jose, 20 minutes from San Francisco International Airports.
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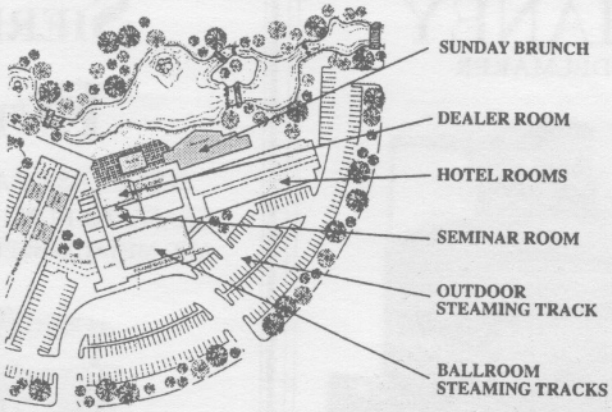

Registration

$50.00 before April 1st. $55.00 after April 1st.

For Registration Information Contact:

Richard Finlayson • 2408 Grandby Dr. • San Jose, CA 95130
Phone: 408/871-0318 (evenings)
email: richardf@steamup.com On the Web: http://www.steamup.com/steamup

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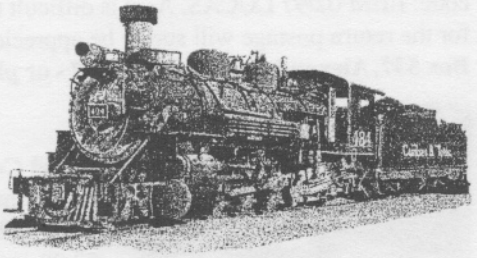
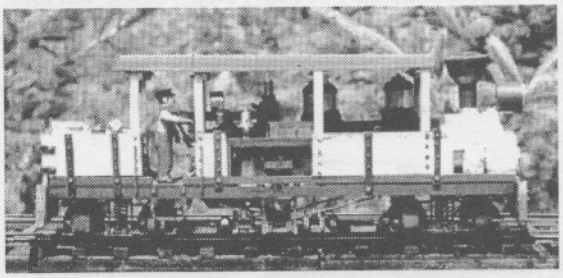
WHAT'S NEW?

Trackside Details, 1331 Avalon Street, San Luis Obispo CA 93405 now has over 150 high quality lost wax cast brass detail parts in their catalog! Wouldn't your favorite engine look better with Pilot Brace & Flange (TD-143), Cab Armrests & Windscreens (TD-147), Air Tank & Valve (TD-149) and Boiler Check Valves (TD-132)?Or dress up your rolling stock with Brackets for Caboose Marker Lights (TD-141) or Sideframes for Small Freight Trucks Used on Mining and Logging Cars (TD-148).There are a lot more parts available from Trackside Details, and many of them are bound to be perfect for detailing your live steam locomotives and rolling stock, so send Pete a check for $2.00 and a LSASE for a copy of his new catalog. You'll be glad you did!



Toltec Images, 1202 Kennedy Avenue, Louisville CO 80027, phone (303) 666-6379, announces a new narrow gauge print, the latest in a series of high quality black & white renderings. This latest print is an image of the Cumbres & Toltec Scenic Railway's Number 484. No 484 is one of ten Class K-36 locomotives built for the Rio Grande in 1925. The print depicts the locomotive as it looked at Chama, Colorado in the spring of 1996. This print is 11" x 17" on eggshell-colored heavy stock paper, and each is individually signed by the artist, Joe Mellen. The price is $20, which includes shipping and handling.



GEOFFBILT, Box 277, Salisbury, N.B. CANADA E0A 3E0 - phone 506-372-4364 - has added a new locomotive to their line of live steamers. The Backwoods Shay shown in the photo features all hard maple construction for the wood parts, which are mounted to a steel footplate. As with Geoffbilt's more modern Shay, this engine runs at realistic speeds. Geoff tells us that it runs great and looks good in operation. Contact Geoffbilt for more information on this engine, or send $10.00 for a catalog and video showing the Geoffbilt line of steamers in operation. Catalog only – $2.00.

Potomac Steam Industries, 5595 St. Charles Drive, Dale City, VA 22193-3503 – Tel: (703) 680-1955 Fax: (703) 590-9399 – E-mail: diesel@erols.com – Internet: http://www.erols.com/diesel/ – is pleased to announce the 1997 availability of two new and exciting live steam locomotives from Wada Works of Yokohama Japan. The first locomotive is a Reading A-4 "Camelback" 0-4-0 complete with tender. A hand water pump will allow the locomotive to be kept under steam almost indefinitely.

The second locomotive is a "Dockside" 0-4-0T saddle tank, similar to those operated by the B&O and Los Angeles Harbor Depatments. The "Dockside" is a self contained locomotive.

Both locomotives are 1/32 scale standard gauge for 45mm track and use the same basic chassis. They boast Stephenson's valve gearing, piston valves, two safety valves, and are alcohol fired. Designed with radio control in mind, your R/C equipment and can be added very easily. Both locomotives feature brass detail castings. These include bells, Westinghouse Air pumps, Hand rails, steps, number plates and headlamps.

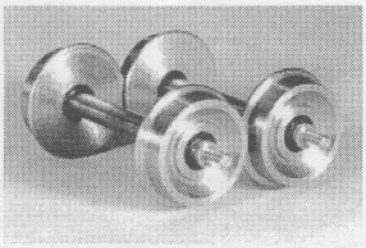
Delivery of the locomotives is estimated for Spring 1997. Price is not firm at this time, but will be approximately $2200.00 for the A-4 and $1500.00 for the "Dockside". For further information or photos contact P.S.I.

Samson Engineering Model Steam Specialists, "Antwyc", 14 Fairfield Avenue, Ruislip, Middlesex HA4 7PH, England – phone 011-44-895-634738, sends word that he has been out of action due to ill health. Mike has asked us to extend apologies to all those who have tried to contact him, and he assures us that he will soon be back in production with his Osmotor. Our best wishes to Mike on his upcoming eye surgery, and for a healthier 1997.

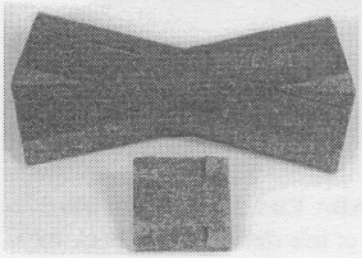
ASTER

Hyde-Out Mountain Live Steam, 89060 New Rumley Road, Jewett OH 43986 – phone 614-946-6611, has been appointed by Aster Hobby Co. Inc. as the new Importer and Distributor for Aster model locomotives for North America. Check the ad in this issue to locate your Aster dealer, and give your dealer a call to check on new, lower prices and immediate availability on factory-built RTR or kit locomotives, parts and accessories.

GARY RAYMOND Quality Large Scale Metal Wheelsets, PO Box 1722, Thousand Oaks CA 91358 - phone 805-492-5858, is pleased to announce their latest release for Large Scale. **E 16 UO** Wheelsets for E Scale on 0 gauge track. E scale is also known as 5/8"n2 (1:19.2) running on American O gauge and SM 32 (1:19.05) running on British 0 gauge. These wheelsets come with standard 0 gauge axles and will fit any 0 gauge trucks made for shouldered axle ends. Needle point trucks may be drilled out to accept the shouldered ends. The wheelsets feature a finescale flange and prototypical appearance and are made of unplated steel. The price of the **E 16 UO** is $3.95 per axle. Order from your local dealer or direct from Gary Raymond.

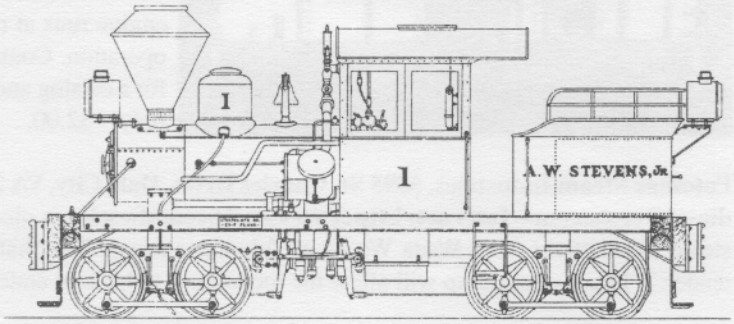


Wilhelm Schroeder GmbH&Co.(Wilesco), Po. Box 2709, D-58477 Luedenscheid, Germany, has announced their new G (45mm) gauge live steam model of the 2-6-0T locomotive "SPREEWALD". Further information can be obtained from the adress above under the code: EBM 02/97 LUCAS. As it is difficult to transfer the DM 2 (German funds) that Wilesco asks for the information material, an IRC for the return postage will surely be appreciated. Readers in North America might try contacting **Yesteryear Toys & Books, Dept. SG, Box 537, Alexandria Bay, NY 13607 - or phone them at 1-800-481-1353**.....and please mention that you saw it in *Steam in the Garden.*



Isabel Central Enterprises is introducing two new crossover units (30° and 90°) to its fast growing line of modular fiberglass roadbed for G Scale garden railroads. The modular units are engineered to work with LGB® and Aristo Craft™ track. For more information about ICE's modular roadbed, send $2.00 and a Large SASE to **Isabel Central Enterprises, P.O. Box 771407, Dept. SitG, Wichita, Kansas 67277-1407.**

Catatonk Locomotive Works, PO Box 335, Newark Valley NY 13811, phone 607-642-8119, fax 607-642-8978, e-mail: docsteam@servtech.com has introduced a new locomotive to their line of geared live steam locomotives. The 1:20 scale model of an 1896 Heisler logging locomotive was jointly developed with well known British engineer and steam engine builder Mike Chaney, and is being produced by Mike Chaney exclusively for Catatonk Locomotive Works.This new loco features a gas-fired T-boiler, slide valve cylinders, Stephenson's valve gear and extensive lost wax castings. Standard equipment includes pressure gauge, water gauge glass and a water pump in the bunker. Production is limited to 25 engines, and the selling price is $1995.00 plus shipping.



GAZING INTO THE FIRE

text, photos & drawings by Peter Jones
(Figs 6 & 7 drawn by Larry Bangham from sketches furnished by the author)

Gazing Into the Mamod's Fire
– or –
Kissing Frogs
(part 2)

We now put the frames to one side and turn our attention to the wheel assemblies. Put the jig described in Fig. 1 (Kissing Frogs, part 1, SitG Nº 34, July/August 1996) into the vice, with that U–shaped opening projecting to one side. Use a 2mm pin punch (or homemade equivalent) to tap the axle out of the wheel, whilst the assembly sits in that cutout.

Don't let the other wheel and axle drop onto the floor. If the gods are unkind, the bushes will slide off the axle and be lost forever. When all four wheels have been tapped off their axles, turn one upside down, with a crankpin sticking down into a hole in the other end of the jig. Tap the pins out. Be warned that crankpins are even better than bushes for vanishing off the face of the earth...

Note that there are two short crankpins and two long ones.

The wheels need to be drilled out 3.9mm. The alloy they are made from is quite soft and, perversely, this makes accurate drilling even more important. A hand-drill is just not good enough. The job has to be done in a bench drill or in the lathe.

I'm afraid that there is no way round it: I have got to say that you need to buy a small tool. It is a 5/32" hand reamer. It will see a lot of use in this job and will find plenty of use in other workshop jobs.

We take the back face of the wheel and enter this hand reamer slightly.

The ubiquitous Mamod...pictured here in both kit form and ready to run. Has any living live steamer ***not*** started his/her live steam career with a Mamod? Or at least tinkered with one or more of them along the way? Has any other live steam loco generated such a bustling aftermarket cottage industry for spares, upgrades and replacement parts?

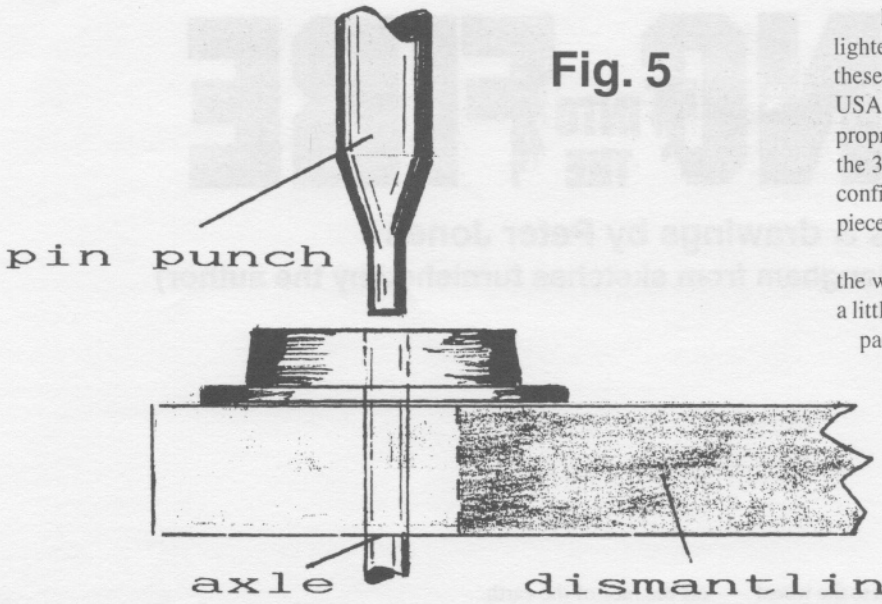


Fig. 5

Push a wheel onto the spigot. The Mamod wheel has two lightening holes cast in. Mark the face of the jig through one of these. Remove the wheel so that you can drill and tap 4BA (or USA equivalent). You will need to consult the tables for the appropriate drill size for your tap. The jig can now be returned to the 3 jaw – that pop mark meaning that you can line it up with confidence. The wheel is pushed onto the spigot and a short piece of studding inserted. This, of course, is what provides drive.

The tailstock is brought up and a revolving centre presses the wheel tight to the jig. If you only have a 'dead' centre, then a little tool can be made up as shown in Fig. 7. This is a pressure pad and will be adequate for us if we are only doing one locomotive. But it will need generous lubrication.

We are going to turn the wheels to a better profile. Now I know that there is active debate about common wheel standards (something often missing in the prototype). I don't intend to enter this debate now but offer a wheel profile which looks reasonable and, more important, works well.

You will need to check through your wheels and find the one with the thinnest flange. They sadly vary and you will need to check with a micrometer. Mount this wheel in your jig and set the lathe topslide to 4°. The tool will need to be ground so that it will give a front face to the flange which is 10° to the vertical. This tool is wound into the work until the flange is cleaned up. Note the reading on the topslide and wind the job in slowly until the wheel has been profiled.

At this stage the topslide is wound back and the cross-slide handle is not touched. The first wheel is removed from the jig and the next one replaces it. Making sure that all four wheels are the same is now just a question of winding in the topslide until we have reached our reading. When all the wheels are done, the tip of one flange is skimmed and, without altering the setting of the cross-slide, the tool is pulled away from the work. The procedure is repeated for the other wheels.

Finally, with a fine file, just round off the tip of the flange and break the edge of the front face of the wheel. Using a small file for such a light job in a spinning lathe is nearly good engineering practice, but don't tell anyone I said so...

You will see that, although parallel, it is slightly tapered at the business end. This is important to us right now. The tool is entered just enough for 1/16" depth of the hole to be opened out to 5/32". It isn't as fiddly as it sounds. The purpose of this is to get a perfect press fit of wheels on axles.

The next task is to turn the wheels true and improve on that wretched profile. For accurate machining we can't rely on the chuck. Here is a job that has to be done right. Fortunately there is another simple homemade tool – a mandrel. This is turned in the chuck and we try not to disturb it once it's there. If it has to be removed, make a mark on the mandrel, opposite the Nº 1 jaw of the 3–jaw chuck.

The mandrel is made from a stub of 1.1/8" mild steel, about l/4" long. Turn the end face true. Whilst doing this, leave a spigot projecting from the centre. This only needs to be 1/8" long and a diameter such that the wheel is a snug fit on it.

Because we have made that pop mark, we can now remove the mandrel with confidence that it will go back in place and be true.

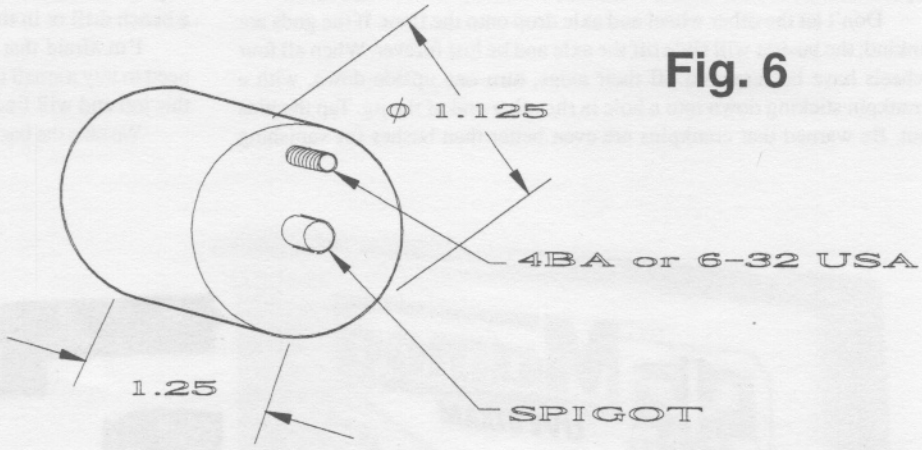


Fig. 6

Make from mild steel

WHEEL TURNING MANDREL

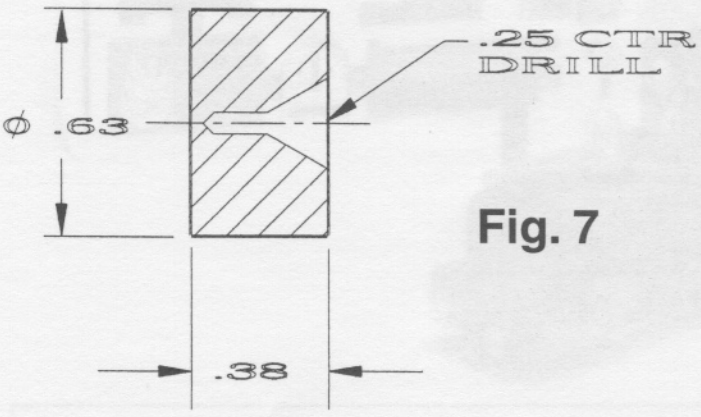


Fig. 7

Make from mild steel

PRESSURE PAD

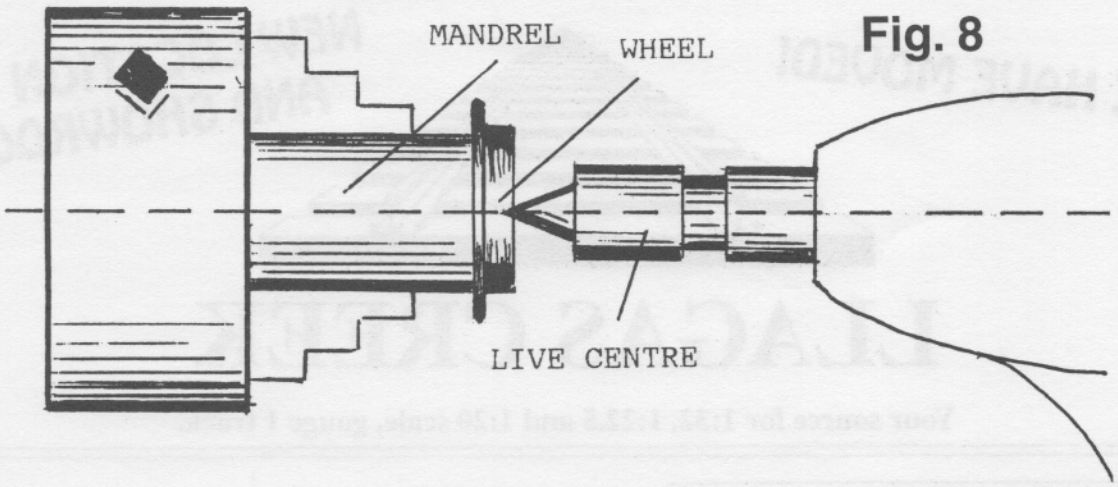


Fig. 8

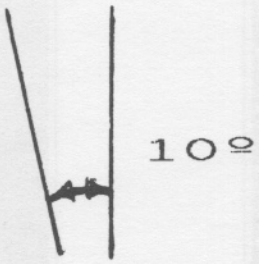
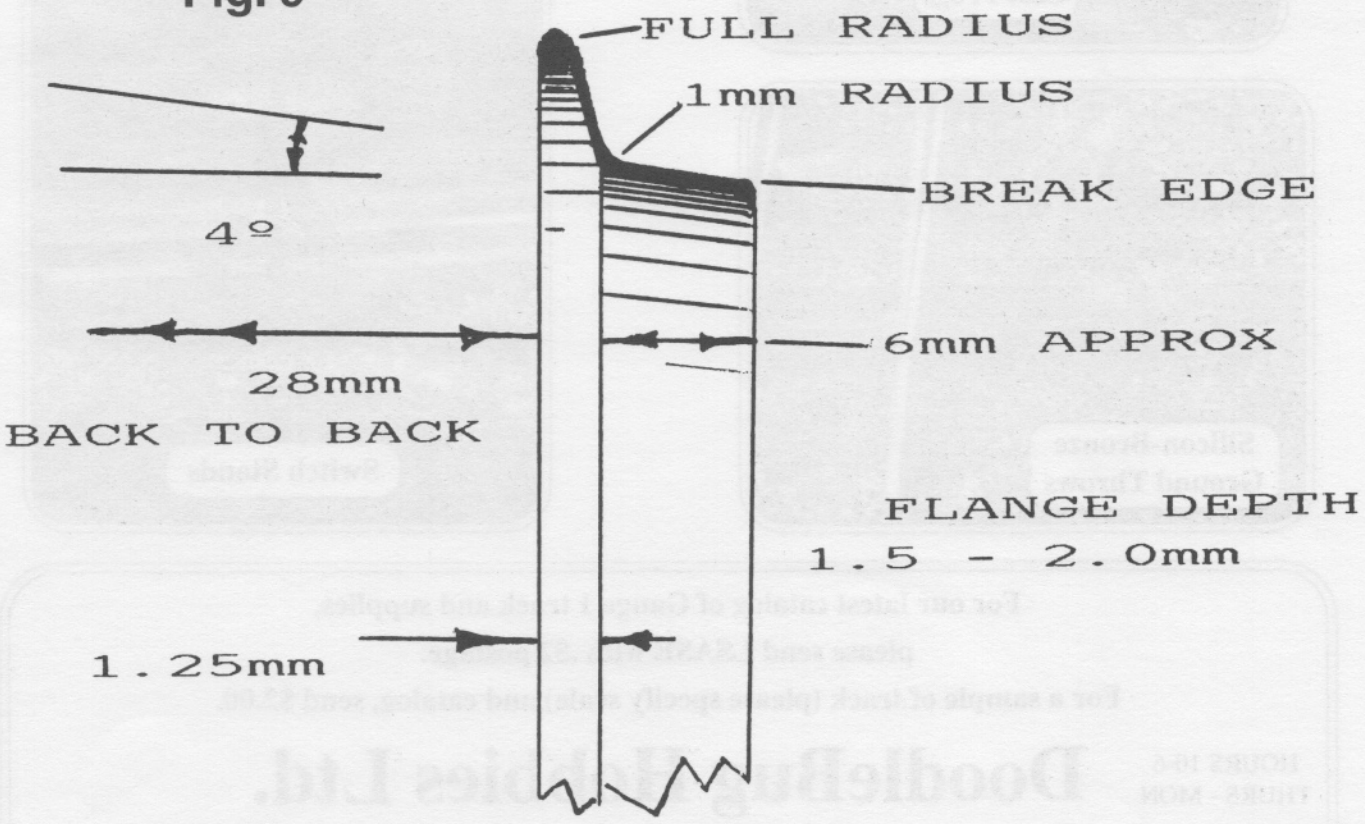


