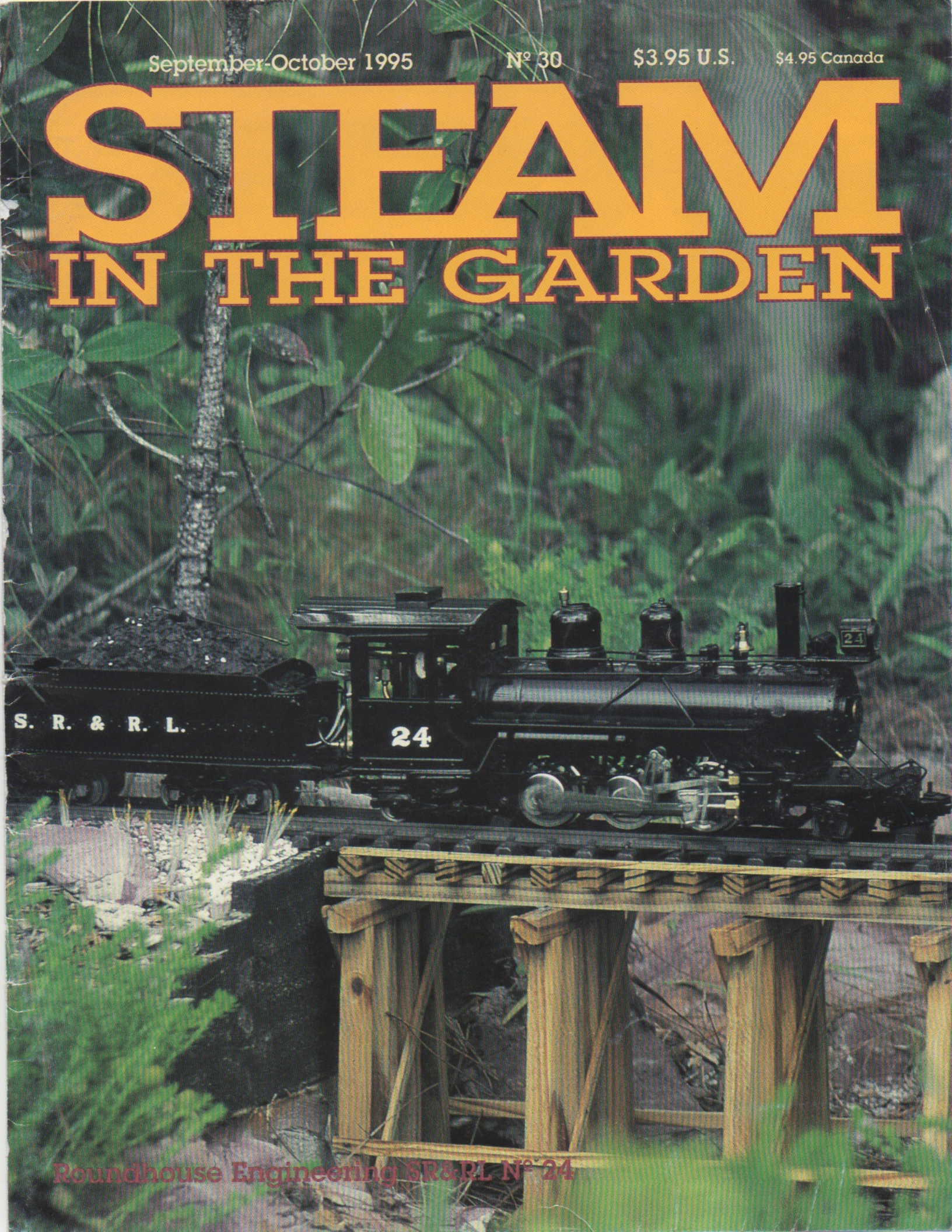
September-October 1995 Nº 30 $3.95 U.S. $4.95 Canada

STEAM IN THE GARDEN



Roundhouse Engineering SR&RL Nº 24

STEAM IN THE GARDEN

Vol. 5 No. 6
Issue No. 30
September/October 1995

Articles

16 ..... **Build Your Own Locomotive, Part VIII** -- *get out the box of bits and pieces you've been making...it's time to turn them into a locomotive!*
by Charlie Mynhier

20 ..... **Clarification on Heat Treating**
by Kevin O'Connor

21 ..... **Loco Review** -- *"COLORADO", a generic 2-6-0 narrow-gauge Mogul from Pearse Locomotives*
by Ron Brown

24 ..... **Lathe-Free Locomotive, Part V** -- *Bodywork & Lubricator*
by Rob Kuhlman

27 ..... **Americanizing the Lady, Part II** -- *The author gets down to some serious metal cutting as the transformation of Lady Anne continues*
by Don Beach

32 ..... **How to Tame a Wild Aster** -- *modifications to the throttle valve*
by Kevin O'Connor

35 ..... **Book Review** -- *The Epic Struggle Between Road & Rail*
by Chip Rosenblum

Departments

4 ..... **Calendar of Events** -- *Who, what, when & where*

5 ..... **RPO -- Letters** -- *Our readers write...with enthusiasm*

8 ..... **What's New?** -- *Latest & greatest commercial offerings*

12 ..... **Gazing Into the Fire** -- *The lowly smokebox*
Peter Jones

14 ..... **The Fitter's Bench** -- *Centers, both live and dead*
Crankpin

26 ..... **Cartoon** -- *An offbeat look at the world of small-scale steam*
Joe Leccese

36 ..... **The Old Curmudgeon** -- *Radius those side rods for that extra touch of class*
Gene Rutkowski

45 ..... **Swap Shop** -- *Incredible bargains on steam engines & such*

2, 38 & 40..**Steam Scene** -- *Reader's Photos*

46 ..... **End of the Line** -- *What? Time to start thinking about another Convention already?*

46 ..... **Advertiser Index** -- *Buy something from these good folks!*

ON THE COVER:

It's morning, and the serenity of the cool, green, leafy glade is broken by the pounding of steel wheels on rails and the roar of a heavy engine hauling its mixed freight over the old timber trestle. Rob's camera froze the Roundhouse Engineering SR&RL № 24 into immobility, but the steam plume from the stack and the blur of the furiously churning side rods and crosshead give us a clue about what's really going on here.

Photo byRob Osterhoudt

Publisher/Editor
Ron Brown

Faithful Assistant
Marie Brown

Graphics Director
Harry Wade

CAD drawings in this issue by:
Charlie Mynhier -- Harry Wade

Contributing Editors
Crankpin ..... The South
Tag Gorton ..... England
Marc Horovitz ..... Colorado
Peter Jones ..... Wales
Joe Leccese ..... Massachusetts
Chip Rosenblum ..... Ohio
Gene Rutkowski ..... Washington
John Wenlock ..... Wales

Steam in the Garden (USPS 011-885, ISSN 1078-859X) is published bimonthly for $21.00 ($27.50 Canadian, $28.50 foreign) per year (6 issues) by Steamchest Publications, 6629 SR 38, Newark Valley NY 13811. New subscriptions please allow 4 - 6 weeks for delivery. Direct correspondence to PO Box 335, Newark Valley NY 13811. Second-Class postage paid at Newark Valley, NY and an additional mailing office.