Fig. 9



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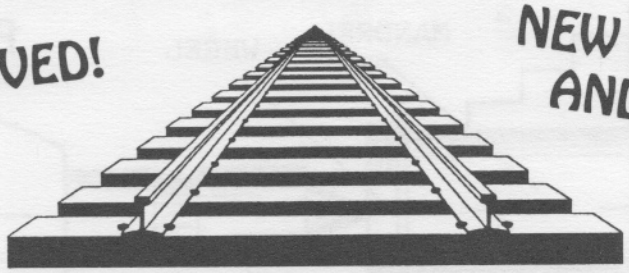

LLAGAS CREEK

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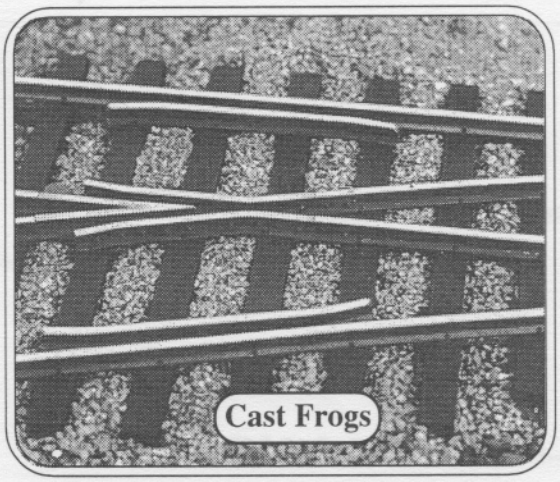

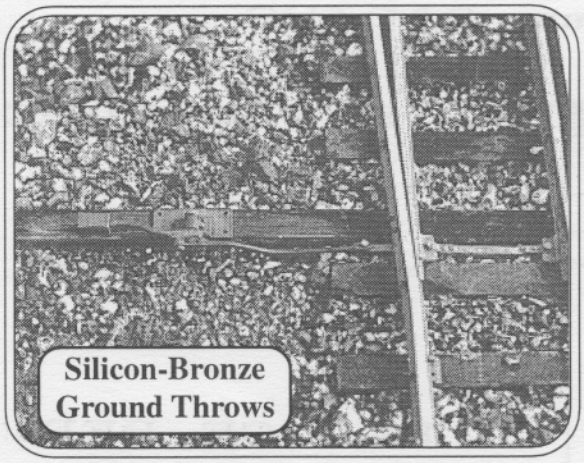

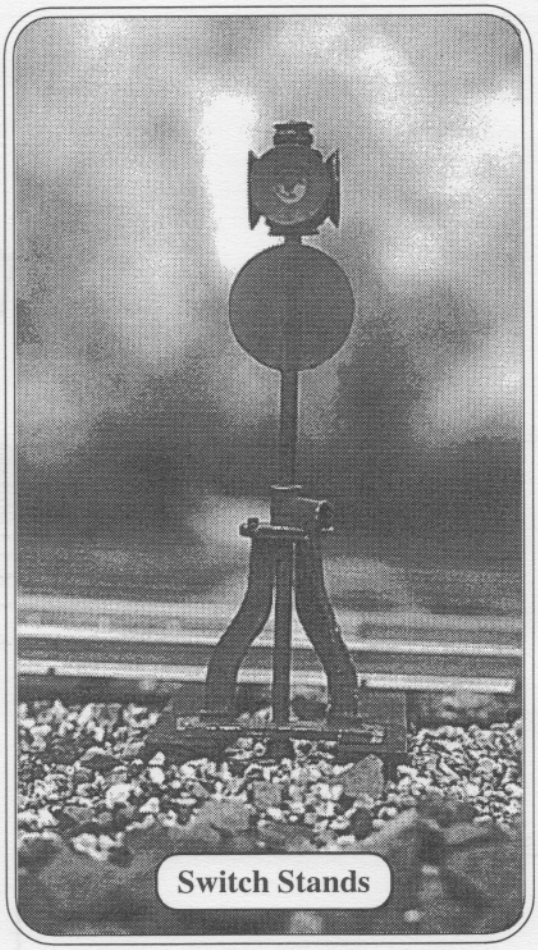

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The Fitter's Bench

by Crankpin
drawings by Harry Wade

Tapers and Their Turning

Several issues ago I described the purpose of the many "tapers" (Morse, Jacobs, B&S, Jarno, etc.) which have been applied to machine tools and accessories over the years. Without resorting to needless repetition, I will refresh your memory by saying that these tapers were developed by tool designers or inventors in order to provide a means of accurately holding attachments or for driving cutting tools. They were all made to geometric formulae which fixed their proportions as a function of either the included angle of the taper or the amount of taper per linear foot. They are all designed to provide two principle qualities which are to optimized the taper's ability to be inserted quickly and hold firmly against rotational forces yet be easily released from its socket when the job is done. In order to perform well, tapers used in this way must be turned to a degree of accuracy that is greater than can normally be achieved by the unaided hand and eye. There are other tapers of interest to us which must be turned with an equal degree of accuracy. Miniature injectors for instance, which are finicky beasts at best, operate poorly and often do not function at all if any of their three internal cones (Fig. 1) is not spot-on for angle and proportion.

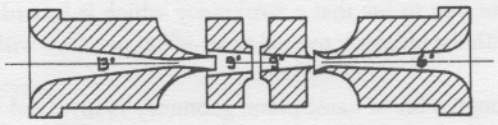


Fig 1: INJECTOR CONES

On the other hand, there are those situations in which the accuracy of a taper is not particularly critical, such as when it does not have to fit a socket, or when it is applied for appearances. A few examples of tapers of this type would be the those normally applied to the treads of railway wheels (Fig. 2), the turned connecting rods or valve rodding of stationary steam engines (Fig. 3), or the traditional ball end handle which is a great favorite of those of us who sometimes make their own tools (Fig. 4).

Although artillery is not the focus of this magazine, I shouldn't forget to include miniature cannon in this list as it is the favorite first exercise in taper turning. What is always desired, however, is a means for applying the taper so that its angle is continuous, and repeatable, and it's turned surfaces are straight, that is, linear and without humps and bumps or a change of angle along its length. Even though these and the previous examples of tapers could be turned by hand, it would be very difficult and the length of time required to do a passable job could not be easily justified. What is needed then is a mechanical aid for the lathe which can be quickly set up and will produce tapers that are accurate, linear, and repeatable.

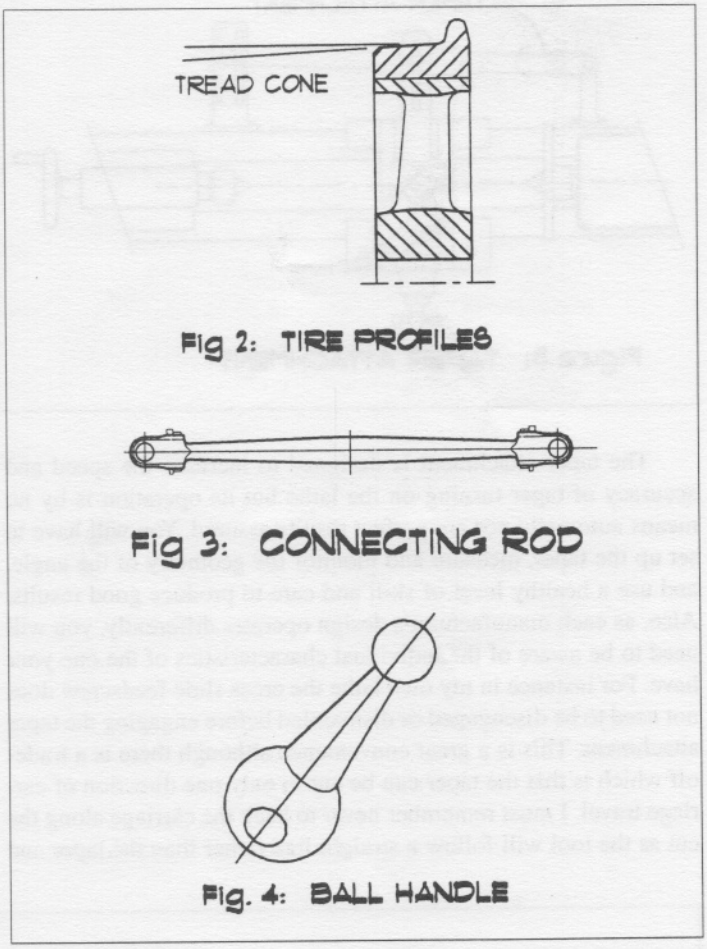


Fig 2: TIRE PROFILES

Fig 3: CONNECTING ROD

Fig. 4: BALL HANDLE

There are three ways in which tapers with the aforementioned characteristics can be turned on the lathe. The first method is to use the **Taper Attachment**, a lathe attachment which is shown in top view in Figure 5. This is a rather a substantial bit of tooling which is intended to be permanently attached to the back of the lathe bed and to the cross slide.

Permanence in this case means that because taper attachments are often very bothersome to install, sometimes requiring the dismantling and alteration of the cross slide mechanism, once they are in place there are few good reasons why they should be removed. The attachment is designed to provide a means for moving

the cross slide across the lathe axis (the Y-axis) at a fixed rate relative to the amount of travel along the X-axis. It does this by using a linear guide (a), very much like a small set of ways, which can be pivoted to create an included angle from the lathe axis of from 0 degrees, parallel with the lathe axis, to about 10 degrees. Somewhere on the face of the guide there is usually a stamped or engraved vernier scale or dial which will allow one to set the angle to be cut to within a fraction of a degree.

Running on this guide is a sliding block (b) which is attached to an extension the lathe cross slide (c). To cut a taper, the cross slide feed screw is disengaged (if required) and as the lathe carriage is moved along the bed, the block, acting on the angled guide, causes the cross slide and the cutting tool mounted on it to cut at an angle to the lathe axis, thereby producing a taper on whatever work is being turned.

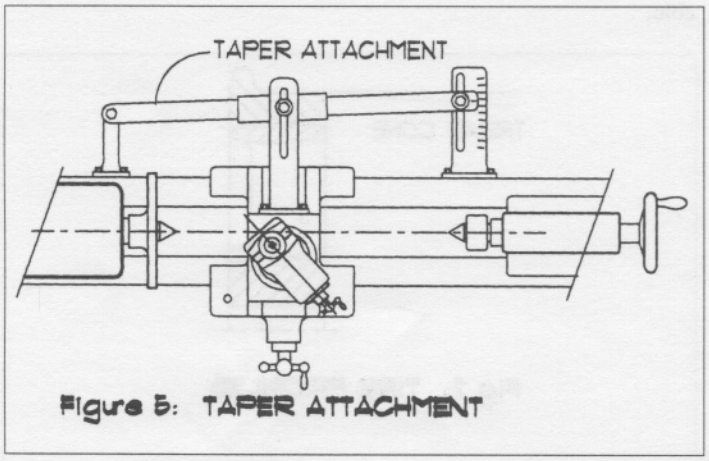


Figure 5: TAPER ATTACHMENT

The taper attachment is designed to increase the speed and accuracy of taper turning on the lathe but its operation is by no means automatic nor are perfect results assured. You will have to set up the taper, measure and monitor the geometry of the angle, and use a healthy level of skill and care to produce good results. Also, as each manufacturer's design operates differently, you will need to be aware of the individual characteristics of the one your have. For instance in my own lathe the cross slide feedscrew does not need to be disengaged or dismantled before engaging the taper attachment. This is a great convenience although there is a trade-off which is that the taper can be cut in only one direction of carriage travel. I must remember never to back the carriage along the cut as the tool will follow a straight line rather than the taper and ruin the workpiece. Other machines may have similar peculiarities and trade-offs.

Unfortunately, not all machine tool builders offer a taper attachment for their machines. Most if not all of the mini-lathes fall into this category and a many of the less expensive Asian products have no taper attachment available. To the best of my knowledge there has never been a generic taper attachment available which, like a chuck or toolpost, could be readily adapted for use on any number of machines. Each different machine requires its own taper attachment although with some extensive re-engineering, and a bit of luck, one might adapt the attachment of one manufacturer to a lathe of like size made by another. Another restriction, but one which is rarely a bother, is that there is an upper limit to the size of the included angle the taper attachment will produce and they are usually limited to shallow angles on the order of 10 degrees or less.

For those of you who are considering used machines, a taper attachment would of course be icing on the cake, but you certainly shouldn't reject an otherwise attractive machine that is without one. You will be able to survive nicely without it. For those of you with an eye and the pocketbook for a new machine, this is one item of tooling that is sometimes best ordered installed at the works and is also, as you could now rightly suspect, one of the more costly accessories to be had.

The second method requires no additional tooling at all and uses the **Tailstock Setover** capability of the lathe for taper turning between centers. The tailstock assembly of almost every lathe, even the eensy weensy ones, is a two-piece affair which is designed to allow the tailstock center to be moved to either side of the lathe central axis by an amount which you can determine with great accuracy. Somewhere just above the surface of the ways the tailstock casting is divided horizontally and when the clamping bolt is loosened the upper part of the tailstock is free to move sideways, usually by means of a pair of adjusting screws. It should not be difficult for you to see that a workpiece which is turned between centers with the tailstock moved to an offset position will result in a taper.

Although a bit of basic plane geometry is involved when using tailstock setover, an accurate taper can be produced by using a rule or calipers and a dial test indicator to duplicate the geometry of the desired taper right in the lathe. This can be done in several ways such as by calculating the amount of offset required from the lathe central axis, given the length of the workpiece, to produce the desired taper angle, or by calculating the amount of taper in

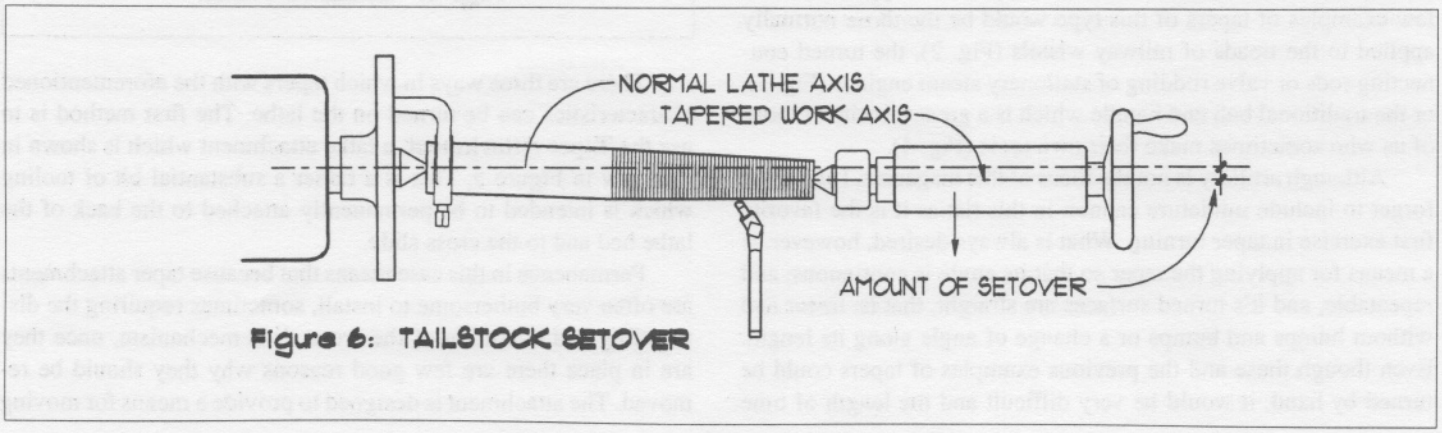


Figure 6: TAILSTOCK SETOVER

.001" per inch and measuring this with the dial indicator. When a taper turning attachment is not available, this method is the preferred for two reasons. First, as I have mentioned already, with care and a bit of mathematics one can generate a very accurate taper. Secondly, limited only by the required included angle (the geometrical relationship of the length of your workpiece and the amount of tailstock setover available), a rather long continuous taper can be turned and, as I stated earlier, no additional outlay is required other than your attention to care in measurement. It's only shortcoming worth mentioning is that since the workpiece must always be mounted between centers, no internal tapers (sockets) can be turned by this method. In a pinch, however, you can use what follows.

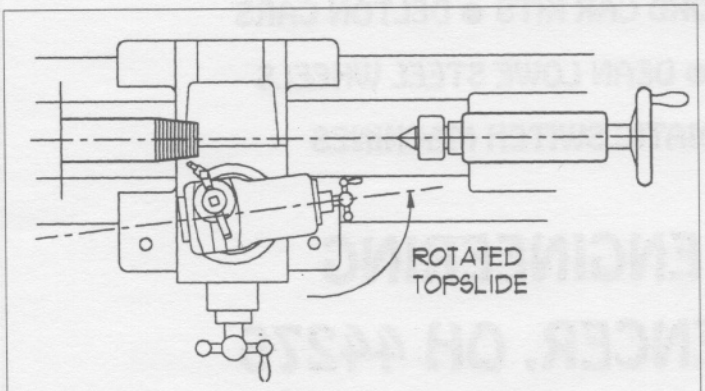


Figure 7: TOPSLIDE SETOVER

The third and simplest alternative is called **Topslide setover** and in this method the lathe topslide (Fig. 7) is rotated to the required angle with the work and by using hand traverse the taper is cut directly with the topslide. The benefits of this method are once again that it is a part of the basic machine and requires no additional expense, it is very quick to set up, and unlike the previous two techniques it provides the capability of producing a large included angle, from 0 to 180 degrees. While offering the greatest latitude of included angles, however, there are limitations to this method, the first being that the length of taper which can be cut is limited to the maximum travel of the topslide, which on conventional lathes has the shortest travel of any of its slides. Another limitation with this method is that even though you can measure with a dial indicator the rate of taper for which the topslide is set, there is no good means by which to adjust the angle of the average topslide in the very small increments sometimes needed to bring it round to precisely the angle required. Predictability, in this case, is quite low and trial and error will be the order of the day. However for short, freehand tapers, internal tapers, or tapers for which there an existing taper to indicate against (copy), this is a very handy way to do things.

That's it for this month. See you in the next issue with the concluding episode concerning lathes and all that, and a few words about where we are off to next.

Notes From The Backyard

by Rich Chiodo

Evolution II

Last time out I shared my top ten commandments for Garden Railway heaven. You may have your own, and I (and your fellow SitG readers) would be interested in hearing about them.