POSTMASTER: send form 3579 to Steamchest Publications, PO Box 335, Newark Valley, NY 13811. Printed in USA.

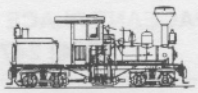
USA, Canadian and foreign (except U.K. & Europe) subscriptions should be sent to **Steam in the Garden magazine, P.O. Box 335, Newark Valley, NY 13811.**

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

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

Items for review may be mailed to PO Box 335, Newark Valley, NY 13811 -- or sent via UPS or FEDEX to 6629 SR 38, Newark Valley, NY 13811.

Questions or comments? Call us at 607-642-8119 before 9:00 p.m. Eastern time, please -- or FAX us any time at 607-642-8978.



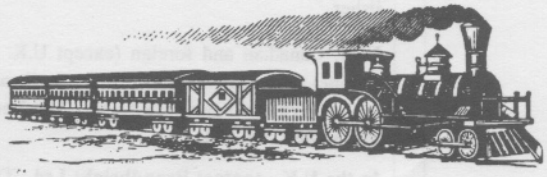
1995 - 1996
Calendar of Events

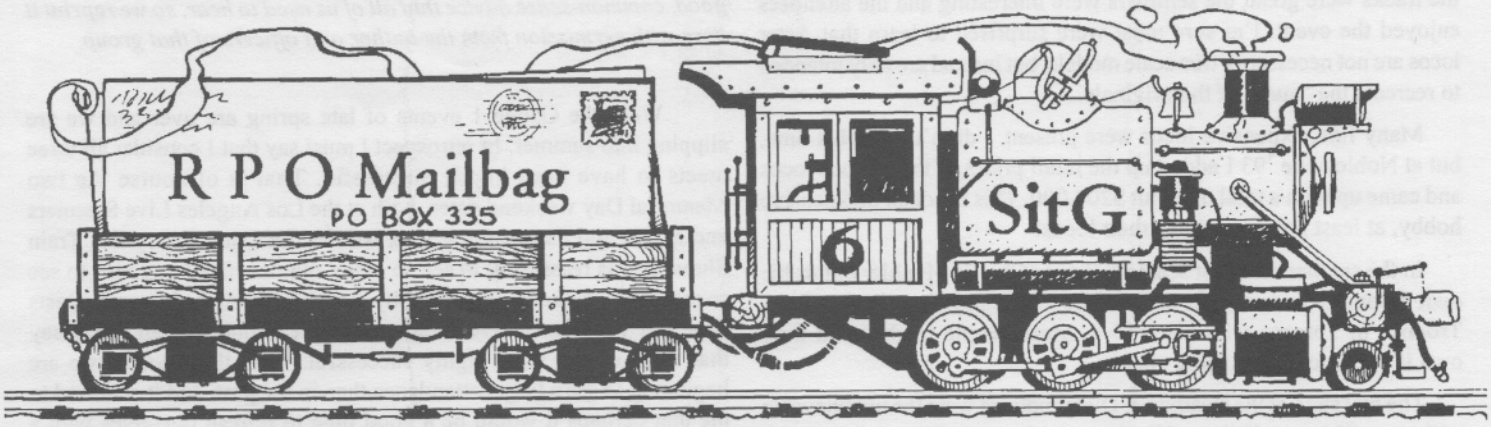
November 18 -- Hagerstown Model Railroad Museum Semi-Annual Trainshow...all scales and tinplate for sale. Location: Mason Dixon Auto Auction, Greencastle, PA (Exit 2 off I-81). Time: 9 am - 3 pm. Adults $3.00, under 12 free. For more info, call Mike Stephens, 301-824-2464.

January 12-14, 1996 -- National Gauge 1 Steamup in Diamondhead, Mississippi. This is the BIG event for small-scale live steamers in North America, so don't miss it! Gauge 1 and Gauge 0, 1:32 scale through 1:19 scale, mainline through logging -- a wide variety of steam locomotives in many different sizes and types will be running during this event. The venue will be the same as previous years - the indoor Atrium at the Days Inn in Diamondhead, Mississippi, just a one hour drive from New Orleans. For more information or to register, contact Jerry Reshew, National Gauge One Steamup, 5411 Diamondhead Drive East, Diamondhead, Mississippi 39525. Phone or fax 601-255-1747.

May 11, 1996 -- 3rd Annual Piedmont Central Railway Steamup and Open House, Charlotte, North Carolina. Saturday, 10:00 AM to 6:00 PM. Gauge 1 railway with 6' minimum radius main line, 5.25' sidings. Main loop approximately 90', ground level, with yard and steaming bay. Contact Malcolm Schaeffer, 704-552-2869 between 6 pm and 8 pm eastern time -- or write 6521 Highwood Place, Charlotte NC 28210. Please enclose SSAE for directions and info on lodging if needed, etc.

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 (ie. ground level or elevated, minimum curve radius, ruling grade, etc.).





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

* * * * *

Richmond, Virginia

Dear Ron:

Ref: "More good stuff on chucks"

I would like to write a few words concerning my own recent experiences with regards to installation and use of both 3 jaw and 4 jaw lathe chucks. Hopefully it may benefit those readers who are about to purchase one of these components.

My own lathe is a 40 year old 9" South Bend type which is still basically a sound machine & has a spindle accuracy of about 0.0005" TIR for which I just purchased new 3 jaw and 4 jaw chucks.

Firstly I strongly recommend to buy only those lathe chucks which have a separate backplate (not the so called direct mounting type).- This applies to both 3 jaw and 4 jaw types.

The first step is to machine the backplate in the lathe itself. It is necessary to first machine a relief in the mounting threads on both sides of the backing plate so that faces "A" and "B" are perpendicular to the threads and also that a 0.0005" feeler gage will not fit between these faces and the spindle shoulder when mounted in the respective directions.

Then it is necessary to machine the faces of the backplate (front and back) and check both for axial runout. Then machine the male rabbet fit onto which the chuck will be fitted. I recommend to machine this with a relief angle as shown and to machine it down to size plus 0.001" and then to turn the last small amount with a file whilst turning in the lathe in order to get a good snug fit. (It is also necessary to have jacking screws to facilitate removal as well as the assembly screws for holding the chuck to the backplate).

The next step is to machine a relief such that only the outer 1/2" (approximately) is in face to face contact with the chuck itself. At this point I assemble the chuck and clamp a precision mandrel into it to take runout readings. The 4 clamping screws are then tightened and by applying different amounts of tension to these bolts it is possible to adjust the angular (or conical) component of the runout down to a very small amount. This will not of course remove any crankshaft component of runout as measured close to the chuck jaws. If this is found to occur then I can only think of two choices - either a) send the chuck back or b) set up the backplate in a 4 jaw chuck and machine an exactly corresponding offset.

Having painstakingly gone through all of the above I find that I can achieve very small levels of runout of either the conical or crankshaft variety. It is also possible to "cheat" a little and use 0.0005" or 0.001" feeler gage material between the backplate and the chuck if this proves to be absolutely necessary.