Expectations for my early line, the Lostock and Barrow Garden Railway, were grounded in running battery powered stock or lightly modified LGB. Remember, this was the mid eighties and I knew nothing of small scale live steam, the G1 Society, 16mm Association, etc. I did have the presence of mind to join several Garden Railway Societies, both local and some not so local. These grass roots organizations published regular newsletters, held get-togethers and generally shared the GR experience, albeit with a decidedly LGB bent. It was through one of these clubs that I met my "MENTOR"; you know...the person who forever changes your life, shows you the WAY, speaks purity and truth, and is omniscient. I'll call him Wayne.

They cause you to slow down, pause, think, ritualize, pamper and tend...and savor the experience.

Wayne was the editor of one of the local GR newsletters. Through his editorials I learned of his Idlenot Light Railway, a strange line of hand laid gauge 0 track running models of Welsh Narrow Gauge to some imponderable scale of 16mm to the foot, 1:19 scale...huh?

The line was point to point.....and.....its motive power was live steam....but not a Mamod. Indeed, here was someone not from here. Wayne acknowledged his fondness for British/Welsh prototypes, explaining that German meter gauge (LGB) was not his cuppa. All this resonated with some subconscious scale/gauge thing I had chosen to ignore, wanting nothing of the microscopic rivet counting that was taking over the smaller indoor electric craftsman scales.

Wayne described quite eloquently the joys and disappointments of constructing such a line. He seemed to be having maximum fun with what seemed to me at the time to be a scratchbuilders/operators nightmare, compounded by the evils of live steam ala Mamod horror stories.

Having become a "serious" model railroader in N scale in the early 70's and scratch building everything for my Catskill Mountain Lines made me wonder how anyone would attempt to do the same in a scale 10 times larger with that many more rivets to count, outdoors. A poor running N scale mechanism seemed like a Swiss watch compared to an O gauge live steamer. How in the world could he enjoy wrestling with a pot of boiling water hurtling along at Bullet Train speed to another point in his backyard...with stock twice as large as it should be, given the gauge?

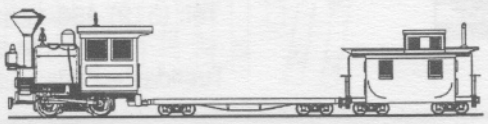
So it was at a get together at a fellow member's home that I met the man. Yes, he was sane and his handicraft was superb. Tallylyn coaches, Ffestiniog slate wagons, tippers, goods van...all hauled around quite capably by a real steam powered loco, built in England by Roger Marsh and named "OGWEN".

I was mesmerized...and converted. The L&BGRy now seemed amateurish, toylike, ersatz in the tackiest of ways...AAAARRRGGHHH! Doomed to another scale, gauge and concept change. The Ogwen was neat, gas fired, easily controlled, capable of slow speeds and ample pulling power. Our conversations led me to the world of Roundhouse, Maxwell Hemmens, and even Aster at their very low end. In fact I was fortunate to pick up an Aster "Old Faithful" of mid 70's vintage, which served as my trainer for several years. The gauge of my garden line was the only thing that stayed the same as I completely rethought my concept. I was hooked....live steam rules.

Wayne and I struck a friendship which has endured these past 10 years. He too had grown up through some "serious" model railroading, and the more we discussed this end of our hobby, the more I became aware of the subtleties and elegance in the details. Things like oiling around...finding that perfect throttle setting and load...setting up our consist so the little dragon progressively takes up the slack..and the load. Link and pin couplers...the sound of metal wheels as several pounds of rolling stock cross those scratchbuilt double diamonds. All of this and more speak to an involvement not easily obtained in many other avocations. I guess an analogy would be attempting to become a scratch golfer using a lovingly handcrafted set of clubs on a golf course of your own construction. That's stretching it, but you get the gist.

The small-scale live-steam-in-your-back-yard hobby combines all of the creative construction aspects of other parts of the model RR hobby with the mystic, Zen-like quality of those little beasts. They cause you to slow down, pause, think, ritualize, pamper and tend...and savor the experience.

Anyway, Wayne is the reason I'm here and I thank him for it. An interesting note is that he has moved on...or back, I guess, to an O scale mainline New England bridge line concept, which is beginning to fill his basement. The stock and equipment was sold. I was fortunate to save some. A piece of his Idlenot Light Railway track is pinned to my workshop wall as a reminder of how it all began. I wonder if he is now converting some aimless soul to O-scale, standard gauge electric??



Getting Started With FRANK S.

Part III

by Kevin O'Connor

Efficient and fun operation of Frank S. locomotives

In the last issue of SitG we lit off and steamed our Frank S. This segment will concern itself with efficient and fun operation of the locomotive.

The biggest difference between Gauge 1 live steamers and the rest of the operating garden railway fraternity is the need for "hands on" control of locomotive operation, with the attendant need to adjust speed, direction, boiler water level, and fuel flow/addition as opposed to operation utilizing either battery or track power and/or radio control. This need to be "up close and personal" with the live steamer is what fascinates me and binds me to the hobby. I'm sure I'm not alone. This difference is also what discourages some garden railroaders from giving steam power a try.

The first issue is "What is the proper operating boiler steam pressure for my locomotive"? It depends on a couple or three things. Each boiler is designed for a particular working pressure and this pressure should not be exceeded. The Frank S. boiler steam pressure gauge indicates up to 5 kg/cm^2 (70 psig). There is a general rule of thumb in the full scale steam engineering business that states that a pressure gauge should be able to indicate an internal pressure 2 times the working pressure of the vessel that it is monitoring. From this general rule we can surmise that Frank S. is designed around a maximum working pressure of 2-1/2 kg/cm^2 (35 psig), but that is not the most efficient boiler working pressure. The lowest operating pressure that will do the job is where you want to be, because a boiler operating at a lower pressure will radiate less heat per unit of time than will an identical boiler at a higher boiler pressure and temperature. Boiler pressure and temperature are directly related and heat radiated by a boiler does no useful work and wastes fuel.

My personal preference is to operate between 1-1/2 to 2 kg/cm^2. A stock Frank S. safety valve will start to blow off at approximately 2 kg/cm^2 (25 psig). This stock safety valve is really a pressure relief device and not a true safety, and so it is prone to weep steam and will not just blow off and reset itself. It is also not adjustable. If you want to operate with a proper safety valve you can obtain a safety valve from an Aster Americanized Mogul and replace the stock pressure relief valve.

As you ease your Frank S. onto the mainline you must pay close attention to the boiler operating pressure. If it drops or increases from the "ideal" pressure you must adjust the butane gas flow to the burner to maintain pressure within 10% of the ideal. Don't do what most of the meths guys do and run with the safety popping, or weeping constantly. It may look colorful, but it is wasting fuel and water. They run that way because most do not understand the interplay between wick tightness, fuel hopper feed control, varying loads and grades, and they have no quick and easy way to adjust fuel flow to their burners. Most of them are just happy to be running at all, and if they haven't lit off the track in doing so, so much the better.

As soon as boiler pressure is adjusted consistent with the load attention must be paid to boiler water level. I do not let my water level fall below 1/4 glass before I top up to 3/4. Having a Goodall valve in the boiler fill boss is mandatory for efficient operation. There are three reasons not to let the boiler water level drop out of the glass. Once it drops from sight you no longer know with certainty what the level is. Once the hot gas flue tube starts to be uncovered by boiler water, the effective surface area available to generate steam pressure drops at an exponential rate and the chance of overheating the flue rears its ugly head. The last reason is that the more hot water that you have in the boiler as you top up the less that the boiler pressure will drop as the result of adding water at ambient temperature.

This last fact, called thermal inertia, allows for fast pit stops and timely returns to operation. My practice is to run at 2 kg/cm^2 and then add water as needed till the boiler pressure drops to 1-1/2 kg/cm^2. If more is needed I just lap the track and repeat the drill until I'm up to operating level.

During the initial steamup and first few laps pay close attention to the temperature of the water in the water bath surrounding the liquid gas fuel tank. During the steamup process we anticipated the cooling of the butane storage tank due to the evaporation of liquid fuel into gas by filling the water bath with warm water, but by now, depending on the locomotive's load and the ambient temperature, the water is most likely getting cool if not cold. The sound of the burner will signal this condition, but usually too late to be on top of the situation. Refreshing the water bath with warm water is a two step method involving the use of a 50cc animal syringe attached to a suitable length of silicone tubing, and a pint Thermos bottle. Stop the locomotive, remove the coal load if you have one, and using the syringe draw the cold water out of the tender's water bath. Trickle warm water from the Thermos bottle into the bath. Be careful not to pour too fast as a sudden increase in gas pressure can extinguish the burner flame and you will have to relight when you are finished topping off the bath.

If the fire should go out for any reason during operation, it is imperative to make sure that the throttle valve is fully closed prior to trying to relight the burner. If your locomotive is equipped with R/C, just moving the motion control bar to neutral will not cut it, as the reversing block will still leak a small amount of steam through the piston valves. The tiniest amount of steam vapor emanating up through the stack is enough to cool the ignition source and prevent the gas path from igniting back to the burner.

After a few runs it will become second nature to note boiler steam pressure and water level as well as tender water bath tem-

perature and burner sounds.

Keep listening for any mechanical sound that was not audible during the last run. If the locomotive was lubricated properly, squeaks will not occur. The villain will be clicking or clanking noises. This is probably due to fasteners that have come loose. When such noises are heard, sideline the locomotive, shut it down, and investigate until a cause is found. Remember that Frank S. is an unsprung locomotive and all irregularities in the roadbed are transmitted by vibration full strength into the chassis and thus to all fasteners.

If a Goodall valve is fitted, and boiler water level is properly maintained, the end of the run will be signaled by a gradual loss of boiler pressure and sound from the burner as the locomotive runs out of fuel.

A sudden and dramatic stop is an indicator of no water in the boiler, and this can happen in a boiler not fitted with a Goodall valve. Ideally a locomotive should run out of fuel before running out of water, but this is not the case with Frank S. and so extreme care must be taken to prevent this from happening. A good rule of thumb to follow for a boiler not fitted with a Goodall fill valve is to fire the boiler for no more than 20 to 25 minutes, including steamup, before shutting down, cooling down, and refilling.

As pressure drops, shunt the fuelless locomotive off the mainline and prepare to shut it down. Add distilled water to the boiler via the Goodall valve. If your boiler is not equipped with a Goodall valve make sure that there is no remaining pressure in the boiler by venting the pressure relief valve.

Now add distilled water through the boiler fill fitting until 3/4 of a glass is visible. This added boiler water helps to cool the boiler and to prevent the condensing residual steam from pulling a vacuum on the steamlines with the chance of sucking steam oil out of the lubricator and back into the boiler. As the boiler cools, the water level will drop to 1/2 a glass as the water molecules contract. Now is the time to open the Roscoe displacement steam oil lubricator supply tank, suck out the condensate, and top off the tank with fresh steam oil. Once again the use of those slender scientific supply house plastic pipettes really eases this job. I reuse them by cutting a 1/2" diameter hole in the lid of a clean yogurt container and sticking the used ones in to drain.

Cap up the steam oil tank and move on to the tender water bath. Syringe out the warm water surrounding the liquid gas tank and leave it empty to cool. If you want to refill it immediately, add cold water to the bath and charge the tank with liquid gas from a warm storage container. As you may remember from part one of this series, fuel, either liquid or gas, will only flow from one container to another when there is a difference in pressure between the decanting container and the receiving container. Cooling the tender fuel tank aids this process.

Wipe the locomotive and tender down with a clean, lint free cotton rag. Full scale locomotives were rarely pristine and a little oil gleaming on the boiler casing looks macho. It will pay to lubricate all the moving parts of the chassis, tender, and motion prior to the next run, and this is a good time to do so. Recheck all the fasteners on the locomotive and tender for tightness.

At this point we have a machine that is ready for its next duty or for short term storage. In the next installment of this series we will cover super cleaning of a locomotive for long term storage or display, and we'll begin to look at improvements that can easily be made to Frank S. to improve our enjoyment of this locomotive.

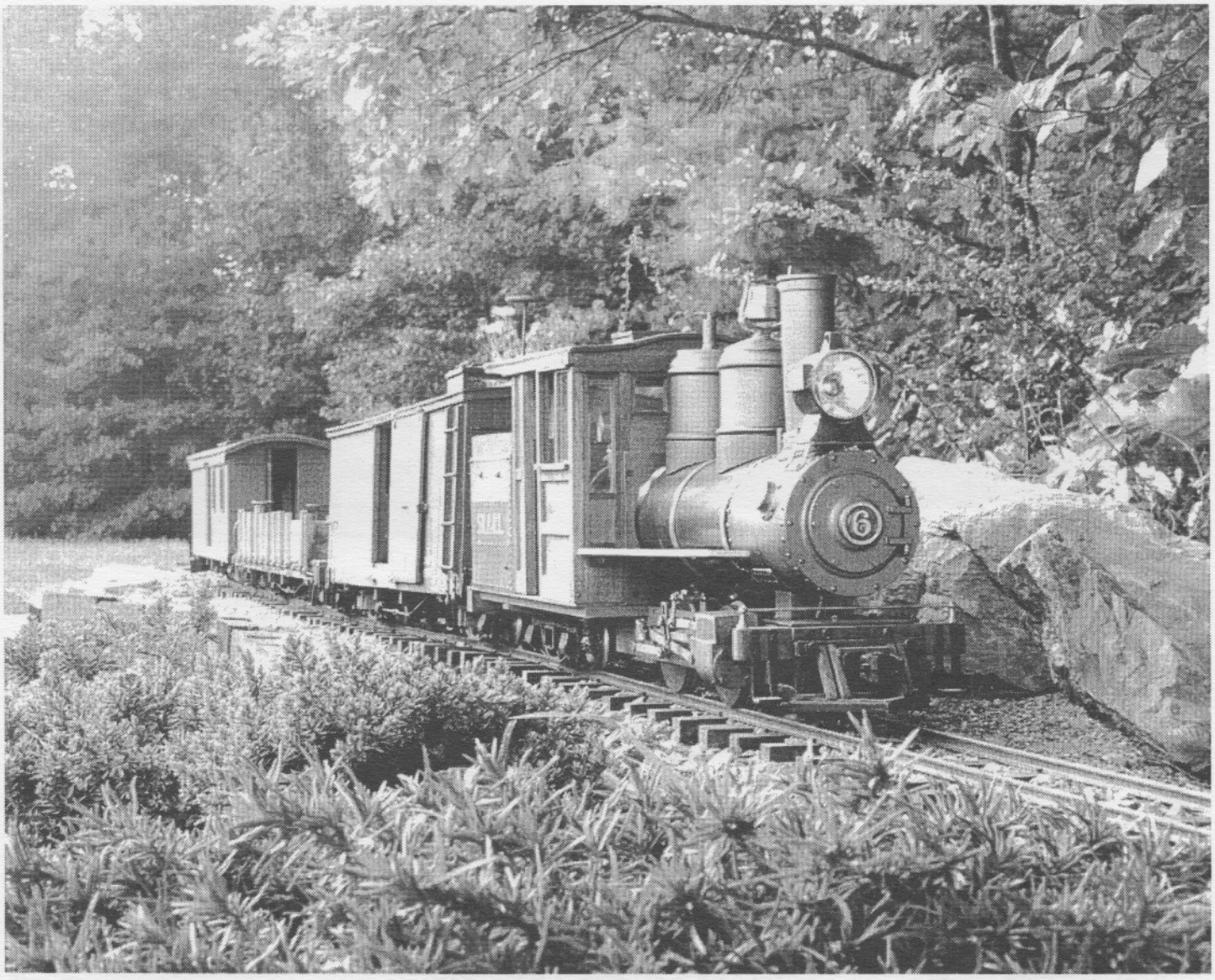
Ride the Sandy River in 7/8" Scale

article and photos by Steve King

It is difficult for me to believe now, but only about two years ago I had actually considered building my 7/8" scale G-gauge railroad with battery powered electric propulsion. From what I knew, I considered live steam too difficult and exotic to attempt. Since my eighth birthday and the first Lionel train set, many, many years ago, my mind-set had been "electric". Now, there's nothing wrong with electricity for things like toaster ovens and light bulbs, but several things occurred to change my mind as far as railway locomotives are concerned. First was the thought of how much of a battery system would be required to move these larger trains. I had already built some freight cars in 7/8" scale, and they run 24"-28" long, 5-1/2" wide and up to 9" high. Second was a trip to Jim Stapleton's live steam track in Northern Virginia. Upon returning from that affair I purchased a Roundhouse 0-6-0 chassis kit, and determined to learn the ins and outs of live steamers.

That was the beginning Now I spend my spare evenings rereading back issues of SitG in case I have missed an important tip, or dreaming up different boiler or firing designs, or thinking about the "next" locomotive project.

That Roundhouse 0-6-0 is now part of the Sandy River 0-4-4

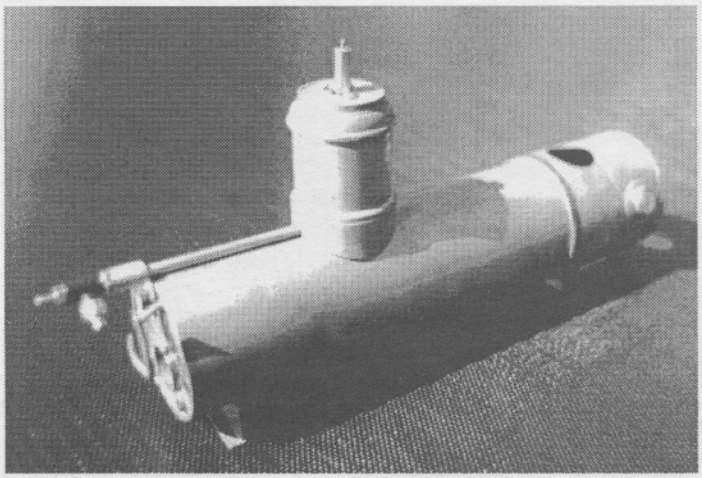


Sandy River Nº 6 running with the evening train of mixed Maine two-foot gauge equipment. The locomotive began as a Roundhouse outside frame 0-6-0 chassis kit.

Nº 6 which is the sole locomotive on my growing railway. Most of the original parts were set aside and the frame was refitted with disc type driving wheels made from 2" dia. bronze bearing stock. Most of the valve gear was useable, but the rocker arm had to be moved back 1/4" to clear the larger wheel. It was with a great deal of concern that I decided to fiddle with the valve gear, and make new radius rods and connecting rods. One was 1/4" longer and the other 1/4" shorter than the original. It seemed to me that since we were simply transferring a fore-and-aft motion through the link, that the position of the link in the middle of this motion didn't matter as long as the (sum) total length of the motion was the same. New side rods were made without the center hole. When it was all put together, I was pleasantly surprised.....it worked.

Meanwhile, the boiler was fabricated from 2-1/2" dia. copper pipe and a copper pipe coupling for the smokebox. There is a single 3/4" flue. All of the other parts were fabricated from brass, bronze, etc. The cab is all cherry wood, and was not painted on the outside.

I used the original Roundhouse cylinders, which are reliable and powerful, although visually undersized for this locomotive. The rear truck is pivoted at a point near the middle of the cab, so that it can swing some from side to side. This reduces the running radius of the locomotive, although it still takes about 16" minimum radius curves.



The copper boiler for Nº 6 was made from 2-1/2" x 9" tubing. Smokebox is a 2-1/2" copper tube coupling, and the steam dome is 3/4" copper tube with a false cover.

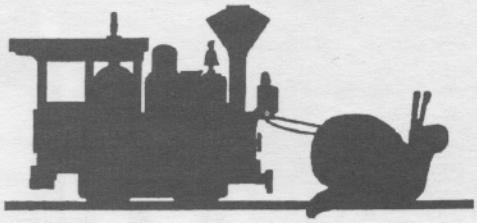
The boiler is fitted with a combination of Roundhouse and Mike Chaney fittings, and a home-built lubricator. The lubricator is larger than the original and has a valved drain (Cole's mini gate valve) beneath the cab floor to allow draining under steam. There is no water gauge, but water level can be checked by sticking a tube down the safety valve port in the steam dome. Since the boiler holds about 400 cc of water, we run out of butane long before we run dry.

I had continuing difficulty getting the butane to transfer to the onboard tank. A larger onboard storage tank had to be abandoned because it could not be filled. The smaller tank from Roundhouse was utilized and holds enough for about 25 minutes running. Generally I bring the boiler up to operating pressure and then shut down and top off the fuel tank before heading out with a train.

Controls are manual. The throttle valve was fitted with a 2-inch long extension of the stem, with knurled end. This allows hand control without removing the cab roof.

Presently my railway has 100' of point to point running out of a planned 330' loop. I enjoy building cars, track, structures and gardening as well. About one-half of my planned railway will run at grade or along a retaining wall, and the rest on posts and benchwork (including the steamup areas). I would like to hear from any others interested in running 7/8" scale on 1-3/4" gauge track. This is true 2-foot gauge. I have had some castings made for trucks and drivers, and would be happy to help others get started in this scale (Steve King, 54 Claybrook Road, Rocky Mount VA 24151 - phone 540-483-9230 or fax 540-483-8703).

These trains are nearly 1-1/2 times larger than typical G-scale, and there is lots more room in the cab for controls and fittings. Many of the available parts for G-scale are oversized anyway, so they look better when used on a larger model.