I also found out (the hard way) that the above precautions are necessary on 4 jaw chucks because even though these have independent jaws it is still possible to encounter a conical runout with the direct mounting type. I managed to set up mine (after several evenings of trial and error) to achieve less than 0.001" next to jaws and 0.0015" at a point 4" from the jaws (simultaneously) by careful machining and assembly of the backplate to the chuck.

I have to agree with the views expressed in Crankpin's article concerning the cost of imported chucks vs. the domestic variety. I've found that there is a 1 to 8 ratio, I'm afraid.

Sincerely,

Denis J. Graves

Everett, Washington

Dear Ron,

I really enjoyed reading the "Radio Control for the Porter" article by Malcolm Wright in the May/June 1995 issue of SitG!

Thanks,

Edwin Besaw

Dayton, Ohio

Dear Ron,

I've just returned from my fourth small-gauge steamup -- two at Noblesville, Indiana and two at Diamondhead, Mississippi. As usual,

the tracks were great, the seminars were interesting and the attendees enjoyed the event. I'm sure most were surprised to learn that Aster locos are not necessarily true scale models, but instead are only intended to recreate the "aura" of the originals.

Many fine, expensive locos were present. I didn't try it this time, but at Noblesville '93 I added up the retail prices of the various locos and came up with a total of about $200,000. This is not an inexpensive hobby, at least not if one buys their locos!

In the smaller scales, it seems that only Charlie Mynhier builds his own locomotives today, at least in the USA, and there is also Peter Trounce in Toronto with his 2-10-4. More people might build their own if the process was more simple.

The real stars of the steamup at Diamondhead were the unbelievable antiques of Murray Wilson. His three toy locos (a Bing 4-4-0, a gear driven Bing 2-2-2T and a Carette Stork-Legs style 2-2-0) ran consistently and dependably for some 25 minutes each time, hauling his four Karl Bub-Nurenberg tinplate coaches, until he blew out the burners to clear the track for others.

All three of those locos have pot boilers, wick burners and single oscillating cylinders. Speed is governed by load, no controls being fitted. Obviously, the commercial train manufacturers B.L. (before Lionel) developed a simple steam loco technology that today, if not wholly forgotten, is being almost totally ignored.

LBSC, writing of his boyhood loco building techniques, gave many details of this nearly lost art, but this material is not readily accessible to most readers today, at least not here in the USA.

Murray told me, based on his task of restoring his collection of "...formerly distressed" Bing, Carette, Marklin, Beggs, Bassett-Lowke, etc. locos, that making the oscillating cylinders from tubing is extremely simple, and pot boilers should also be simple to make from tubing and soft solder. The locos run well on only 10-15 lbs. pressure. Methylated spirits (called denatured alcohol in the USA) is easy to find in paint, hardware and sporting goods stores as shellac thinner and campstove fuel.

In England, Bowman used this same level of technology. More expensive locos usually had fixed, double-acting cylinders and the Bassett-Lowke locos had these. Today, Mamod locos have double-acting oscillators, and Wilesco steam rollers and traction engines have fixed, double-acting cylinders.

Despite the simple levels of technology, such locos can have an impressive scale appearance, rather than the toylike look of the antiques -- witness the magnificent 2-4-2T of Roy Scott, which was custom built in England by Harold Denyer.

Perhaps if we're all lucky, Steam in the Garden might convince Murray Wilson, who recently retired, to describe this simple steam loco technology, with details of design and possibly a construction series. How about it, Ron?

Yours for homemade steam in the garden!

Philip F. Peterson

Southern California

The following letter was written to members of the Gauge 1 Model Railway Association, Southern California Group. It makes several very good, common-sense advice that all of us need to hear, so we reprint it here with permission from the author and officers of that group.

Well, the Gauge 1 events of late spring are over and we are slipping into summer. In retrospect I must say that I consider all three meets to have been highly successful. That is of course the two Memorial Day weekend dates, both at the Los Angeles Live Steamers and at Lee and Patty Barrett's, as well as the Queen Mary Big Train Show. It was reassuring to see so many familiar faces and also to see so many new inductees to the hobby, not to mention the honored guests from the Yokohama Live Steamers. I believe that we can safely say that these events were highly successful. With this success we are beginning to see a larger attendance than in the past, and it occurred to me that perhaps it would be a good time to refresh ourselves with a couple of old and time honored, common sense rules, especially regarding get-togethers at members homes.

In the past many hosts and most guests have generously provided refreshments and even meals, but as we are growing it becomes increasingly harder for the few to supply the many. Don't get me wrong. For the most part people have been very good about this. A good rule of thumb however is, "Bring it with you when you come!" So if you can't live without it, provide it. This includes not only snacks (to share) and beverages of choice, but also fuel, oil, water, and tools for running your locomotive.

Secondly, about cameras...we all enjoy snapshots and videos, but bear in mind that these meets are primarily for steam enthusiasts to run their locomotives. These are not photographic events. We have recently seen too many collisions with video cameras and other objects left on or near the track. The other problem lies with photographers coming between locomotives and their operators. This is especially problematic when the engine driver is trying to secure an out-of- control loco or initiate a smooth but often tricky start-up. Sorry to nag, but it needed to be said.

Finally, on a lighter note I would like to take time to thank John and Jeanette Wieland for their tireless generosity and energy. A lot of hard work went into preparing the two track, wide radius, portable layout which they provided, transported, set up, and tore down. Without their efforts there would have been no L.A. Live Steamers or Queen Mary runs

Respectfully,
Gary White
Member: Gauge 1 Model Railway Association

McKinleyville, California

Dear Ron,

Steam in the Garden gets better all the time, and each issue offers me something very useful to my interests in the hobby. For example, I found the "Merlin Mayflower Mods" *(Issue №26, January/February 1995)* article by Tag Gorton especially helpful since I own a Merlin Matterhorn, which I believe is much the same in construction as the Mayflower. Although I did not make all the mods Tag so carefully described, thanks to him my loco is now properly timed. The "Welsh Nuts and Other Black Diamonds" article by David Pinniger *(Issue №*

26, January/February 1995) was also interesting and well received, for although I only fire my 3-1/2" gauge locos with coal, the tips are generally applicable. The only firing of a coal fired loco I observed at the National Steamup in Mississippi was the Aster JNR 62, fired by Yves Guillaume. The thoroughness and patience taken by Yves in obtaining a good, solid fire was an education in itself!

There were many other helpful and interesting articles by Peter Jones (as always!), Chip (who doesn't need a last name), Charlie Mynhier and all the others who contribute. There wasn't an article that didn't hold some interest for me.

Keep up the good work, Ron. Keep those contributors contributing!

Happy Steaming!

Geoff Spenceley

Rock Hill, South Carolina

Dear Ron,

I just bought the May/June issue of SitG last weekend and I can't put it down. Please find my check enclosed, and sign me up for a subscription.

I noticed several on-going projects in SitG. Is there an index of those projects somewhere so I would know which back issues to order? Also, could you start a series on boilers and burners (both gas and alcohol)? I think everyone would benefit from that kind of information.

Sincerely,

Patrice Bruneau

Thanks for the letter, Patrice. The answer to your question about an index is yes...and no. Yes, there is an index available for Volumes I - IV from fellow steamer Ricky Morningstar in New Brunswick, Canada. Check his Swap Shop listing for more info. No, there isn't an index out yet for Volume V, but we hope to have it ready as soon as Issue № 30 is finished.

Marc Horovitz, John Wenlock, Charlie Mynhier and others have written some excellent articles on burners and boilers in past issues. We will continue to offer articles and drawings on these and other topics as it seems appropriate, so check out the back issues and watch for more to come! -- ed.

Nashville, Tennessee

Dear Ron,

I have just received a catalog which contains at least two listings that might be of interest to your readers. The S. LaRose Co., PO Box 21208, Greensboro, NC 27420, phone 910-621-1936, are tool and parts suppliers for the commercial jewelry/watch repair/clock repair trade. Most of their stocks are for use in jewelry and horology, but they do have tools and materials which can be useful to modelers. If any readers are planning to add a jeweler's saw to their tool kit, as shown in Don Beach's article on modifying the Roundhouse Lady Anne, S. LaRose has two such saw frames listed in their latest catalog -- Pre-inventory Sale Cat. #242. The first is an "economy model", item #061226, priced at $6.50. The other is a first quality German saw, item #SW-602-1/2, priced at $12.35, both plus postage. I have one of the latter and it is a first rate tool.

They also stock hundreds of types of saw blades at reasonable prices, though none were listed in this catalog. Service is prompt and friendly, they accept Mastercard & VISA, and they offer a full satisfaction or money back guarantee.

Regards,

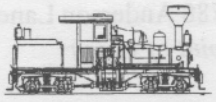
Harry Wade

The following report on a garden railway society get-together arrived as part of the Greater Humboldt Bay Garden Railway Society Newsletter (Northern California Coast), the members of which take themselves less seriously, and hence have more fun, than just about any group of people in the Universe. TELEGRAFFER Richard Heisler and CONDUCKTER Geoff Spenceley are fellow live steamers, and it sounds like they have even more fun than the other zanies in the GHBGRS. Don't you agree that life would be better if we were all having this much fun? Read on and see for yourself! -- ed.

Demolition Derby at BT&L Lines

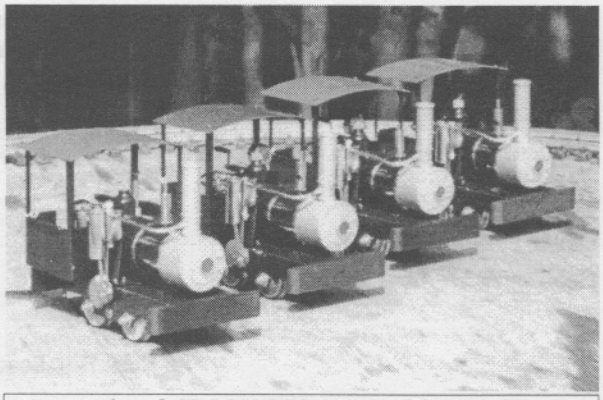
The meeting at the LaBranches' was, as usual, extremely well attended. Plants burgeoned, water gurgled, rails gleamed and locomotives steamed, crashed and derailed. The culprits were the live steamers of your conductor and eddietour. In its debut performance, Uncle Dick's CRICKET, double-headed with Geoff's identical loco, managed to run through switches, down deadend spurs and generally derail a lot. Once everything was straightened out, the pair ran like clockwork. Your humble scribe then steamed up his Wrightscale Porter and managed to engineer a runaway, finally rolling the loco into the ditch and floating the caboose in one of the BT&L Lines water hazards. No injuries were reported beyond some scratched paint and a bruised ego; nothing which couldn't be remedied by the bountiful buffet and bar. A fine time was had by all.

We know that several of the garden railway societies in this country have formed steam special interest groups within the main society, and we'd like to ask that they share their newsletters with us so that we can more easily keep up with what's happening across the country and around the world. We thank the GHBGRS and others for keeping us on their newsletter mailing list, and we hope that more and more will share their experiences with us. -- ed.



WHAT'S NEW?

Berkeley Locomotive Works, 2821 Hillegass Avenue No 22, Berkeley, CA 94705 -- phone/fax 510-849-9284, is shipping CRICKET STEAM MOTORS. A brochure just received from BLW lists 3 variations on the CRICKET; the standard CRICKET, the English CRICKET and the Type "E", or Economic CRICKET. Also offered are options, such as 2 sizes of pressure gauge and insulated wheels (so you can run your steamer while your friends are running their electric mice, of course!). BLW has a special offer good until 12/31/95.....if you send in the coupon from their new CRICKET brochure with your CRICKET order, they will pay the freight. Phone, fax or write for your CRICKET brochure right away, and tell Mr. O'Rourke that SitG sent you.



A gaggle of CRICKETS await shipment to patient and long-suffering customers.
photo by Michael O'Rourke

Doubleheader Productions, 3725 Pageant Place, Dallas TX 75244 -- phone/fax 214-247-1208, has added some new lines of quality models, beginning with JD MODELS of England. JD MODELS, maker of a full line of battery powered locomotives for G-scale garden railways, recently announced a new option for their line of narrow gauge diesels. They can now be operated in standard mode, from track power, or from on-board batteries with a flip of a switch. If rails are clean and track connectors tight, run from track power just like any other G-gauge locomotive. However, for those times when time does not permit rail cleaning or hooking up the power pack, these JD MODELS locomotives will operate 4-6 hours on their own batteries and electronic speed controller. No separate battery car, just put the locomotive on the rails and away it will go. All JD MODELS diesel outline model locomotives can be ordered for 45mm (gauge 1) track or for 32mm (gauge 0) track. Their line of diesel locomotives include a 30 h.p. Kerr Stuart, a 60 h.p. Kerr Stuart, a "double" Kerr Stuart and a 60 h.p. Hunslet, shown in the accompanying photo. Contact Doubleheader Productions for information on their full line of locomotives and other unique items for the live steamer and garden railwayman.

Whoops -- goofed again! The heat got to your addle-brained editor and I forgot to mention some important points in the last issue about the new items from **Trackside Details, 1331 Avalon Street, San Luis Obispo CA 93405**. They are all fine quality lost-wax brass castings -- and just a small part of a long list of 125 brass detail parts now available from Trackside Details. The #124 Stack is a shorter version of the venerable #66 Stack -- both of which are made hollow for steamers or electric 'smokers'. The steps are much more robust than earlier versions, and should have no problems with minor derailments, etc., if secured with nuts & bolts through the holes provided. The flag holders and finials are turned with 1/16" dia. holes for handrail wire insertion. Now that you know "the rest of the story", you can place your order and start dressing up those plain-vanilla locos.