BUILDING THE VEST POCKET CLIMAX

text and photos by Mel Ridley

drawings from the author's sketches by Harry Wade

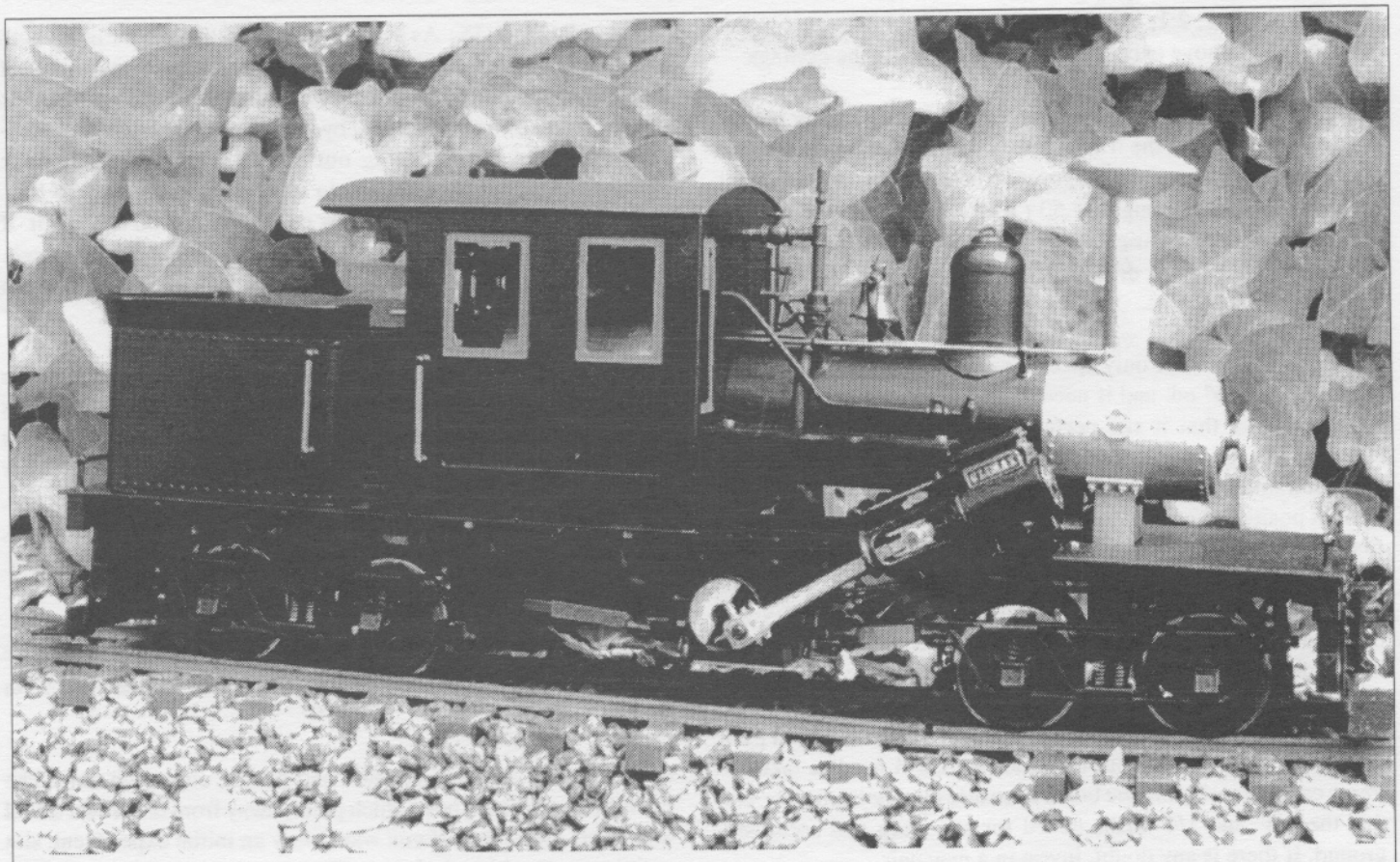
Part 2 – Trucks + Frame = Rolling Chassis

Editor's Note: Though it probably will not be of any importance to most of us who are following this series, we are including this information for the benefit of those who may want to know. A reader wrote to take us to task for claiming that the Vest Pocket Climax is built to a scale of 1:20. According to him, it is actually too small to be a 1:20 scale model. We referred his comments to the author of this series, who suggested that the reader should go back and read the introduction to this construction series in issue № 35, where it was clearly stated that little was known about the prototype when the first model and patterns for the castings were started, and there were no drawings available, only two photos from which to estimate dimensions. Further, the author was under the impression that the prototype had been built as a standard gauge model, but it was later revealed that it had been built as a 3-foot narrow gauge loco, and later sold and regauged by the new owners. By the time this new information came to light, the patterns for the castings had been completed at no insignificant expense, and it didn't seem important enough to start over again. So.....for those who might be offended that this engine is not exactly to 1:20 scale, we offer our apologies. And for those of us to whom it doesn't really matter.....let's get started on the trucks!

ERRATA: There was an error in the dimensioning of the Frame Stretcher drawing for 1.1c in part 1. The hole at the top that is shown as a #20 hole should be a #28 hole. If you have already drilled it #20, the author tells us that it will work okay that way. If you have not drilled it yet, then make it #28.

2:0. TRUCKS: As most people want to get a rolling chassis going pretty quickly, and are impatient to see what it will look like, this section will deal with construction and machining of the various parts, including gearsets up to assembly, testing and running in.

FORWARD: From now on as the series progresses, you will no-



This is one of the author's finished models - just so we won't forget where we're headed.

tice the increased use of an eclectic mix of scales and dimensions; i.e. decimal inches, fractions and metric, even on the same component. Whilst not totally necessary, it has been done purposely as an aid rather than a hindrance, to save in some cases figuring down to a few decimal places.

NOTE FOR 32mm GAUGE USERS: As a number of requests have been made by 32mm track users, at the end of this section under heading 2:6. are notes for building to **32mm GAUGE** and additionally, though more complex, a **MULTI-GAUGE VERSION** adopted by the author for use on both gauges of track.

All the castings for the trucks are in Manganese Bronze for strength. It is recommended that oil be used as a lubricant for drilling operations, and more particularly, cutting compound for tapping.

MATERIALS REQUIRED: Set of castings comprising sideframes, bolsters, spring planks & springs, brake beams, gearsets, wheels & axles, 10" of 1/8" BMS rod for driveshafts, 2" of 1/2" od brass, 8 – 10BA steel hex screws & nuts, 12 – 6BA grub screws and 8 – 1/8" id x .020" spacer washers.

Before we start hacking any metal, a brief note on painting. The main truck components – sideframe, bolster, spring plank, and brake beams need painting before assembly. Similarly, the wheels are easier painted before mounting on the axles, particularly if spraying, as it will save lots of time in masking gears, etc. later. It's up to you.

Referring to Drg. 2:1, identify the parts. Clean out any ceramic deposits and remove excess sprue material. Fettle the castings.

2:1. SIDEFRAMES: Remove the cast nbw detail top & bottom at each end on top of the frame. This was included on the original master purely for cosmetic purposes. Where the nbw was removed, on centreline drill through Nº 50 (.070") for a snug 10BA clearance fit. These will be used to mount the brake beams later. Turning the sideframe over, drill the axle holes 1/8" x 13/64" deep directly on the popmarks.

2:2. BOLSTER: The only operations here are to drill through for the kingpin 3/16" od, and if needed, to file the top frame bearing surface flat so that it sits perfectly square against the chassis stretcher. Try the bolster for fit on the kingpin. The bolster fits into the sideframe by sliding in sideways and twisting around to the upright position. You will notice a curved surface on one side that fits between the stanchions, enabling this to be done. The spring plank just slides in from either side, but take care not to destroy the small lugs that position on the lower part of the frame. Try this operation a few times, because later on you will need to do it holding 14 different items, all trying to go their own way.

2:3. GEARSETS: We now come to one of the most critical parts of the loco, and for smooth operation you will need to take extreme care in machining the bores to ensure that they run truly, and that the 1/8" and 1/4" drills called for are sharp and accurately ground. If there is any doubt, invest in a new pair.

First of all, a quick note about the axles. They are standard Tenmille products in BMS 1/4" od with 1/8" stub ends, giving a back to back of 40mm. Refer to drawing if you want to make your own.

Unique amongst the major geared loco builders, the helical gears of the Climax were offset to drive all axles on the centreline and comprise a crown wheel and pinion and a cross box to keep them in alignment. Before starting on the gears, pay particular attention to ensure that they are free from any flash or spelter left over from the casting process, especially within the teeth, and clean out if necessary with a knife-edged Swiss file. Whilst they have been checked before despatch, any slight impediment will hinder smooth meshing and affect performance. A small amount of eccentricity would be tolerable and acceptable for smooth running.

2:3:1. CROWN WHEEL & PINION: Carefully remove the sprue with a fine saw from the rear of the crown and grind away any excess. Boring is best accomplished in the 4-jaw, holding by the boss and ensuring the tooth face is running square and true. Open out the axle hole by increments up to 1/4". Try for fit on the axle and ream 1/4" if needed. The pinion wants to be drilled through Nº 31 and reamed 1/8" for the drive shaft. They are both secured on their respective shafts using 6BA grub screws. Drill Nº 44 and tap the shaft bosses on the pop-mark 6BA, fitting grub screws. The screws will require to be ground down to a more appropriate length, which is best accomplished by holding with an Allen key and gently offering up to the grindwheel, using the rest or steady as a platform.

2:3:2. CROSSBOX: As mentioned earlier, this device holds both gears in alignment. Sitting on the axle which revolves within, it floats in situ held by the crown wheel and keeper on either side and is prevented from revolving by the drive shaft above. It is therefore important that cleaning out the respective bores is done squarely. Open out the axle shaft to 1/4" and the drive shaft to 1/8". Ream both and check for fit. They need to be a good sliding fit. If too sloppy, further excess wear will occur, upsetting the gear mesh. Finally we need to drill a 1/16" dia. oil lubrication hole down through the top so it intersects with the drive shaft bore.

2:3:3. KEEPER BUSH: These are straight forward and require no expertise apart from looking presentable. Made from 1/2" brass roundstock, we need to make four. Mark off four pieces 1/4" long in the bench vise, allowing for the thickness of the parting tool or hacksaw between each. Centre pop in the middle for the grub screw. Chuck in the lathe and drill 1/4" for about 1.1/4" or so. Remove, place in the vee block and drill Nº 44 cross holes through one side. Tap 6BA, clean up and fit grub screws.

2:3:4. DRIVE SHAFTS: Cut a couple of 5" lengths of 1/8" BMS rod and dress the ends. These will later be reduced to 3.5" in length.

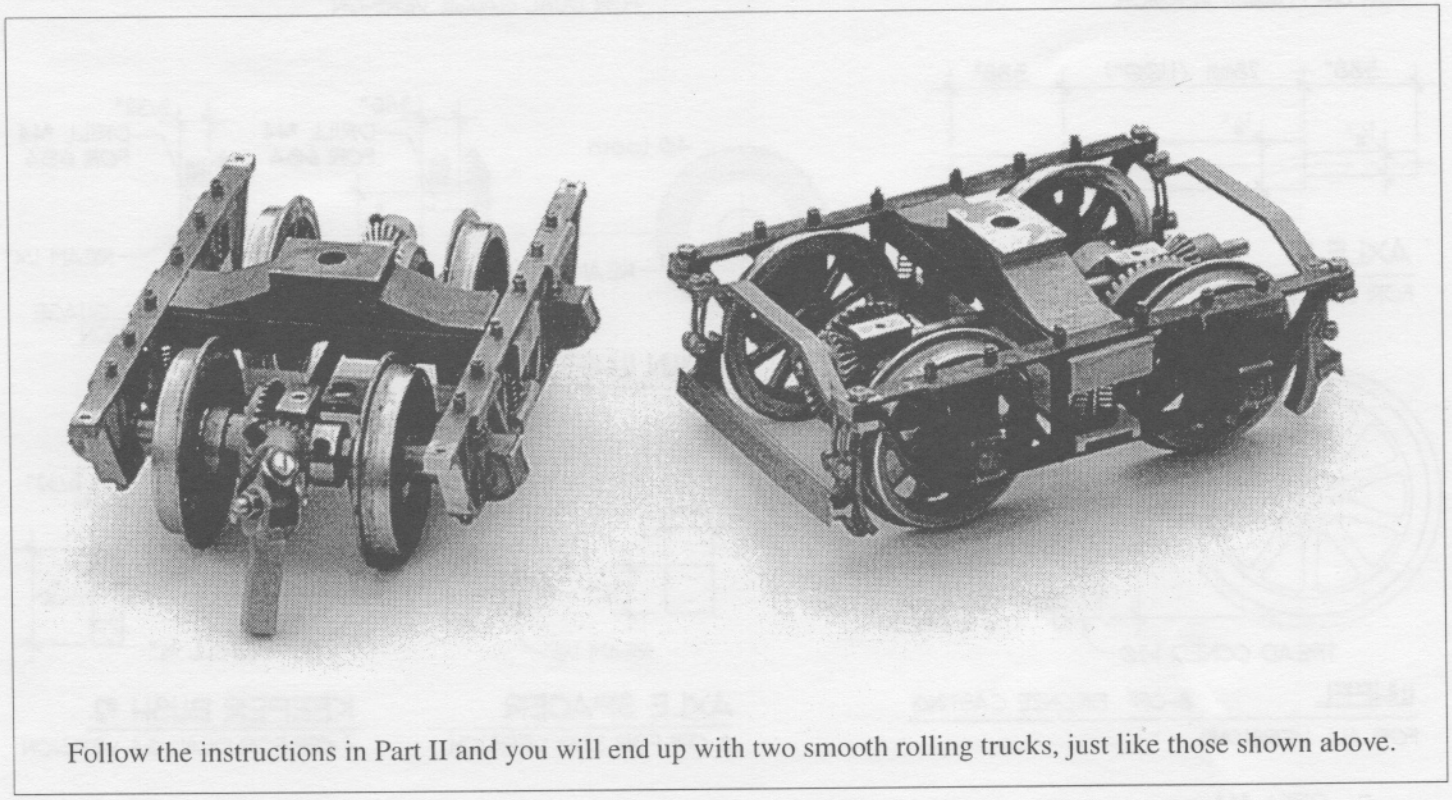
Slide a crown wheel, cross box and keeper onto each axle. The cross box has an axle boss which points away from the crown wheel and meets the keeper. If you want to try an initial experiment, slot a pinion on the drive shaft and offer up to the cross box to see how the gears will mesh.

2:4. WHEELS: The gate or sprue for casting the wheels is located on the inside against the flange and inner rim. Remove the sprue in two operations. A junior hacksaw first to remove the bulk of it, taking care not to damage the flange. Mount by the wheel rim in the 3-jaw, ensuring it is square, and gently cut away the remainder, continuing through to the inner hub and finishing off with a smooth file to retain the flange radius. Drill through Nº 31 and ream 1/8", having before checked the axle stubs for size. We need an interference fit here.

We're now going to push-fit the wheels on the axles. Check that each axle has a crown wheel, crossbox and keeper in place, and the cross box is the right way round. To push-fit the wheels, we will require a piece of hollow material with squared ends (1/4" copper pipe is okay) about 3/4" long so we can grasp it with our fingers. Open out the bench vise jaws so they can take an axle and one wheel. Put a drop of bearing fit (Loctite™) on the axle end, and keeping everything square, gently force the wheel onto the axle stub until it nearly reaches the stop. Turn the assembly around and repeat for the other wheel. Now do the exercise again using the spacer to push the wheels home. Don't overdo it or the axle stub will bend. Needless to say, the wheels haven't got to be quartered as in conventional locos.

To check for concentricity, mount a wheelset by the rim in the 3-jaw, holding the other axle end in the tailstock chuck with a bit of 1/8" bore sleeving so it can revolve. Again, a short piece of copper tube is ideal, lubricating the inside first. Using the cutting tool in the toolpost as a guide, bring it up to the rim while revolving the chuck slowly by hand on each quadrant. If any material needs to be removed, do it very carefully and gently, say a 1/2 thou at a time. This is hardly good engineering practice as you are relying on the force fit at either end and a relatively unsteady support at the tailstock.

2:5. TRUCK ASSEMBLY: Before a test of your mental and digital dexterity, mention is made that we have yet to drill the painted or unpainted brake beams prior to fitting. They will require Nº 50 10BA clearance holes at each end, which are nominally 2.9/32" apart on centreline. Check this dimension on the job after assembly.



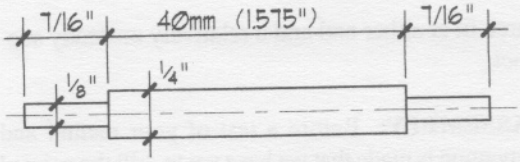
Follow the instructions in Part II and you will end up with two smooth rolling trucks, just like those shown above.

As outlined in the earlier stages of this section, you should now be conversant with mounting the sideframes into the bolster. When we come to assembly this time, have all the parts laid out in front of you.

2:5:1. Slip a .020" spacer washer on the end of each axle. As they have a mind of their own, a little oil won't come amiss and they will (should) adhere to the wheel through the meniscus. The axle sets for each truck need to be placed so the crown wheels are in opposing directions. Refer to the drawing.

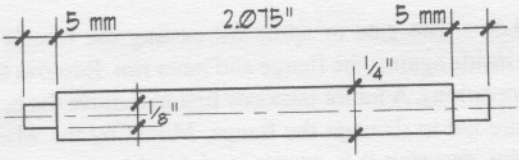
Place a bolster sideways-on into the sideframe and position two axle sets into the axle boxes. Offer up the other side frame onto the bolster which is still sideways-on, locating it in the axle boxes. Twist the bolster around until it seats horizontally at the top of each sideframe locating the axles. Push through the spring plank and, holding the frames apart, slot it down until it fits either side on the bottom bearer.

Holding the bolster and spring plank apart, insert the springs in the locating holes, best accomplished using surgical tweezers and locating in the bolster first.



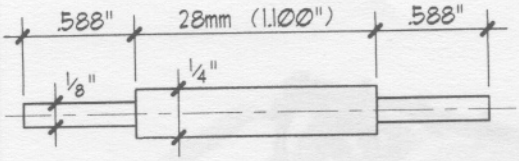
AXLE #1 4-OFF 1/4" BMS/CRS

FOR GA 1 (45mm) VERSION



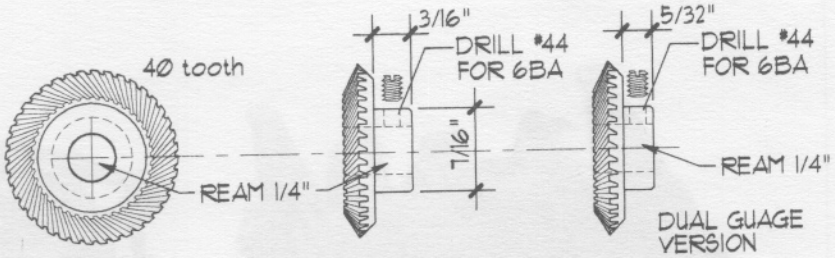
AXLE #2 4-OFF 1/4" BMS/CRS

FOR DUAL GAUGE VERSION

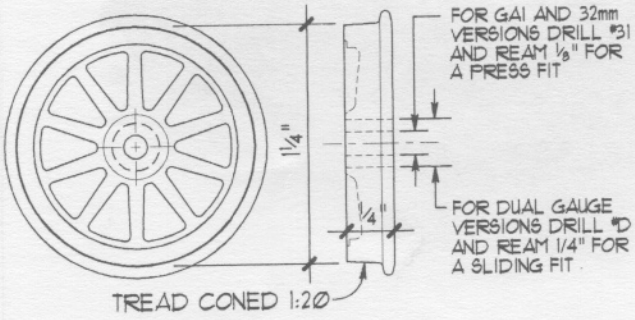


AXLE #3 4-OFF 1/4" BMS/CRS

FOR 32mm VERSION

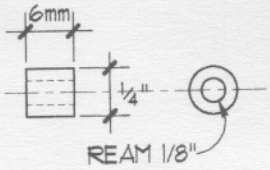


CROWN WHEEL 4-OFF BRONZE CASTING



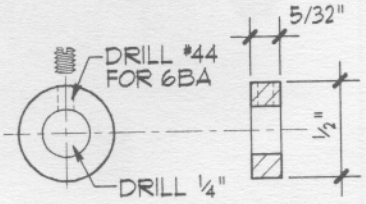
WHEEL 8-OFF BRONZE CASTING

FOR ALL VERSIONS



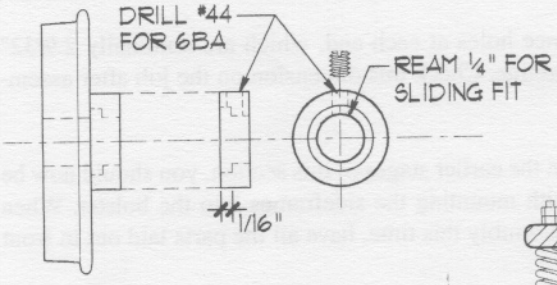
AXLE SPACER

8 OFF FOR 32mm VERSION



KEEPER BUSH #2

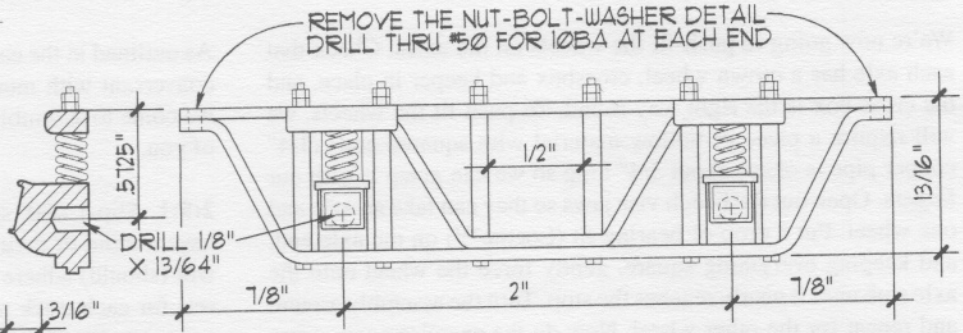
4 OFF FOR DUAL GA VERSION



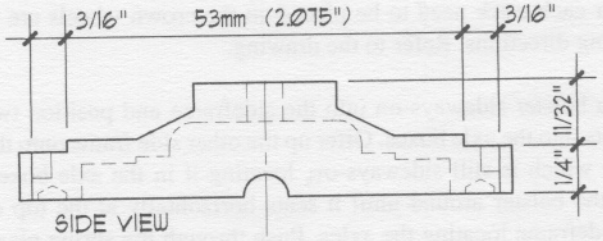
WHEEL BOSS 4-OFF BRASS

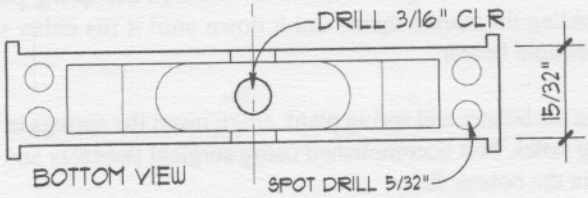
FOR DUAL GAUGE VERSION

UNLESS SPECIFICALLY NOTED, ALL PARTS ARE DRAWN AT FULL SIZE.