The Florida Garden Railway Society announces "The Orange Blossom Special", the 12th Annual Garden Railway Society Convention, which will take place April 23-28, 1996. The site for this event will be the Twin Towers Hotel and Convention Center, located adjacent to the entrace to Universal Studios in Orlando, Florida. For more information, contact Jack Nutbrown, 10780 Anderson Lane, Lake Worth FL 33467. *(See End of the Line in this issue for more on this Convention from a steamer's point of view.)*

Classic Construction Models, 6590 SW Fallbrook Place, Beaverton OR 97008 -- phone 503-626-6395 or fax 503-646-1996, has announced the release of Model #5 in their Limited Edition Series of construction equipment -- an American Hoist & Derrick (AH&D) Model 518 Self-Slewing Guy Derrick. Precision scaled at 1:48, the model was developed from turn-of-the-century AH&D photographs and drawings of the original machine. Hand built entirely of brass, the model features a power train with steam cylinders that stroke, winch drums that turn and rotating gears. It also has raised rivets on the boom and boiler, accurate piping and controls and a vintage gray-on-gray color scheme with green accents. In addition, the derrick is capable of rotating 360 degrees and raising and lowering both the boom and load block. Authorized and authenticated by the manufacturer, production of the AH&D Model 518 Derrick will be limited to 500 models. Each model comes with an oak display base, brass serial number plate and a registration certificate to verify its authenticity as a Classic Construction Model.

Sierra Valley Enterprises, 2755 Saratoga Avenue, Merced CA 95340 have just introduced a new line of metal wheelsets for 1:24, 1:22.5 and 1:20.3 scales. The new line comes in 4 sizes, which represent 20" through 30" diameter wheels in the three scales. They are available in Gauge 1 or Gauge 0; unplated, cadmium plated or blackened; and long axle or short axle. Retail price is $2.95 per wheel set unplated, or $3.95 per wheel set cadmium plated. They are packaged 4 wheelsets per bag. Shipping cost is $6.00 for up to 48 wheelsets. California residents should add 7.25% sales tax.

One size, #3, is a specific replacement for the plastic wheelsets found on LGB, USA Trains, Bachmann and most "G" scale trains. Some of the features of the new wheelsets are 1) Flange height has been reduced to improve appearance without sacrificing performance. 2) Design of the wheel face is based on narrow gauge prototypes. 3) The wheel tread and flange are tapered and have a fillet between them like the prototype. 4) Heavier metal wheels improve performance over plastic wheels and lower the center of gravity of your rolling stock. 5) Wheelsets are double insulated. 6) Compatible with all commercially available track and trucks. 7) Each wheel set is inspected and tested for gauge and true running. 8) This product is 100% designed and manufactured in the USA.

Gary Watkins, head honcho at Sierra Valley Enterprises, writes: "I have been commercially building 1:20.3 narrow gauge freight cars for more than two years now. One of my goals has been to continuously upgrade my products by adding details that are closer to scale. As the scale appearance of my rolling stock improved, I felt the need for metal wheel sets that were closer to scale than those currently being offered. I decided that the quickest way to get these wheel sets was to design and produce them myself. This would supply me with the closer-to-scale wheels I required, and would allow me to offer them to the public as well."

We received samples of all wheelset sizes currently available, plus a pair of Saxton Car & Foundry 1:20.3 scale Carter Brothers sprung trucks equipped with the new Sierra Valley Enterprises wheelsets. Appearance and performance are outstanding, and we are giving serious consideration to equipping our entire roster of rolling stock with these trucks and wheelsets.

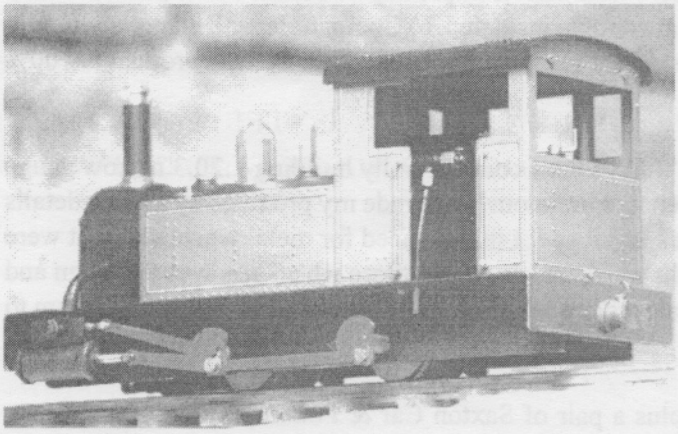
Based on our assessment of the review samples, Gary has produced a wheelset that is at least the equal of anything currently available. Appearance is excellent. Machine work is beautifully done, and sizing is consistent. No wobble or inconsistencies were observed in roll tests. We like the shouldered axle system used to set and hold the wheels in gauge. The tread taper, fillet and close-to-scale flange provide superior tracking, with no derailments on any of the track or turnout types used in our tests. Definitely a superior product, and well worth looking into. Write Sierra Valley Enterprises at the address above for more information, or to place your order.

Berkeley Locomotive Works, 2821 Hillegass Avenue No 22, Berkeley, CA 94705 -- phone/fax 510-849-9284, has just announced several interesting new products. The first is a beautiful water sight glass, suitable for boilers down to 2 inches. It requires boiler bushes tapped 3/16"X40 and it sells for $18.00. Next on the list is an adjustable safety valve, threaded 1/4"X26 (Mamod), which sells for $12.00. We get many requests from readers for information about where they can buy spoked locomotive wheel castings. BLW is offering beautiful 8-spoke wheel castings in white bronze, unmachined, 4 for $25.00. The last item is BLW's new gas valve, which sells for $6.00 and has an 8-60 (very fine) thread, giving a range of control over 1-1/2 turns. All prices are postpaid. Give these new BLW items a try!

Because of reader demand, Ron & Marie Brown of Steam in the Garden magazine have made arrangements with **Bob & Carol Paule of Sulphur Springs Steam Models, Ltd., PO Box 6165, Dept. RB, Chesterfield MO 63006 -- phone/fax 314-527-8326** for SSSM Ltd. to supply reprints of all sold out issues of Steam in the Garden magazine to our readers. Please contact Bob or Carol at SSSM Ltd. for prices and ordering information.

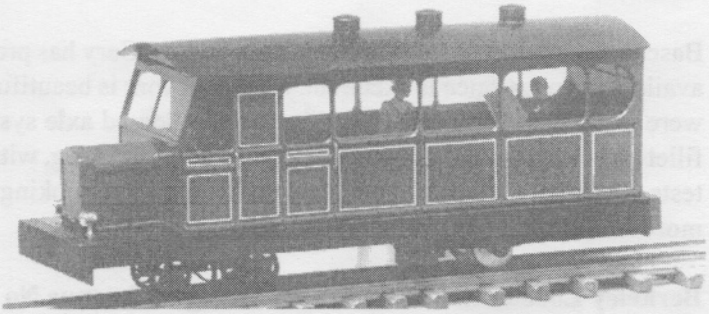
Brian Jones, Kingsley Lodge, School Lane, Raithby by Spilsby, Lincolnshire PE23 4DS, ENGLAND -- phone or fax 011-441-790-752042 has a wide range of interesting products for the garden railroader. Most interesting for the R/C live steamer is SAM-2, an electronic device that plugs in between the receiver and the servo and eliminates glitches and "rusty bolt effect" in R/C installations. Steam in the Garden will be conducting tests on SAM-2, and we will publish the results in an upcoming issue. For more information and pricing, contact Brian Jones at the address or phone/fax number listed above.

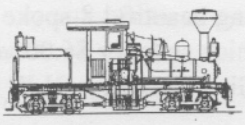
Rio Pecos Garden Railroad Co., 27136 Edenbridge Court, Bonita Springs FL 33923 -- phone 813-495-0491 or fax 813-495-7264, has dedicated fuel tanks in stock for the Maxwell Hemmens Porter. With the cost of the micro-cannisters going up, hazardous material shipping charges, and availability ranging from difficult to impossible, it makes sense to consider a dedicated fuel tank for your Porter. The tank comes complete with a gas control valve, fuel line and connectors. It drops in the tender in place of the micro-cannister and can be refueled from any standard butane or butane/propane cannister. We have tested this tank in our own Porter and recommend it. Contact Bob, Fran or Rob at Rio Pecos for more information on this fuel tank and on their whole line of high-quality products for the small-scale live steamer. (The Pearse 2-6-0 Mogul COLORADO is in stock at Rio Pecos now!)



Salem Steam Models, Salem, Llandeilo, Dyfed SA19 7HD, Wales, U.K. -- phone 011-441-558-822530, announces a new 16mm scale live steam loco - the COAL Class 0-4-0 Tank Locomotive (shown in photo at left). This loco features new piston valve cylinders, slip eccentric valve gear, 6" x 2" silver soldered copper boiler, choice of butane or meths firing, regulator and water level valve in cab, adjustable gauge (1 or 0), 40 psi safety valve, Goodall boiler filler valve, full rivet detail, optional pressure gauge and very attractive pricing. Heavily built of steel, brass and copper with all bolted and screwed construction for longevity and easy maintenance, this new model has excellent duration due to its large boiler and fuel tank and the inherent low steam consumption of the new piston valved cylinders.

Also new from Salem is a RAILBUS (seen at right). The body is heavy gauge styrene by IMP, the chassis is steel and wood, and it is powered by a sealed lead-acid battery with onboard charging socket. Available in 32mm or 45mm gauge. The bodies are available separately, completely assembled, lined and painted. Also available are Inspection Car bodies by IMP, similar to the Railbus, but only half the length and suitable for a 4-wheel underframe. Write or call Salem Steam Models for pricing and availability.





Gazing Into the Fire

by Peter Jones
photos by the author, drawings by Hank Bloch

The Front End of the Dragon

The smokebox area of the small steam engine often gets taken for granted; a kind of afterthought following careful design of burners and boilers. Maybe it will do no harm to take five minutes out and make sure that we are getting the best performance out of the muzzles of our iron horsettes.

In the simple pot boilered engine, the smokebox is virtually a cosmetic metal drum that does no more than hold the front end of the boiler up. But through it goes the exhaust pipe to let the steam come out of the chimney. We can adjust the amount of visible water vapour we want to see. If we take a pipe right up until it is slightly lower than the chimney top, there will be a better show of steam. Yes, you are quite right; steam IS invisible. It is the water vapour we see. That means that a good cloud comes from cooler steam.

It also means that there is a lot of condensate slopping about. When we steam up, the engine can be in a perpetual bath of water and it all looks most unsatisfactory. The established cure is to crimp the top of the pipe and cut a slot near the top (see FIG. 1). The condensate then strikes the chimney and dribbles down between the rails, leaving a much cleaner cloud coming from where it should.

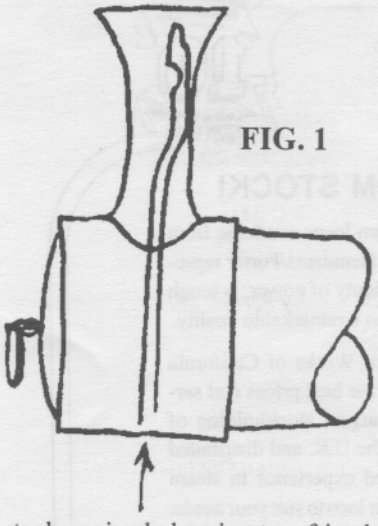


FIG. 1

If we wanted to be really efficient, we could take the exhaust pipe and run it in a loop, back through the flames, before sending it up the chimney. This would give a clean exhaust. Unfortunately it would give no apparent steam exhaust and we would be losing part of the magic. I have in mind a little tank engine belonging to a friend of mine that is beautifully efficient. It glides round without a sound and with no clouds coming from the chimney. It is a lovely piece of engineering but it might just as well be battery powered. Our pleasures are a mixture of the engineering and the aesthetic.

If the smokebox is at the front of a gas fired boiler with a central flue tube, we need to get the size of the gas flame just right. Too little and the thing is shy of steam, too fierce and the front of the smokebox burns off its paint. If you can't get the balance just right and you have to make a choice between two evils, plump for too much flame. You can lag the inside of the smokebox, including the front, with; well, I was going to write asbestos but times have changed. These days there are some nice non-asbestos felts sold for boiler lagging, which do the job nicely.

When we come to the internally fired boilers, with flue tubes or the Smithies principle, then the smokebox wants to be airtight. At the bottom of the smokebox this can be difficult because we have one or two pipes coming up from the floor, The bottom may be mostly filled in with a loose piece of brass and then the gaps filled with some sort of filler. In the past, the traditional material was fireclay, as sold for sealing domestic coal fires, but these days there are vast bits of the country that never encounter the need for such things and it is difficult to obtain. A very good modern substitute is automobile muffler repair paste. This bakes nice and hard with heat.

One improvement that can be made to many a smokebox is to fit it with an opening door. The methods of hinging and locking are well documented in the larger scales of model engineering, My main comment is that the British locking screw is easier to copy than having to make a lot of clamping dogs.

When the exhaust pipe comes out of the cylinders, it wants to be plenty big enough. It certainly wants to be bigger than the steam pipe going in. If the exhaust pipe is even fractionally too small it will choke off the gas flow and slow the engine down. Knowing this can be put to good use. As the pipe comes up, we can put a valve in it to deliberately choke off the exhaust. When used in combination with the main throttle valve at the back of the engine, this gives magnificent slow speed control to even the most spirited of machines. The handle for the valve is disguised as the central locking wheel or lever on the dummy smokebox door. It will cut out the lovely rich exhaust note, but it does make the engine wonderfully manageable.

One little device I did try was a pipe for an external blower, which came in from the side of the engine at the bottom. We talk about putting an electric blower on top of an internally fired engine to raise steam. Well, of course, it isn't a blower; it's a sucker. But suppose we actually do send a jet of air or steam up from the bottom of the smokebox...then it is a true blower. In my case, it consisted of a length of copper pipe which came in from the side of the engine and pointed up towards the chimney (see FIG. 2). I could plug this in to an air compressor OR I could run a bit of flexible pipe from an adjacent engine already in steam. I don't claim that there is anything wonderful about this arrangement, but it does work. As usual, in my case, I tried the experiment for experiment's sake.