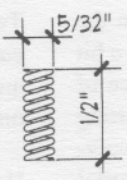


TRUCK SIDEFRAME 4-OFF BRONZE CASTING



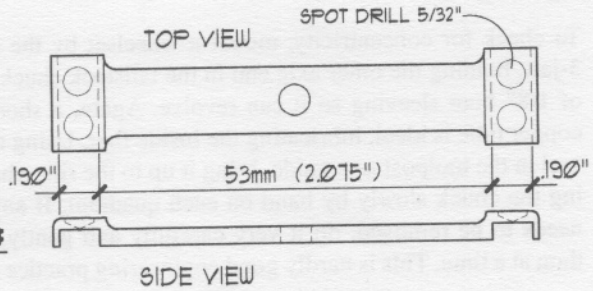


TRUCK BOLSTER 2-OFF BRONZE CASTING

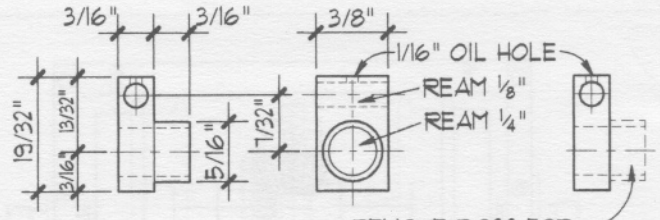


COIL SPRING

8-OFF STEEL

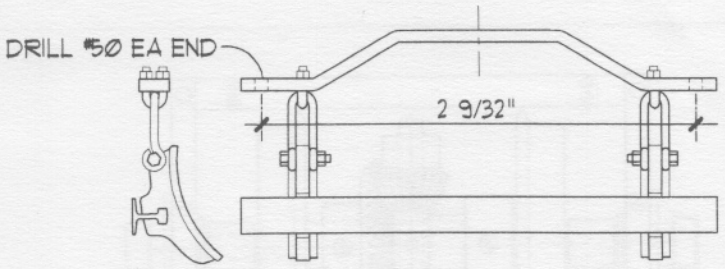


SPRING PLANK 2-OFF BRONZE CASTING



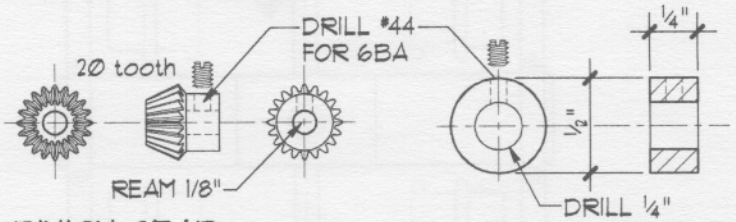
CROSSBOX

4-OFF BRONZE CASTING



BRAKE BEAM

4-OFF BRONZE CASTING

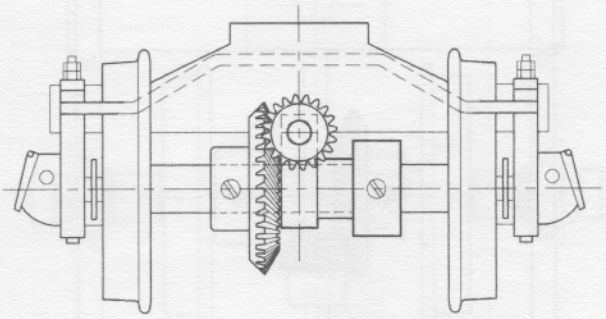


PINION GEAR

4-OFF BRONZE CASTING

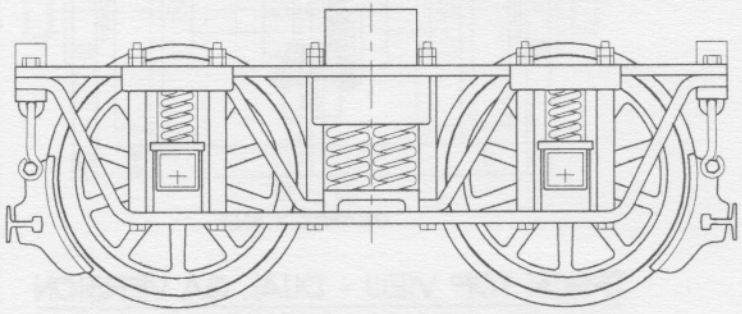
KEEPER BUSH #1

4-OFF BRASS BAR

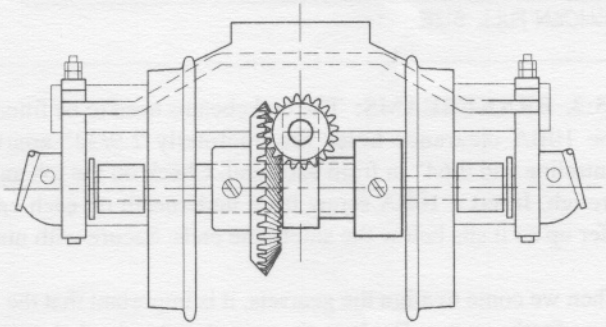


TRUCK END VIEW - GAUGE 1 VERSION

SHOWN LOOKING AT THE GEARBOX END
BRAKE HANGER BEAM NOT SHOWN

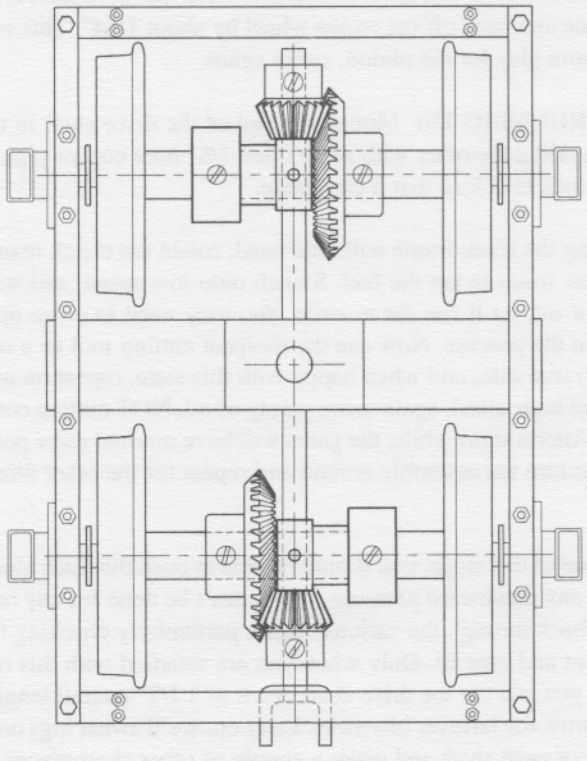


TRUCK SIDE VIEW - ALL VERSIONS



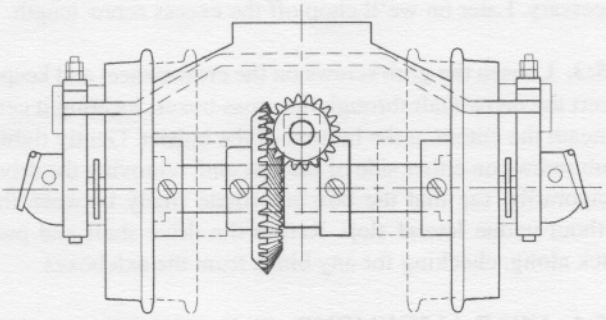
TRUCK END VIEW - 32mm GA VERSION

SHOWN LOOKING AT THE GEARBOX END
BRAKE HANGER BEAM NOT SHOWN



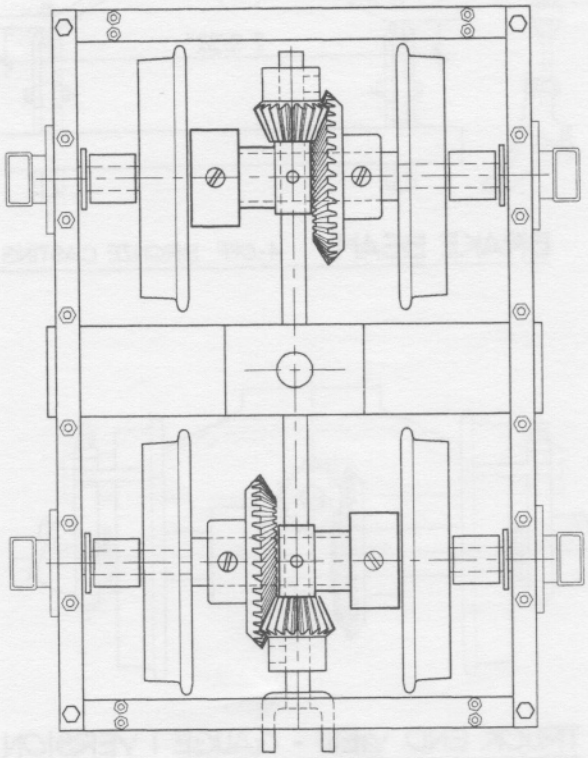
GEARBOX END

TRUCK TOP VIEW - GA 1 VERSION



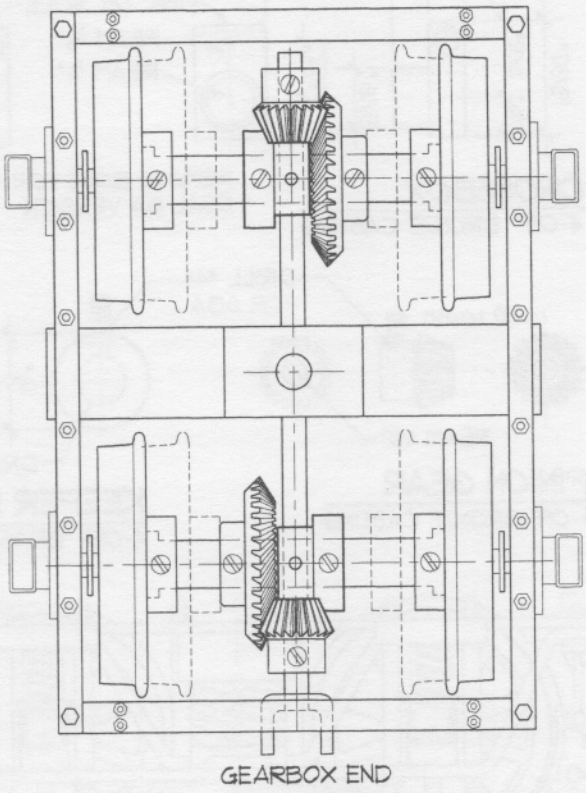
TRUCK END VIEW - DUAL GA VERSION

SHOWN LOOKING AT THE GEARBOX END
BRAKE HANGER BEAM NOT SHOWN



TRUCK TOP VIEW - 32mm GA VERSION

SHOWN FULL SIZE



TRUCK TOP VIEW - DUAL GA VERSION

SHOWN FULL SIZE

2:5:2. BRAKEBEAMS: The brakebeams need to be fitted next. The 10BA clearance holes are nominally 2.9/32" apart on a centreline and 9/64" in from each end. Check on the job and drill through. Insert a 10BA screw from underneath on each end and offer up so it sits below the sideframe ends. Secure with nuts.

When we come to align the gearsets, it is important that the trucks sit perfectly square. Because they are as yet unloaded, it is probably that the springs have twisted the sideframes out of square. On a flat surface, press down on the bolster and tighten the brakebeam retaining screws to hold the whole assembly square and rigid. Check that the brake blocks don't foul the wheels, bending out slightly if necessary. Later on we'll chop off the excess screw length.

2:5:3. Loosen the grub screws on the crownwheel and keeper and insert the drive shaft through the cross boxes, locating it centrally beneath the cutout at the bottom of the bolster. Gently tighten the grub screws on either side of the box and, removing the driveshaft temporarily, see that the box can rotate freely between the two without undue lateral slop. Return the drive shaft and push the truck along, checking for any binds from the axleboxes.

2:5:4. GEAR ALIGNMENT: Slide a pinion onto each end of the drive shaft, leaving roughly an equal distance at either end of the shaft. Gently nip up the grub screws so they just mesh with the crown wheels. Ideally, if you push one up to the cross box, there should be about 3/64" float at the other end.

Try and rotate the shaft by hand or run the truck along some track. In all probability, it will bind. Check again that the drive shaft is on centreline and back off the crown wheel by about 1/64". This will allow more play for the pinion, so try again.

2:5:5. RUNNING IN: Mount one end of the drive shaft in the 3-jaw, holding the other with some oiled 1/8" bore copper pipe in the tailstock chuck so that it can rotate.

Steadying the truck frame with one hand, rotate the chuck manually a few times to get the feel. Switch onto low speed, and with plenty of oil, let it run for a while. You may need to close up a pinion in the process. Now use the toolpost cutting tool as a rest for the frame side, and when happy with this state, repeat on medium and high speed, again using plenty of oil, **NOT** cutting compound. After a short while, the gears will have meshed more positively, so turn the assembly around and repeat for the other direction.

At the end of this stage, you should be able to push the truck along without any downward pressure. If this can't be done for any reason, go back through the various stages, particularly checking for alignment and gear fit. Only when you are satisfied with this operation, you can cut the drive shaft down to 3.1/2" overall length. Don't throw the leftover bits away. Later on, we'll sweat lugs onto one end of each shaft and make a couple of other short pieces to couple up into the Universal Drive.

2:6. ADJUSTABLE GAUGE: There are two options here, a simple fix for 32mm gauge as used by members of the 16mm Association, and a Multi-Gauge version. The latter, whilst requiring more effort, does enable the user to run on both gauges (or anything in between) by adjusting the wheelsets and, of course would be suitable for anyone who may contemplate a change of gauge at some time in the future.

2:6:1. 32MM GAUGE: Standards issued by the 16mm Association call for a back to back measurement of 28mm in this gauge. The standard Tenmille axles give a back to back of 40mm. Check this dimension anyway because they can vary from one batch to another by about .5mm or so. Turn down each end for a length of 6mm equally to 1/8" diameter, giving a 28mm back to back. Whilst this might seem to do the trick, any side play will only be taken up by the extended stub ends in the sideframe axleboxes, so we need to make 8 spacers. These, apart from looking more pleasing, add a little more strength to the axle ends when fitted in situ, and importantly, having fitted the .020" spacer washers as in the 45mm version, take up end play against the axleboxes. Using 1/4" od steel or brass rod, centre & drill 1/8", opening out a shade to No 30 if necessary to give a sliding (not sloppy) fit, and part off 8 pieces x 6mm long. Fit the gearsets & wheels as outlined earlier, **BUT TAKING CARE** when push fitting the wheels themselves to prevent the stub ends from bonding and collapsing under pressure. Slip on the 6mm spacers and washers and assemble the truck as before.

2:6:2. MULTI-GAUGE VERSION: For these, we will need to make 8 bosses, one for each wheel. These are going to be soldered to the wheel itself, on and around the inner hub and drilled and tapped for a 6BA grub screw to facilitate fastening to the axles. At first sight this may seem to be all that is required, but because of the crown wheel being off-centre in the narrower back to back, we have to trim the thickness of the crownwheel boss, keeper bush and cross box. Unlike the 32mm version, the axles remain unmodified.

Using 1/2" brass roundstock, centre and drill 1/8". As these are going to locate around the inner hub, we now have to counterbore them on one side to 11/32" x 1/16" deep. Alternatively, you can lightly drill size 11/32" and, using a 'D' bit, go 1/16" deep. Part off each piece 5/32" long. The boss needs to be cross-drilled and tapped through one side only, and a 6BA grub screw fitted. This can be done before or after soldering to the wheel. Mounting the finished wheeltread in the 3-jaw, drill carefully through by increments up to 1/4" and ream 1/4" full if necessary for a good sliding fit. Because the wheels are cast in Manganese Bronze and are quite brittle, care is needed when breaking through the end of the wheel hub.

Make the keeper bushes as before, but only 5/32" thick. Carefully saw the boss off the crossbox so it reverts to its 3/16" body width, and finally grind down or turn off the crownwheel boss to a maximum of 5/32". When assembled on the axles and in operating mode – i.e. pinion on centreline and correctly meshed, the overall width of these three central components will be 23/32".

Test and run-in the assembly as in the gauge 1 configuration. When this is satisfactory, first close up the wheel against and abutting the crown wheel boss on each axle. Close up the other wheel to give a 28mm back to back so they are as close on centreline as possible.

SOURCING

In order to assist our readers in the acquisition of all the bits & pieces they need for the Vest Pocket Climax project, we will publish this list of sources at the end of each article in the Climax series. We will continue to add sources to this list as they come to our attention, so if you know of a reliable source that isn't listed here, please let us know.

Castings & boiler ..... Llagas Creek, Dept. SG
2200 Llagas Road
Morgan Hill, CA 95037-9429
Phone/Fax (408) 779-4391

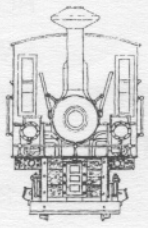
Fasteners (BA & ME) ..... Sulphur Springs Steam Models
(including taps & dies) Dept. RB
PO Box 6165
Chesterfield, MO 63006
Phone/Fax (314) 527-8326

Machine Work ..... Steam 'n' Stuff
Dept. SitG
11996 Gast Road
Bridgman, MI 49106
Phone (616) 426-3596
Fax (616) 426-8907

Sulphur Springs Steam Models
Dept. RB
PO Box 6165
Chesterfield, MO 63006
Phone/Fax (314) 527-8326

Raw Materials ..... Sulphur Springs Steam Models
Dept. RB
PO Box 6165
Chesterfield, MO 63006
Phone/Fax (314) 527-8326

When you contact any of these suppliers, please tell them that you found them in* Steam in the Garden *magazine.



Loco Review – Aster's Magnificent Stirling Single

by Lee Barrett
photos by John Coughran

Technical Specifications

SCALE/GAUGE:	1:32, GAUGE ONE	
TOTAL WEIGHT:	3.3 KG	
DIMENSIONS:	LENGTH	504 MM
	WIDTH	78 MM
	HEIGHT	127 MM
WHEEL ARRANGEMENT:	4-2-2	
	DRIVING WHEELS	DIA. 76 MM
	PILOT TRUCK WHEELS	DIA. 35 MM
	TRAILER TRUCK WHEELS	DIA. 43 MM
	TENDER WHEELS	DIA. 36 MM
ENGINE:	CYLINDERS 2 X CYLINDERS OUTSIDE OF FRAME	
	BORE 10 MM X STROKE 18 MM	
VALVE GEAR:	STEPHENSON – VALVE CHEST INSIDE THE FRAME	
	STEAM PORT 1.2 MM, CUT OFF 85%	
	LAP 0.7 MM, TRAVEL 3.8 MM	
BOILER TYPE:	"C" TYPE FOR ALCOHOL BURNING	
	WATER CAPACITY – 90 CC AT 80% FULL PRESSURE	
	3 KG/CM2 AT NORMAL WORKING PRESSURE	
FITTINGS:	1 X SAFETY VALVE, PRESSURE GAUGE, WATER GAUGE,	
	THROTTLE VALVE, BLOWER VALVE, BYPASS VALVE	
AXLE DRIVEN PUMP:	MOUNTED ON THE LEADING DRIVER AXLE	
	PUMP BORE 5 MM X RAM STROKE 4 MM	
LUBRICATOR:	ROSCOE DISPLACEMENT TYPE MOUNTED ON THE SMOKEBOX	
BURNER:	3 WICK TUBE ALCOHOL BURNER	
WATER TANK CAPACITY:	200 CC, HAND OPERATED PUMP MOUNTED	
FUEL TANK CAPACITY:	90 CC OF ALCOHOL	
MINIMUM RADIUS:	1.2 METER	
PRICE:	MSRP – FACTORY BUILT.....$4,060 KIT.....$3,280	
AVAILABLE FROM:	YOUR FRIENDLY NEIGHBORHOOD ASTER DEALER	

My love affair with Patrick Stirling's magnificent Single dates back to my introduction to Gauge One. Having just purchased one of Wilag's superb Bavarian Pacific's, I was searching for information on how to run it. As luck would have it, I stumbled upon a couple of dozen English model railway magazines. I purchased them because they contained some articles about the then unheard of (to me) hobby of small scale garden railways. One of these articles mentioned the Gauge One Model Railway Association, and thus began the long saga of The Building of Badger Green. Another article revealed the Stirling Single.....I was hooked!

A quick glance at the Single tells the observer that they are viewing something quite extraordinary. The eye focuses upon the huge eight foot drive, with the running plate sweeping over the driver center in an elegant, graceful curve. The splendid smokebox/cylinder cover, with its perfectly proportioned chimney, next catches the eye.

It's here that I must catch myself and get on with the task at hand. To the bench!

I found the assembly basically straightforward, but it would be a stretch to say that it "fell together". The loco is quite small, with the axle pump, valve gear and the remaining piping being fitted in a rather confined space. Clearly, it's not a beginner's loco.

The most difficult assembly sequence that I experienced occurred on the backhead pipe fittings, where the upper waterglass bushing interfered with the banjo nuts (part GN5). I was able to gain clearance by filing the thick sides of the interfering bushing (don't worry, the thickness remains twice that of the boiler barrel). John Wieland was able to fit up the assembly and **then** offer it up to the boiler. In any case, it's a tricky piece of work.

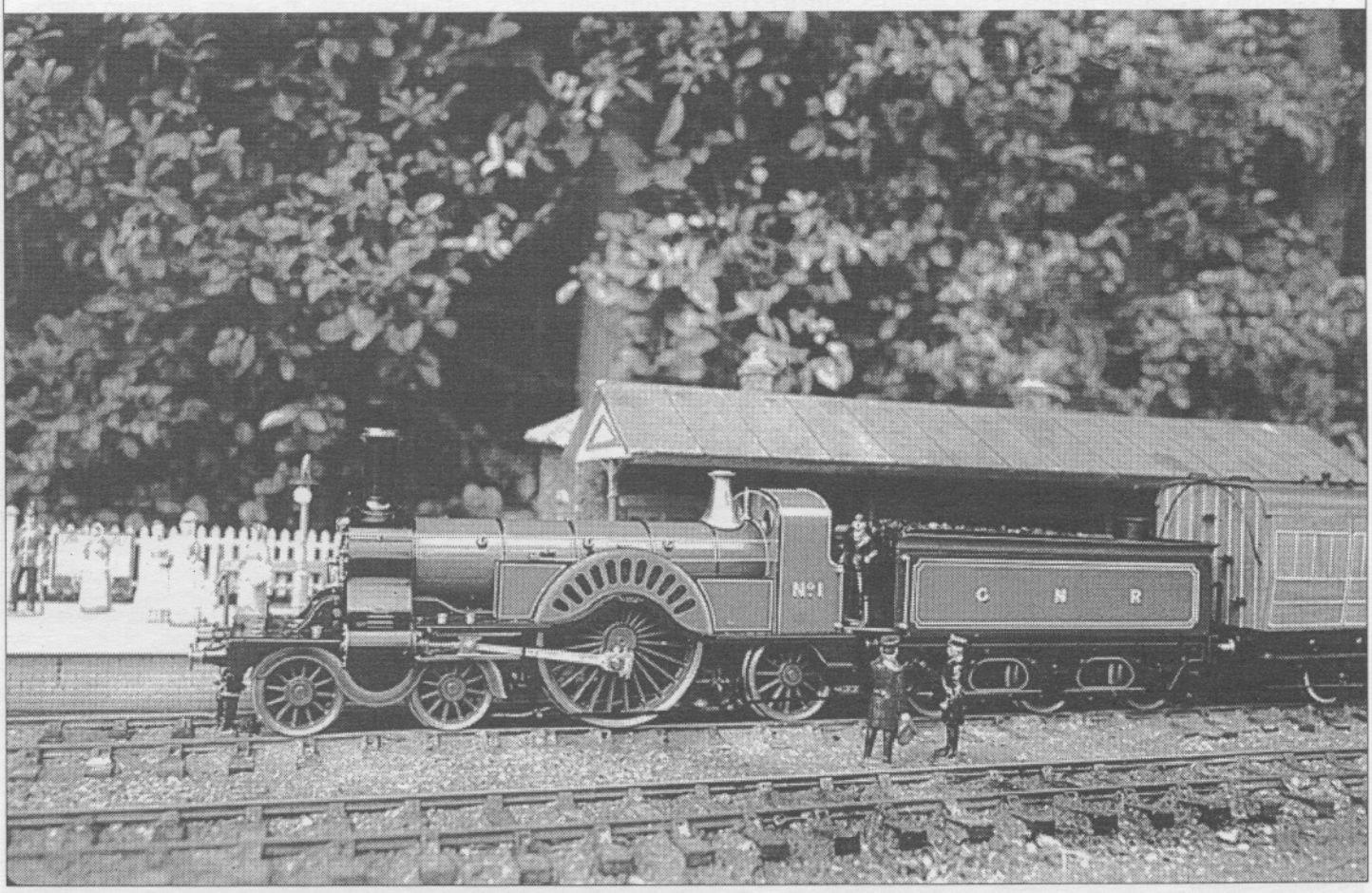
The hinges of the smokebox door were brought to their proper silver color by carefully scraping off the covering paint. Another change was to wind the tender feedwater pump hose with wire, so that it won't rupture when pumping against high pressure.

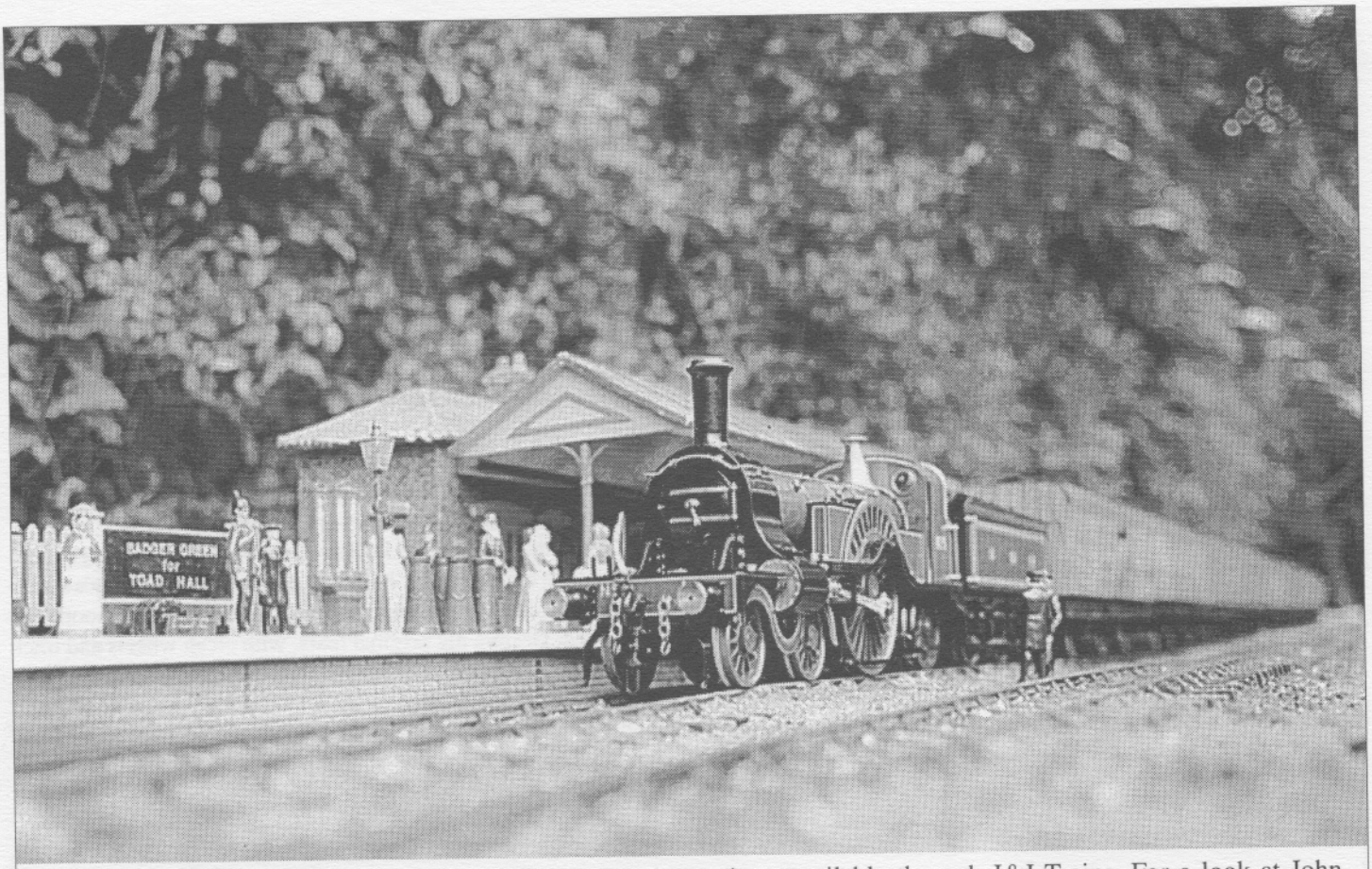
The tender axleboxes, though sprung, rest upon protruding stops that prevent vertical travel of the journals. Upon filing them off, I then found that the center tender wheel flanges rested upon the center tender frame stretcher. As this frame member isn't necessary, I cut it away, resulting in a smooth riding, fully sprung tender.

The remainder of the kit went together without incident, though I did have to reassemble the axle pump to seat the check balls. Without perfect seating, the pump will not draw water.

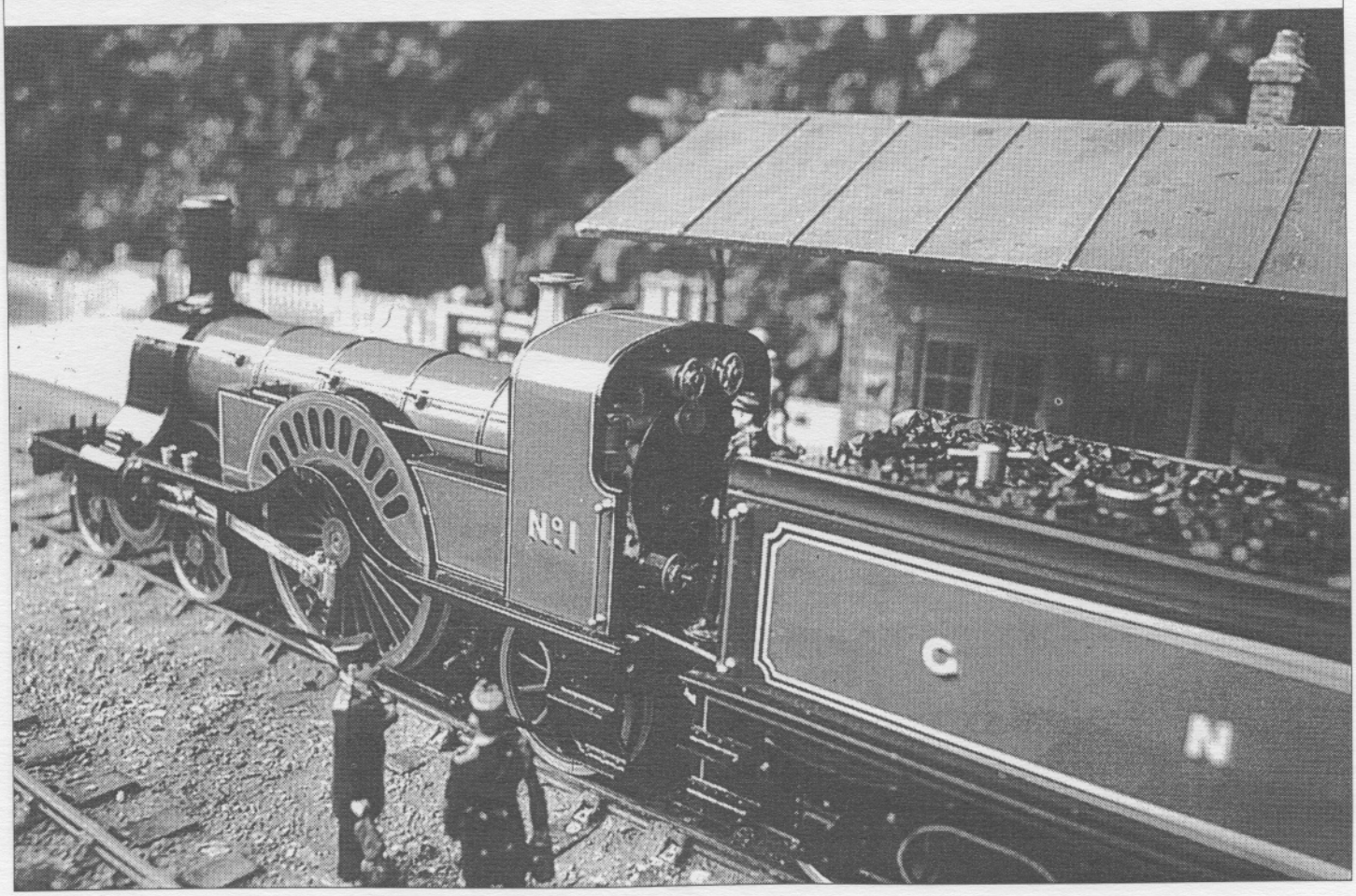
The finished model more than lives up to my original expectations, with the loco easily handling eight of Peter Comley's splendid varnished teak six wheel carriages. The motion is smooth and controlled. Despite my original fears, with clean wheels and track the engine runs without slipping. I've even been able to start a heavy train of eight coaches without slipping. All, I might add, without the obvious advantage that the prototype enjoyed of steam sanding. The loco runs evenly with a crisp, loud bark.

The ten o'clock Anglo-Scottish Express stops at Badger Green.





The beautiful coaches are custom built by Peter Comley and are available through J&J Trains. For a look at John Coughran's excellent photos of the Anglo-Scottish Express in full color, check out our web site at <www.steamup.com>.



By now you can tell that I'm a little more than just satisfied with my new Single. But then perhaps I'm a bit biased. You see, when Comley and Barrett are on the footplate, we're only two inches tall.

Today's train is a particularly heavy two hundred ton Anglo-Scottish Express. Although we're going 71 miles per hour, we're running late out of Wood Green. A dense, continuous shower of incandescent cinders is exploding out of the chimney, and tallow polish on the smokebox (or is it the paint itself?) is smoking again. As we hit 78 mph, it's not without a sense of trepidation that we anticipate the long 1:100 bank to Potter's Bar. With the whistle screaming and the fire so dazzling white that we fear the grate might melt, we tear through that misty morning at the dawn of the new century.....

References

Great Northern Locomotive Engineers, F.A.S. Brunn, published in 1966 by George Allen and Unwin Ltd.

The Great Northern Railway, O.S. Nock, published by Ian Allen Ltd., 1958

Patrick Stirling's Locomotives, L. Rolt, Published by Hamish Hamilton Monograph, 1964

The Stirling Singles, K. H. Leech and M. G. Boddy, by David and Charles Locomotive Monographs, 1965

Top Shed, P. N. Townend, Published by Ian Allan Ltd., 1975

Ed. note: John Coughran submitted lots of beautiful color slides for this article, and we're sorry that we are not able to print them in color here. However, for those who have internet access, they will all be available for viewing on our web site at <www.steamup.com>.

Whistle Valve for the Aster C&S Mogul

article and drawings by Larry Bangham

Larry responds to reader's pleas with a valve for his Harmonic Whistle

The valve I will describe was conceived as a quick way to get my Harmonic whistle under steam. It seemed that a safety valve had all the necessary components: a seat, a ball, a spring, and a plunger. All I had to do was figure out a way to raise the plunger and direct the steam into the whistle. The cab mounted safety valve on the C&S Mogul is rather inaccessible and for that reason is very rarely tested. If it never pops off and doesn't get tested now and then, it will soon become inoperative. When I took mine off I found that the ball was frozen to the seat and the plunger wouldn't move. Now at least it gets operated frequently, although for a different purpose.

Like most of my projects this one requires a small machine shop to do it right. However, there are usually alternate ways of doing most things. I consider my machine tools to be among my most valuable possessions, although monetarily you would be hard pressed to buy a decent used car with the total outlay I have in them. If you enjoy creating in metal they are probably the best investment you could ever make. A good tool, well maintained, can provide a lifetime of purposeful pleasure....but like all things, it's gotta be your bag.

Drawings

All of my drawings employ the decimal system of dimensioning, mostly because of my background in Aerospace engineering, but also because you don't see many machine dials, vernier calipers, micrometers, or dial indicators in fractions. I also try to round off numbers to end in 0 or 5 when possible. Its easier to read on a dial. A two place decimal indicates a looser tolerance than a three place decimal. I haven't specified the actual tolerances on dimensions because I know that most home machinists will try to get it as close as they can and will make it work one way or another. Unless otherwise specified all dimensions are in inches. Some of the standard symbols that are used are Ø for dia, and ↧ for depth.

Safety Valve fig 2

Removing and installing the safety valve will require removing the pressure gauge line nut to get wrench clearance. The safety valve can be modified without disassembly by gently gripping the plunger in a vise and center drilling a dimple prior to drilling. I chucked it up by the outside hex and very carefully turned the groove. Some valves have fins which make it easier to turn (less material to remove). I made a miniature Bung wrench out of 3/16 OD stainless steel tubing (fuel line) so I could adjust the nut down and raise the release pressure. I was able to get it up to about 80PSI (5.6 Kg/Cm^2) before the nut bottomed out. This will prevent the whistle valve from inadvertently popping off before the steam dome mounted valve, and provides a more positive shut off. The nut has been staked in place by Aster so it is necessary to work it back and forth with a little lubricant to free it.

Housing Assembly fig 4

The strange angles allow the set screw to be accessible from the rear (without removing the cab) for occasional checking, while the control handle exits from the front window on the fireman's side. The angles are not critical. Approximate is good enough. To minimize leaks, the safety valve should be a push fit into the bore. There is more than one configuration out there so you should fit the valve you are going to use. Soft solder can be used to assemble the tube and nipple.

Lever and Actuator figs 3 & 5

The location of the servo rod hole in the lever will pretty much determine where you put the servo. I used a HiTec HS-80 micro servo mounted on a bracket attached to the cab floor. The servo is visible through the forward windows on the fireman's side. If you want it more hidden use the smaller and more expensive HS-60. If you are not using a radio leave the hole out. The bend in the actuator should be fairly sharp and ground down so it will fit through the access hole in the housing.

Assembly fig 1

Install the safety valve and O-ring, I used a little teflon plumber's paste on the O-ring and threads to act as a lubricant and sealer. Reinstall the pressure gauge nut. Rotate the valve plunger so that the hole is pointed towards the fireman's forward facing window. Push the housing on with the access hole aligned with the plunger hole. While holding the housing with one hand, insert the actuator through the access hole and feed it through the plunger hole. It might take a little fishing around, but with the chamfer on the actuator it's not so bad. Install a .70 length of silicone rubber tube over the brass tube and work the lever into place. While working the lever onto the actuator press the other end of the actuator against the valve plunger by inserting a small tool through the access hole. Tighten the set screw while holding the actuator against the plunger. Make sure that the rubber tube is not stretched during installation.

Install the access screw with a small O-ring or a short piece of silicone rubber tube to seal it. Tighten the housing set screw after aligning the handle to exit through the cab front window. I used 1/8 neoprene tubing from the discharge nipple, routed down to the floor of the cab and through a notch in the front wall behind the tool box. The tool box is notched to accept the tube and acts as a clamp when it is screwed in place.

If you are not running R/C and don't have the support of the servo control rod, it may be necessary to use a stiffer spring in the safety valve, or add an external spring to keep the handle from bouncing up and down and releasing steam. I hope this information will be useful to some of you whistle lovers and, as always, I'll be glad to answer any questions that I can. Keep on Quilling.....