The other advantage of a smokebox is that it is an enclosed space that is going spare, especially when it is used for pot

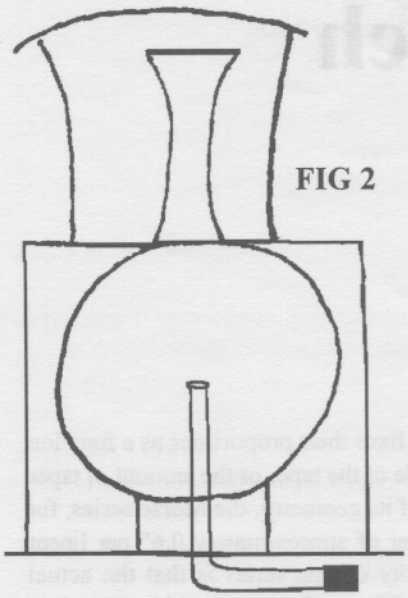
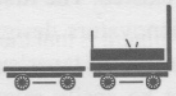


FIG 2

boilers and thus need not be airtight. For example, you can turn the front half inch of the box into a large lubricator that is completely hidden from view. I also have this feeling that there is a steam whistle design itching to be discovered. It is a drum, say, two inches diameter and around half an inch thick. Steam is blown across an opening at the edge. This would fit beautifully into a smokebox. It would give a deep tone and, because the area is so hot, is much less likely to suffer from condensation. But it needs more work to bring the concept to fruition. Perhaps a reader may be inspired to investigate further

So there is the humble smokebox. I hope that I have shown that it has a potential for interest over and above its immediate apparent value. What's more, there is still some way to go down this particular road.



The Fitter's Bench

by Crankpin

Drawings by Harry Wade

Lathe Essentials: The Centers

Back a quite a few episodes ago (Issue #20, Jan. '94) I explained to those of you who were with us then that the most basic of all functions of the "center" lathe was to turn between centers. It was always thus because in those ancient workshops the very first machines for turning could do only that. For those of you unfamiliar with the process, turning between centers involves mounting the workpiece between a pair of metal points, the "Centers", which are inserted into the bores in both the headstock, spindle and tailstock barrel. The workpiece is then connected to the spindle by means of a driving peg or "dog" (to be described in more detail in an upcoming issue) and is turned with the spindle as it rotates. Before we go further it might be well to remind you that a "Bore", when mentioned in connection with machine shop practices, is a hole that has been finished to extremely precise and predictable limits of straightness, parallelism, and concentricity.

On all but the most peculiar lathes both the spindle and tailstock barrel bores are made with a hollow internal taper into which can be fitted various items of tooling made or fitted with tapered shanks. Among the benefits of taper mounted tooling are that it can be manufactured to a high degree of precision without excessive cost and it can resist a relatively large amount of torque when properly wedged in a matching bore. Add to this the relative ease and quickness with which taper mounted tooling can be installed and removed, and you have a system that is well suited to small lathe operation.

There are a number of different families of machine tool tapers, each of which was developed by a tool designer or inventor to suit a particular need. Most of these continue to be known by the names of their designers, such as Morse, Jarno, Jacobs, and Brown & Sharp. All of the systems named are still in common use today. Once upon a time however, almost every major machine tool manufacturer had its own taper design and few of them were alike, very much like threads before Mr. Whitworth came upon the scene, and what a bloody awful mess this was! Fortunately for us, the machine tool manufacturers have seen the benefits of standardization and virtually every lathe manufactured in the world today uses the American Morse series for internal tapers. This particular system of tapers is numbered from #0 to #7, with #0 being the smallest.

Each of the various taper designs have as their basis a geometric formula which fixes their proportions as a function of either the included angle of the taper or the amount of taper per linear foot. In terms of its geometry, the Morse series, for instance, represents a taper of approximately 0.6" per linear foot, although a peculiarity of this series is that the actual amount of taper is slightly different for each individual number. I must say that a closer study of the geometry of tapers reveals that in no two systems are the rates of taper the same and, as in the case of the Morse tapers, follows no logical or predictable pattern at all, which leaves me wondering if Messrs. Morse and Jarno hadn't spent a bit too much time in the noonday sun.

There are, however, two probable reasons why these inconsistencies in tapers existed. The first of these is that each of these early machine innovators designed a geometry that they believed would optimize the taper's ability to hold firmly in all circumstances, yet be easily released from the hole. Secondly, since most of these designers were in fact closely associated with machine and tooling manufacture, their taper geometry was designed so as to be extremely difficult for their competition to reproduce with accuracy and consistency. Thus if you owned a machine which its manufacturer equipped with Jarno tapers, you would have needed to return to Mr. Jarno to acquire additional tapered tooling which fit properly. Very clever trick this, but no longer the case, much to our benefit.

It is usual on most lathes made in this century for the tapers in the tailstock and headstock to be of two different sizes with the headstock taper always the larger of the two. For example, a typical 10" bench lathe will probably have a #2 Morse taper in its tailstock and a #3, or possibly #4, in its spindle. These machines would be furnished with two dead centers, in this case #2 Morse, and a reducing sleeve which was to be inserted into the spindle bore to reduce its taper from #3 to #2.

With the sleeve in place, the #2 centers can be inserted on both ends for turning between centers. This arrangement allows the spindle to be made with a larger bore, thus allowing it to pass a larger diameter of bar stock through the spindle for turning.

The most elementary form of center is the "dead" center and is illustrated in Figure 1. The nose or point of all standard centers are ground to a cone of 60 degrees included angle and the body, or shank, is turned and precision ground to a Morse

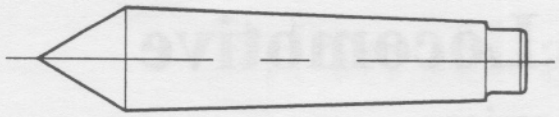


FIG. 1 DEAD CENTER

taper. It is called a dead center because these centers are intended to remain stationary (or dead) with respect to the spindle into which they are inserted. A dead center in the tailstock barrel remains stationary while the workpiece turns. Although a dead center in the headstock end will rotate whenever the spindle bore which holds it rotates, the shank should remain stationary within its respective bore.

It is very, very naughty for the shank of a center, or any tapered shank mounted tool for that matter, to become loose in a bore and rotate. This will very quickly do a great deal of damage to the surfaces of the taper by scoring or galling and will result in a loss of the precision alignment between the tapers and the lathe central axis. There are, however, ways of preventing problems such as this one, as we still see in coming issues when we explore more thoroughly the world of lathe tooling. In the meantime, we must finish the business at hand.

Dead centers are an example of the very earliest machine technology and, although they are certainly useful accessories, in this age of high turning speeds and heavy cutting loads they are not without their disadvantages, due primarily to the effects of our old friend friction. The problem arises at the tailstock end when a workpiece, a shaft or axle for instance, which has been snugged up to the rear center cold (i.e. room temperature) begins to expand from the heat generated by the action of the cutting tool. As the shaft expands against the center, running clearance between the work and center will disappear and friction will quickly cause damage to both the center and the work unless the tailstock barrel is adjusted to restore adequate clearance. It is imperative when using dead centers to keep the running clearances adjusted to compensate for workpiece expansion and to keep the center point well lubricated with a good, stiff machine oil. This is as it sounds, a fiddly chore that

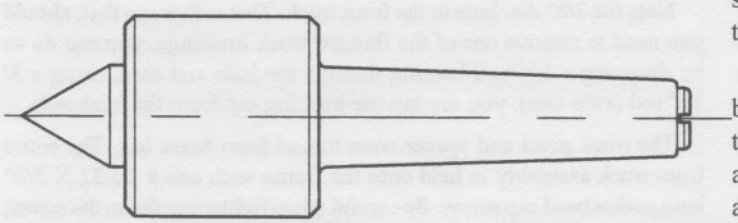


FIG. 2 LIVE CENTER

takes your attention from minding the cut, but take heart lads, relief is within sight.