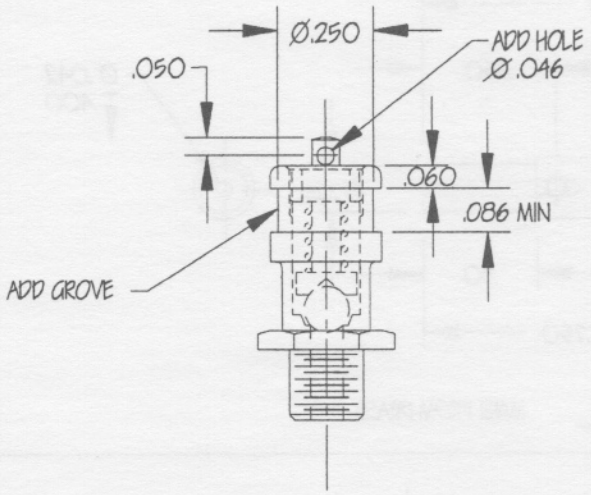
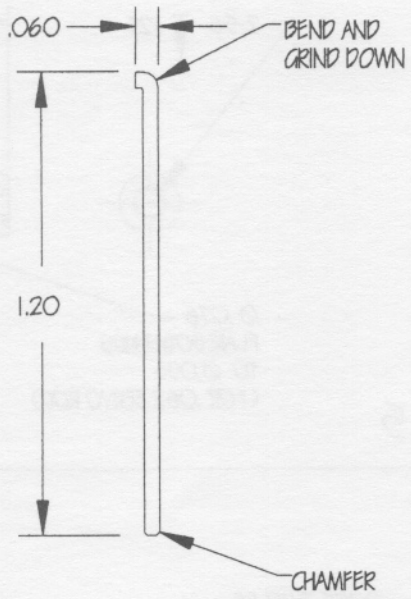


fig 2 SAFETY VALVE REWORK



MAKE FROM .040 MUSIC WIRE

fig 3 ACTUATOR

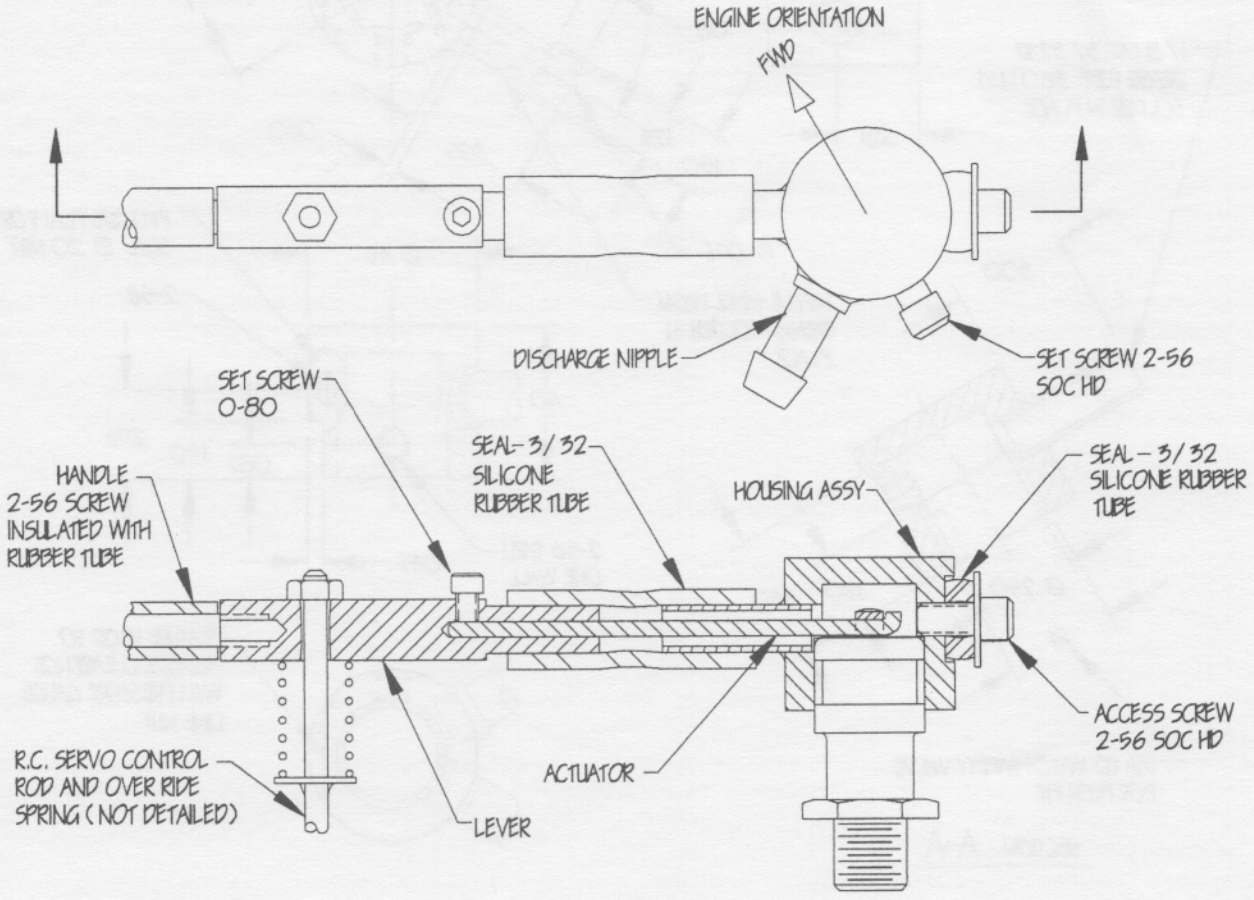


fig 1 WHISTLE VALVE ASSEMBLY

SCALE: 2/1

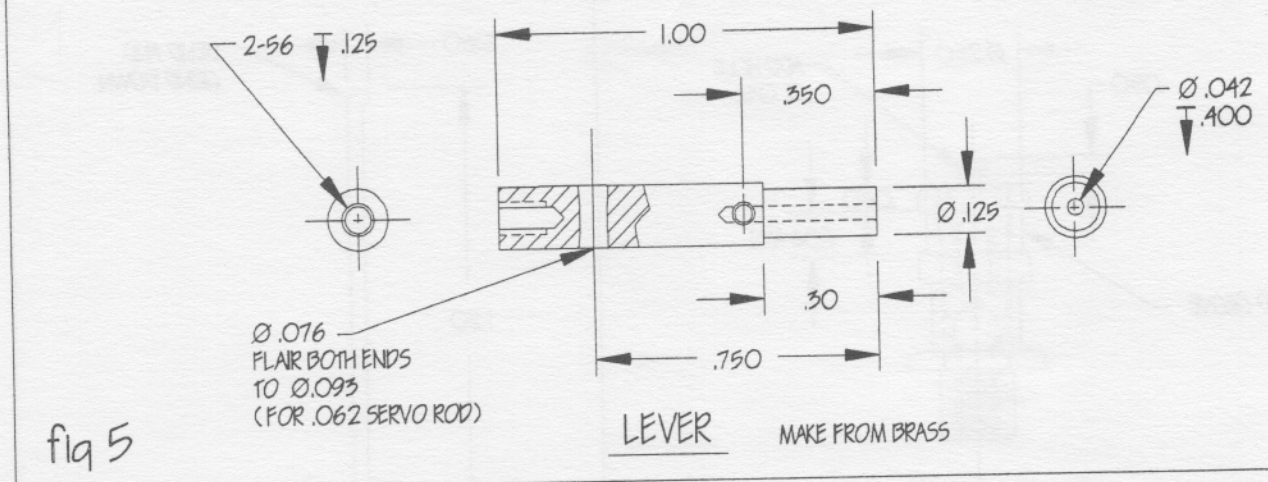
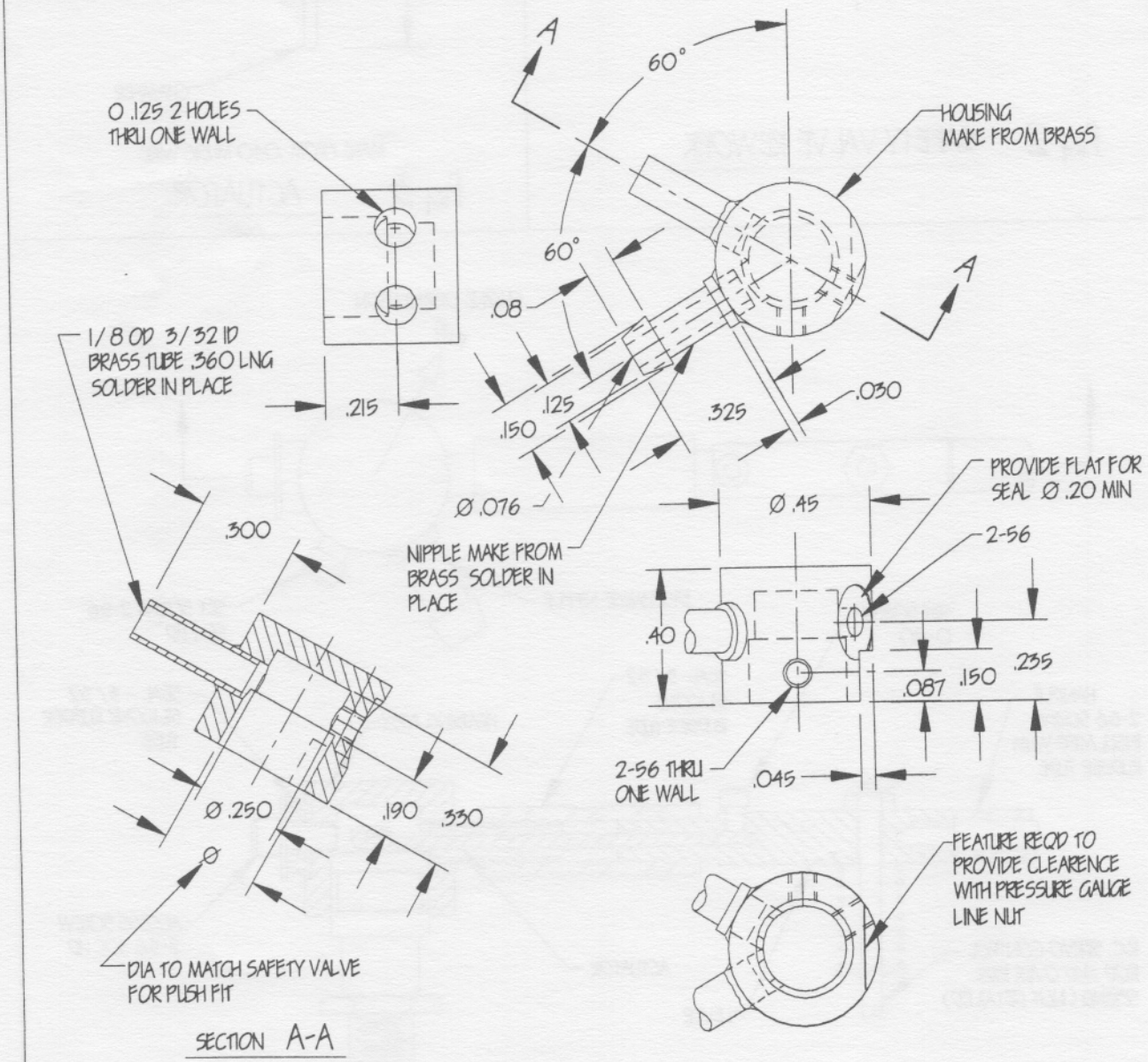


fig 5

LEVER MAKE FROM BRASS



SECTION A-A

fig 4

HOUSING ASSEMBLY

Steam Shay Construction Notes

notes and photos by Jerry Barnes
Part II

The day the engine arrived from England was just like Christmas. It is quite a jewel. It's very well made, moves smoothly and looks great. It came with tubes, connectors and a few extra screws and O-rings. The reverser is mounted on top, and I connected a short piece of brass with a brass tubing handle bolted onto it for speed and direction control. It has a red crankshaft, which is supported by four main bearings. It appears to be a very sturdy engine, and it should hold up to lots of serious steaming.

Mike drilled 1/16" holes in the ends of the crankshaft so I could mount my u-joints to it. (See part I, SitG #35)

Because I hadn't finished the frame when I ordered the engine from Mike it is amazing that I was able to hook it in to the frame with very little modification. I am lucky sometimes.

"The day the engine arrived from England was just like Christmas."

The engine had the inlet and outlet pipes mounted under the reverser. I was able to bend them up slightly, but did have to notch out the frame a little so they would clear the frame. If you have Mike build an engine for you, have the pipes come out above the reverser or bend them up a little higher. I only needed 1/4".

The engine itself had a flat plate on the back that the braces mounted to. Mike had drilled a few holes in it to mount the engine. I bolted a piece of brass plate to the frame, measuring 1/16" by 6" by 1-1/2". The plate is angled on each end, tapering up to 1/2" at the top. The engine is bolted to the angled plate.

The frame is 17" long by 2-1/2" wide across the ends. The bolsters are made of 1/8" brass bolted to the frames, with 4-40 bolts where I wanted to connect the power trucks.

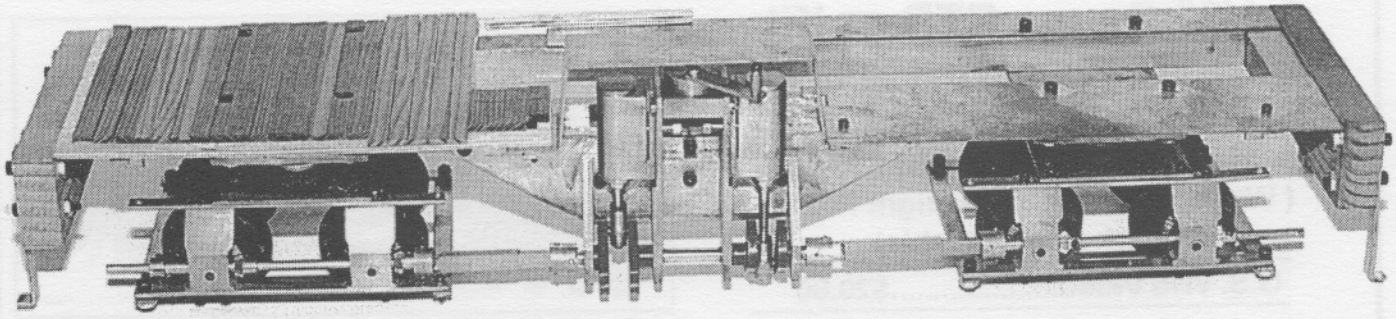
Remember, you have to offset the trucks so the shafts and the crank line up together in a straight line. You do drill your hole in the center of the power trucks, but offset the hole in the bolsters. Mine were drilled 3/8" off center to accommodate the offset. I used 1/4" brass bolts with 5 fender washers to raise up the frame to clear the top of the trucks for clearance on turning. Ron advised me to put a stop on each truck, so it doesn't turn out of position and disconnect the driveline as you are carrying the engine over to the track after you have got it steamed up.

The engine is mounted equal distance between the trucks. I wanted to avoid the real short telescoping shaft that you see on a Shay. I figured I would have fewer problems with the shafts separating if I had more length to work with.

To calculate the length of the telescoping shafts I temporarily mounted the shafts to the u-joints and power trucks with straight pins bent over on the ends. Didn't want any permanent attachments until I had figured everything out.

I took the Shay out to my track's tightest curve (4' radius). I set it down on the curve with the gears to the outside of the curve and marked how long the shafts could be.

Then I turned it around with the gears to the inside of the curve and marked how long they could be.



The completed Shay frame with trucks, steam motor, universal joints and drive shafts installed. All ready for the boiler!

Reversing it around once more, with the gears on the outside of the curve, I noted that the inside length would work fine on the outside also, so that was the length I cut.

The running boards are made from 1/32" brass. They are 1-1/2" wide on the geared side and 3/4" wide on the other. I also bent a bracket to go over the engine.

I decided to make the cab out of wood (easier for an old wooden boat modeler). I bolted a base of 1/8" ply to the frame, then framed up the cab with 3/16" maple over 1/8" plywood sides. These panels have thin redwood planks layered between the maple. You can

get thin wood through boat model supply houses like The Dromedary or Model Expo. The bunker section was made up the same way. The maple edges are glued a little below the panels, so when it is set on the ply base you don't see the edge of the plywood. I did plank the plywood base with thin redwood planks. The little Dremel table saw was invaluable for this step.

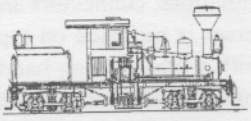
The cab roof is 1/32" plywood curved over a redwood frame. Thin strips of wood form the rain diverters on each side. There is glazing in the front windows and the cab is planked on the inside. The roof is removable and will be hinged for easy access to the boiler and backhead.

Parts from Trackside Details will be used for the domes, headlight, generator, compressor and smokebox details...unless I get real inspired and have the time to make them myself.

The whole project has taken 6 months so far. I should note that I am a high school art teacher and had most of the summer off to work on the Shay. I am now making some rolling stock from plans in Garden Railways magazine. A flatcar and a work caboose are nearly finished. They are made of redwood (had lots left over from a trestle project).

A Roundhouse boiler will generate the steam for our Shay. Of course, this will have to be worked into the budget!

I want to thank the editor for all the help he gave me to get this project going. Of course, I bribed him with an offer to write this article, waiving his usual high rates of remuneration. The Shay project has been great fun as well as a wonderful learning experience, and I recommend it to anyone.



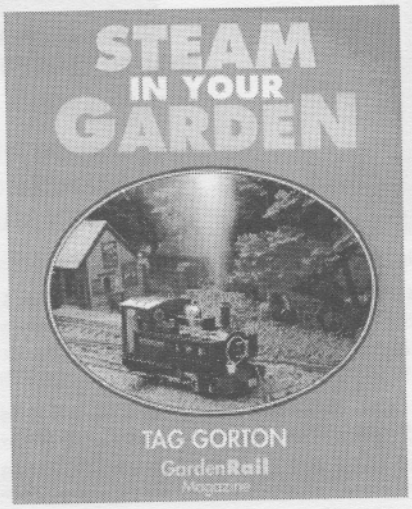
Book Review:
Steam in Your Garden

Author: Tag Gorton

Published by: Atlantic Transport, Trevithick House, West End, Penryn, Cornwall TR10 8HE, U.K.

Size: 8-3/8" x 10-3/4"; soft cover; 80 pages; b&w and color photos

Price: £11.95



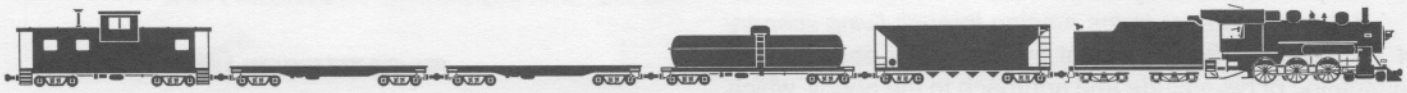
Starting with an introduction that paints a lovely image in the reader's mind, the author draws the reader right into the story with the very first paragraph. Popular *Steam in the Garden, GardenRail* and *Garden Railways* author Tag Gorton has done a fine job of bringing the hobby of miniature steam garden railroading to life in this glossy, colorful book. Filled with beautiful photos of charming scenes, locomotives in steam and rolling stock at work on the author's Longlands & Western line in England, the combination of photos and skillfully worded text makes it nearly impossible to resist the urge to get started right away on your own miniature steam railway...or to add to what you may already have.

"I dream of steam trains running through living scenery at my behest." This statement by the author seems a fair summation of his attitude and approach to the hobby, which are reflected in this book. No one I know of, with the possible exception of the late Grover Devine, has done as fine a job of creating a believable steam-era world in miniature than Tag Gorton.

What Tag has authored here is not a technical treatise on steam, but rather a lovingly presented overview of his hobby. It would take a strong man (or woman) to resist the allure of steam as shared by the author.

Chapter headings include *Investigating Options, Buying or Acquiring Live Steam, Dreaming Into Action, Landscaping and Terraforming, Buildings and Structures, Last Train to Saltash* and more.

Steam in Your Garden is perfect for the newcomer to garden railroading. It's also right on the mark for anyone who loves steam railroads in miniature or those who appreciate fine modeling in any scale. The photos alone make it a must-have for those of us who are hopelessly obsessed with steam in our gardens, and the author's friendly, over-the-back-fence writing style makes this book great reading any time. Buy the book...I promise you'll love it – RB.



Steam Scene.....

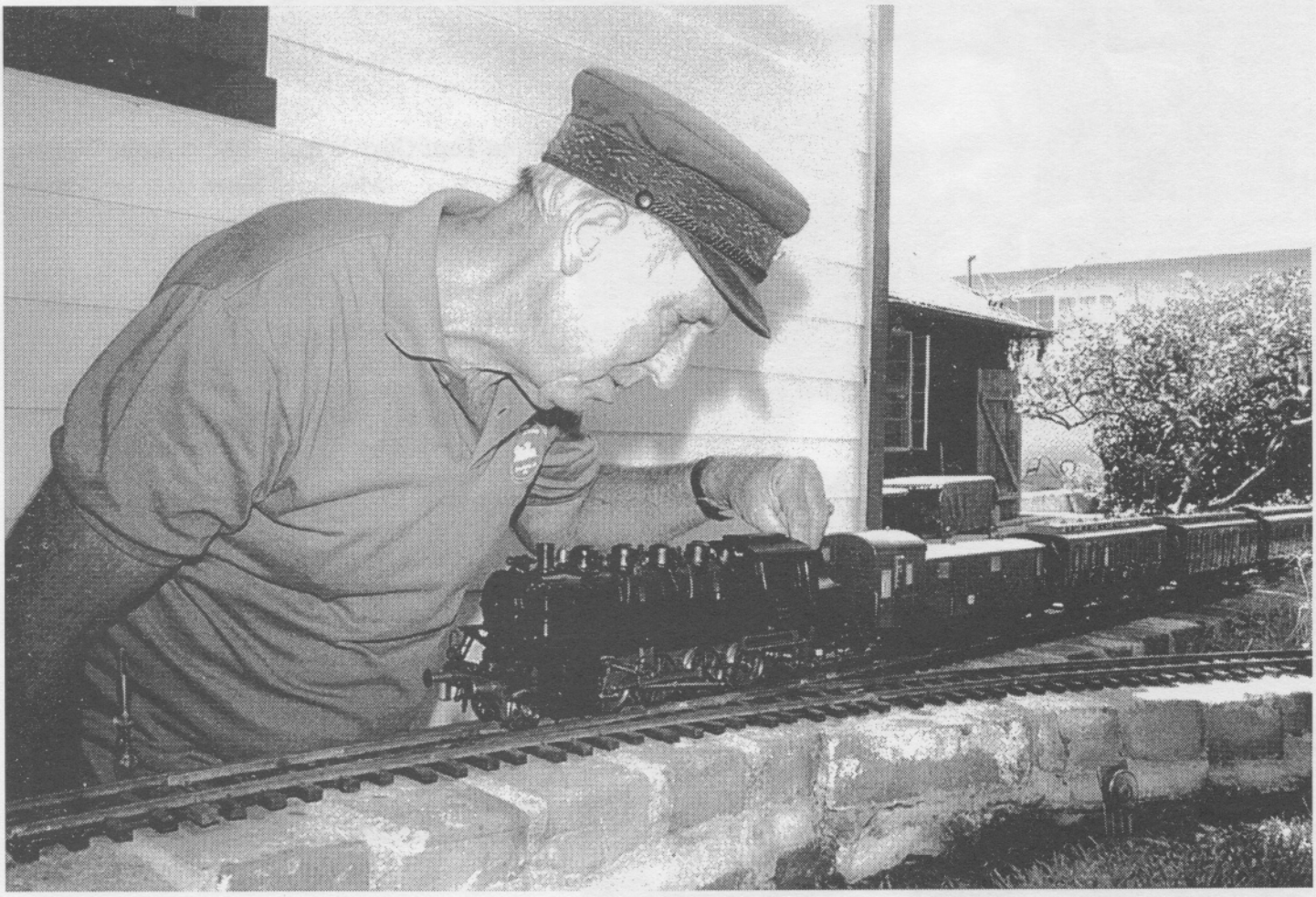
We invite you to send your favorite photos for this feature. PLEASE label each photo with vital information like photographer, subject, where, when and why. Stick-on mailing labels work great for this. Don't try to write directly on the back of the photo...it embosses the front and ruins it. Mail them to SitG, PO Box 335, Newark Valley NY 13811. Please include a SASE with sufficient postage if you'd like your photos returned.

***ERRATA:** In issue #36, we mistakenly identified one of the Steam Scene photos as having been taken at a steamup in Italy. What the photo actually showed was Jerry Reshew's Aster Schools (modified by Doug Pattman), running with a set of Peter Comely teaks on Jim Stapleton's railway in Virginia.*

In our pursuit of enjoyment from our hobby, steamups are one of the most popular items on the agenda. They are held at various times and places, come in many sizes, and are universally enjoyed by live steamers around the world. Thus we give you glimpses of some of the steamups our readers have shared with us.....

The first is a steamup held at Sonny and Wendy Wizelman's home in Los Angeles over Labor Day weekend in September, 1996. John Coughran took the photos and reports that it was a splendid event and a lovely setting. Brickwork around the swimming pool and yard supported the track in a beautifully landscaped garden. Food and drink were provided by the hosts, with additional comestibles brought by the guests. Steaming was constant throughout the afternoon, highlighted by the running of Lee Barrett's Aster Stirling Single, the first of these engines assembled in the U.S. This interesting engine proved to be a fine runner, producing a strong exhaust bark while pulling a rake of proper teak 3-axle coaches built by Peter Comley. Along with the fellowship, tours of the host's lovely home were popular, with the majority of the guests lingering in the hobby room, admiring the many fine models tastefully displayed.

Photo below: John Coughran with his Aster BR86 and six Marklin 3-axle coaches.



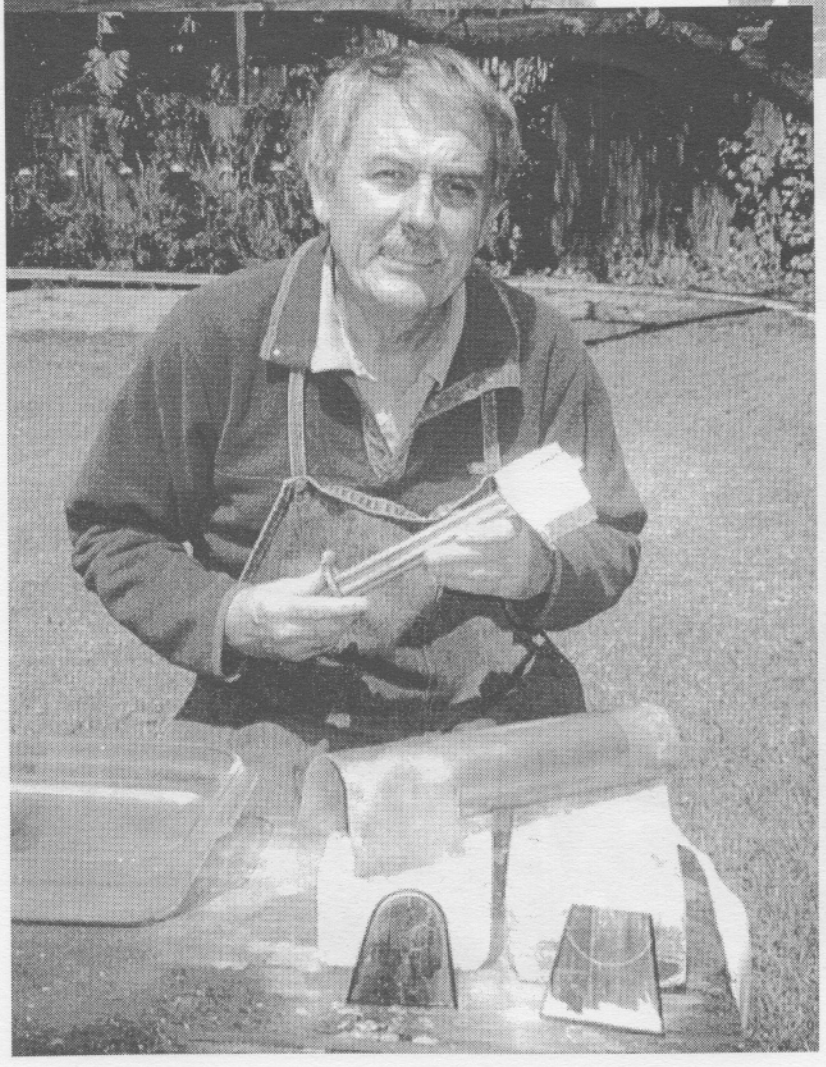


Photo Top: Gary White with his Aster Western Maryland Shay.

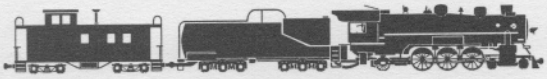


Photo Left: Lee Barrett shown fabricating a coal fired boiler for an Aster Pennsy K4 Pacific.

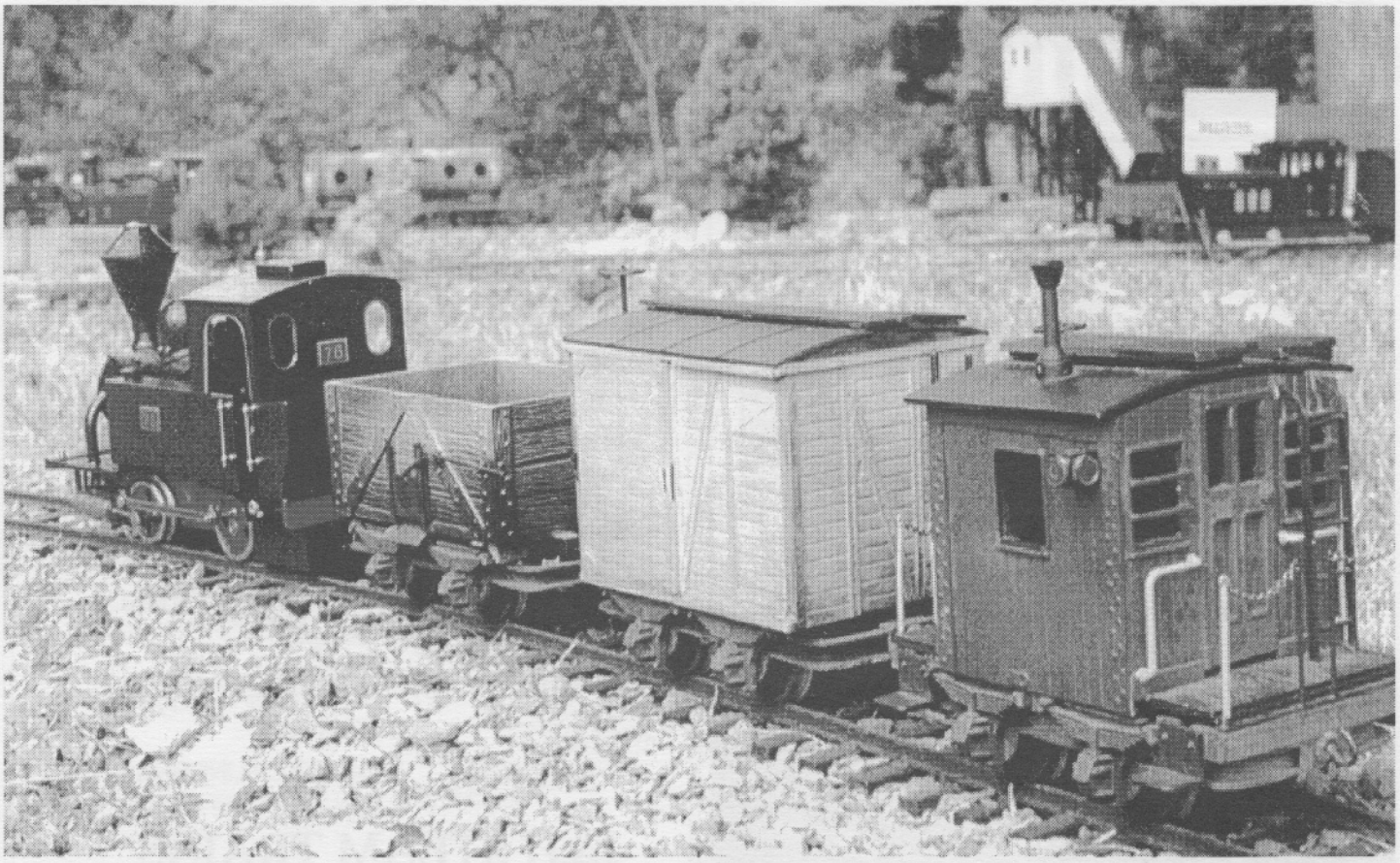


Photo Top: Long ago and far, far away...an Aster "Old Faithful" with a scratchbuilt work train at a steamup on the sadly departed Silo Falls Railway in Upstate New York. ***Train & photo by Rich Chiodo***

Photo Bottom: Ernie Noa's scratchbuilt Mogul, inspired by Charlie Mynhier's Build Your Own Loco series. Ernie gets together with Bob & Carol Paule and Larry Herget for frequent steamups in Missouri. ***Photo by Ernie Noa***

SWAP SHOP

For Sale: Aster BR 86 live steam loco, carefully built by owner (me). Loco has been air tested, is in A-1 condition, and has never been run. Best offer over $2250.00, which includes UPS shipping to lower 48 from Colorado. John Pedersen. Tel (303) 444-7555 – Fax (303) 417-9880. (36)

Wanted: J&M blue and ivory CIWL cars; Fine Arts Models Pennsy N5C Caboose; Aster K-4 kit. J. Hyde, 614-946-6611. (36)

For Sale: Build your own turnouts! Point and stub manuals and step by step video, $25 plus $3 SH. Satisfied customers all over the world. See the review in SitG July 96 page 40. Send checks to Jerry Wilson, 2118 Judson, Longmont, CO 80501. Phone 303-772-5399 or e-mail to jjwilson@bvsd.co.us for more information. (36)

Wanted: British profile, live steam, gauge 1 engines, rolling stock and accessories. Bob Uhrmann, 935 Seasounds Ave., Marmora NJ 08223-1061. Phone 609-390-1259. (36)

IF YOU ARE BROWSING YOUR SITG BACK ISSUES FOR INFORMATION ON A SPECIFIC SUBJECT, YOU NEED THIS INDEX! Index to first 5 volumes of SitG, indexed by author, subject & contents. Send $5 (cash, check or money order) to Ricky Morningstar, 11 Kimberly St., Riverview NB, CANADA E1B-3P8.

Wanted: Distressed or incomplete gauge 0 or gauge 1 live steamers. Will not be resold. All correspondence answered. Murray Wilson, 604 N. Chester Rd., Swarthmore PA 19081 - 610-604-0444. (36)

For Sale: I have the following engines & parts for sale. **#1 -** Clishay, 7.5" gauge...needs work - $2,000; **#2 -** 0-4-0 vertical boiler, 7.5" gauge...needs work - $1500; **#3 -** Shan, $200; **#4 -** Miss, $175; **#5 -** Dodi - $60; **#6 -** Ann, $60; **#7 -** Lucy, $35; **#8 -** Dotty, $275; **#9 -** Small vertical boiler, $100; **#10 -** Wheels, $5.00. Ed Warren, 11996 Gast Road, Bridgman, MI 49106 - phone 616-426-3596. (36)

For Sale: Aster Pannier BR Tanker (Black). Never run, mint condition – $2,000.00. Peter, (212) 927-1696 (6:00 p.m. – 9:00 p.m.). (36)

For Sale: Aster Big Boy, live steam version. $12,000. Contact Bob Pennock, PO Box 191, Spencer OH 44275 - phone 800-664-3226. (37)

For Sale: Berkeley Loco Works "Cricket". Mint, never been fired. $400. Fred Kuehl, PO Box 93, Rowland PA 18457, phone (717) 685-2239. (37)

Wanted: O.S. Engines portable steel track - 3.5" gauge or dual gauge. Straight and curved sections needed - also switches. Contact Bill Crane, 4780 Ferry Neck Road, Royal Oak, MD 21662 USA – (410) 745-2868. (37)

Wanted: Used or abused 0-4-0 "Little Giant" by Steamlines. Primarily interested in running gear, boiler not necessary. Please write: D. V. Herrscher, 1945 Via Encantadoras, San Diego CA 92173-1839. (37)

Wanted: Lindsay Shay, any condition, any gauge. Also, Roundhouse Fowler in good condition with green paint. Other 0 gauge meths-fired locos considered. Please call any time at 707-769-1650. Richard M. Popek, 1020 Palmetto Way, Petaluma CA 94954. (37)

For Sale: Aster Big Boy - steam. Fired four times, excellent runner. US$11,500 plus shipping. Contact Gordon Watson at 011-61-359-686-573, 241 Belgrave - Gembrook Rd., Clematis, Victoria, Australia. (37)

For Sale: #1 - Hemmens Porter, NIB, unsteamed, fitted with R/C & whistle - $1350 + shipping. **#2** - Aster SNCF 141R. Rare green livery w/ pinstriping, unsteamed, absolute beauty - $4200. Ash Rajan, 201-379-7109. (37)

Wanted: Aster PLM 231. Also miniature HO gauge live steam engines - Rocket, Cramden sold by Solar Engines. Ash Rajan, 201-379-7109. (37)

For Sale: Maxwell Hemmens Porter 0-4-0, excellent condition, $1150.00. Donald Boone, 3381 Indian Trail, Suffolk, VA 23434 - phone (after 5:30 p.m.) 757-925-1402. (37)

For Sale: 1-1/2" scale, 7-1/2" gauge track, IBLS Standards - two 3-car trains, electric powered, engine - gondola - caboose. $900.00 train set. Also 15" gauge, two 4-wheel trolleys - for amusement or home use. Adults ride inside. Also 24" gauge train, unfinished but running. Robert Hankla, 16233 Richardson Avenue, Abingdon VA 24210 - 540-628-6879. (37)

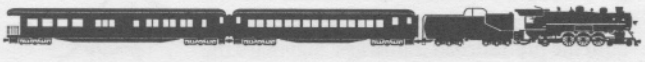
Wanted: Inexpensive live steam Shay locomotive, (Geoffbuilt, etc.). Prefer radio control and wood cab. Tom Myers (tjmyers@ix.netcom.com), 52887 Seven Oaks Drive, Shelby Township, MI 48316, (810) 726-9534. (37)

For Sale: Aster Pennsy K4s, live steam, factory built, never fired. Perfect! Have books, accessories and original wooden case. $5,000 plus shipping. David Bruck, 2180 Singletree Lane, Redding, CA 96002. Phone 916-221-3410. (37)

For Sale: #1 Aster BR-96 kit (black), $5,900. **#2** Aster C-56 kit, $3,000. **#3** Aster Big Boy #4024, built by John Weiland, great runner, run less than ten times. $13,000. **#4** Aster C&S Mogul with R/C, $4,000. **#5** Argyle South Pacific Coast № 3 with R/C, run twice, $2,800. **#6** Argyle Old Star with R/C, $2,800. **#7** Roundhouse Erika 0-4-0 with R/C, $1,200. **#8** Aristocraft Heavyweight cars (Southern Pacific): Combination, Diner, Observation and 3 coaches, $600/set. Contact Jim Hadden at 801-649-8297 or via e-mail at: <jimhadden@aol.com>

For Sale: Aster DB78 and 4 Marklin DB Passenger cars as steamed in Diamondhead '97. Strong runner...$2300. Geoff Spenceley, 1865 William Ct., McKinleyville CA 95519. (707) 839-5291. (37)

Swap Shop listings are offered at no charge as space permits. No phone-in ads, please! Send your listings to SitG, P0 Box 335, Newark Valley NY 13811, or fax to 607-642-8978 (24 hours), or e-mail to <docsteam@servtech.com>. Ads must contain sellers name, plus address and/or phone number. Ads will be run one time only unless previous arrangements are made. If you wish to run your listing again, please contact us before press time. Finally, when your item has sold, please let us know so we can cancel the ad.



End of the Line

Steamy Events

As predicted, the National Steamup at Diamondhead, Mississippi was a roaring success. With over 200 registered participants and hundreds of steam locomotives in attendance, how could it be otherwise? We'll have a full report for you in the next issue, but you can get an early start by checking the photo report (in full color!) on the Steam in the Garden Online web site at:

<http://www.steamup.com>

If you don't want to miss out on Diamondhead '98, we suggest that you make your reservations now...the convention center is filling up fast.

We also suggest that you start planning now to attend the 1st Annual West Coast Steamup in San Jose, California, May 30 thru June 1, 1997. This is shaping up to be another world-class event, with seminars, a dealer room and indoor and outdoor steaming tracks available 24 hours per day. Check out the ad in this issue, then make your reservations. Hope to see you there!

How Specs Live Forever

The US Standard railroad gauge (distance between the rails) is 4 feet, 8.5 inches. That's an exceedingly odd number. Why was that gauge used?

Because that's the way they built them in England, and the US railroads were built by English expatriates. Why did the English people build them like that? Because the first rail lines were built by the same people who built the pre-railroad tramways, and that's the gauge they used.

Why did "they" use that gauge then? Because the people who built the tramways used the same jigs and tools that they used for building wagons, which used that wheel spacing. Okay! Why did the wagons use that odd wheel spacing? Well, if they tried to use any other spacing, the wagons would break on some of the old, long distance roads, because that's the spacing of the old wheel ruts.

So who built these old rutted roads? The first long distance roads in Europe were built by Imperial Rome for the benefit of their legions. The roads have been used ever since. And the ruts? The initial ruts, which everyone else had to match for fear of destroying their wagons, were first made by Roman war chariots. Since the chariots were made for or by Imperial Rome they were all alike in the matter of wheel spacing.

Thus, we have the answer to the original questions. The United State standard railroad gauge of 4 feet, 8.5 inches derives from the original specification for an Imperial Roman army war chariot. Specs and Bureaucracies live forever. So, the next time you are handed a specification and wonder what horse's backside came up with it, you may be exactly right. Because the Imperial Roman chariots were made to be just wide enough to accommodate the back-ends of two war horses.

Happy Steaming!

Ron

Many thanks to Larry Larsen of Larry Larsen Graphics for giving his permission to use the nifty graphic images designed by him, which you will find scattered throughout every issue of SitG. Larry also designed our Catatonk Log & Lumber Co. RR logo, with which we are well pleased.

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This is a scale model of an American 2-6-0 Mogul class locomotive built by the H.K. Porter Locomotive Works at Pittsburg, Pennsylvania, in 1880. This historic and distinctively styled engine is typical of the locomotives used in the opening up of the vast railroad system of the United States, the largest in the world, in the nineteenth century.

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Notwithstanding the tremendous advances made in recent years in other types of working models - radio-controlled planes and helicopters, for example - the steam locomotive still takes pride of place in the eyes of many model engineers. O.S. live steam locomotives bring the hobby to a new and wider section of model enthusiasts. No longer is it necessary to possess an expensively equipped workshop and to spend years building a steam loco. Parts are ready machined and some sub-assemblies, such as the boiler, are ready built. An O.S. locomotive kit needs no more than a few simple tools and the true enthusiast's careful hand,to produce a superb model that duplicates a fullsize locomotive's operation in every respect' from raising steam to driving and maintenance procedures.

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