All of the common problems associated with friction were essentially eliminated when some brilliant and thoughtful person invented the "Live" center, shown in Figure 2 and 3. These have a 60 degree point, as does the dead center and a tapered shank which fits into the tailstock barrel, and just as would a dead center. In the live center, however, the point is an extension of a free running ball or roller bearing spindle contained within the outer casing. Depending upon their design and intended load bearing capacity, live centers may contain from one to four sets of bearings which are normally sealed within the casing and lubricated for life.

Except when furnished with a new machine as a part of a tooling package, the live center is an option that is always bought separately. They can be had new or used at very reasonable prices, and as with most other lathe tooling, are made by a number of manufacturers in many levels of quality and precision. Their prices will vary depending upon the taper size and the level of precision that you require. A quick check of mail order catalogues shows that an excellent quality #2 Morse taper light duty live center can be had for less than US$60, with a few "budget" models priced somewhat below this. Several examples were listed with a precision on the order of 0.0005" (T.I.R./concentricity) which should more than satisfy the needs of even the most accomplished amateur. For my

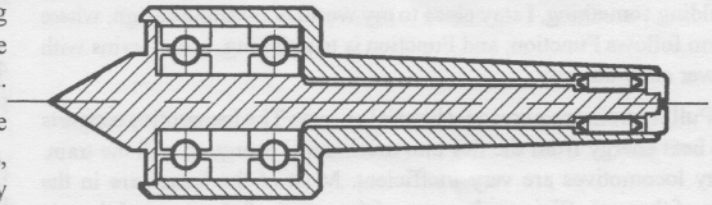
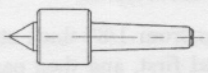


FIG. 3 LIVE CENTER

money a live center is a must; few lathe accessories will make your workshop life easier for so little money.

I cannot close for this issue without just a wee bit of preaching, but I promise not to keep you too long. Tapered tooling relies almost entirely upon the friction of the very close fit between accurately finished surfaces to hold it in place and do its job. Tapers usually begin life with precision ground surfaces, but handling and repeated insertions and removals eventually change this bright finish to a dull patina; still, no harm is done. What is very harmful is for the tapers, either inside or outside, to be nicked, dented, or otherwise deformed so that a full, close, metal-to-metal fit is not possible. To prevent this damage, several things need your ongoing attention.

First, acquire the habit of cleaning your tapers thoroughly before insertion; a small bottle brush is just the ticket to insure that no chips or dirt are caught in the squeeze. Left unattended, a single stray chip can significantly alter your lathe's precision alignment, not to mention the potential for buggering up the surfaces of the tapers. Secondly, handle your tapers with care; they are precision tools and deserve to be handled as you would your other fine tools. Resist the tendency to store them in a pile in the lathe chip tray or bin somewhere and they will reward you with many years of faithful service. Preaching done -- see you in the next issue with more on lathe accessories.



Build Your Own Locomotive

Part VIII of a series

text and drawings by Charlie Mynhier

Time to start putting it all together!

The major difference between real and model steam locomotives is the purpose for which they were built. Real steam locomotives were built to pull cars, and model steam locomotives were built to look like the real ones that pulled the cars. The purpose for the engines that I build is to pull cars, so maybe it could be said that I build real steam locomotives, because I don't build scale models.

I have often admired, appreciated, and sometimes envied the men who build those beautiful scale models, but when it comes to actually building something, I stay close to my world of machine design, where Form follows Function, and Function is to pull long, heavy trains with power and authority.

Pulling trains requires mechanical energy. The locomotive converts the heat energy from the fire into mechanical energy to pull the train. Tiny locomotives are very inefficient. Most of the losses are in the area of thermal efficiency because of the nature of physics, and there is not much we can do about it except lag the boiler and turn the fire up, so we will spend most of our efforts on mechanical efficiency.

Pulling trains requires traction, and traction is caused by friction between the driving wheels and the rails. Full size locomotives used sand on the rails to increase the friction, but this is not practical for #1 Gauge engines, so I use weight. When I design a locomotive, I take advantage of every opportunity to make it as heavy as possible. All this extra weight requires that our axles run in ball bearings (this locomotive requires R4 bearings on the driver axles) -- we want friction to be between the wheels and the rails, not in the wheel bearings, where it would be counter productive. Even the headlight on this engine adds to the performance. Although it does not work as a light, it adds enough weight for the engine to pull 2 to 4 extra cars that it could not pull otherwise.

Another thing we can do to make the most of what little energy the boiler is giving us is to use viton O-rings to seal the piston, piston rod, and valve rod.

After making a boiler, cylinders and wheels, we need a frame to mount all this stuff on. I made the frame for this engine out of 1" X 1-1/2" X 9-3/8" long 1018 cold finished flat bar. 1018 is a common grade of mild steel, and it is easy to machine. Brass would make a good frame also. I have provided a layout drawing to show the placement of the frame on the flat bar. Where the drawing calls for a 1/4" radius, drill and ream a 1/2" hole. After drilling all holes, insert 1/2" dia. plugs into the holes, and then saw away the excess metal before taking the bar to the mill and finishing it up. Try to leave about 1/16" of metal to mill away before reaching finish size. The reason for the plugs is so the saw will not jump to the opposite side when cutting through, leaving a permanent scar on our beautiful frame.

Cut the cylinder mount from 1/8" thick steel plate. The cylinder standoffs should be drilled first, and then parted off from 1/4" dia. brass bar.

The bearing spacers were drilled and parted off from 5/8" dia. brass bar. These spacers need to be pressed into the frame so as to leave equal recesses on either side for the bearings. If your press fit is a little loose (i.e. -- they fall out on the floor!) you could drill and tap the frame into the side of the spacer and hold them in place with set screws.

The drawbar was cut from 1/16" thick brass plate, and the drawbar nut was turned from 3/8" brass hex stock.

The valve gear bracket was milled from a piece of 1/2" X 1" X 1-3/4" mild steel flat bar. The expansion link pivots were made from a piece of 1/8" dia. stainless steel welding rod.

Make the cross shaft bearings from 1/4" thick brass, and the cab floor from 1/4" thick mild steel plate. Notice the twelve (12) # 2-56 tapped holes...these screws hold the cab sides on. Drilling and tapping #2-56 threads into blind holes is risky, as there is always a chance of breaking the tap off in the hole. Let me suggest that you tap only the end holes and drill clearance holes for the rest of the screws. #42 would make a good clearance drill. When we make the cab sides from 1/16" thick plate we can drill and tap these mating holes for the screws. Tapping 1/16" plate is easy.

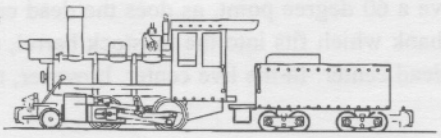
The cab floor is held on the frame with one #10-32 UNF X 1" long socket head cap screw. This screw needs to protrude through the frame so the drawbar and drawbar nut can be installed.

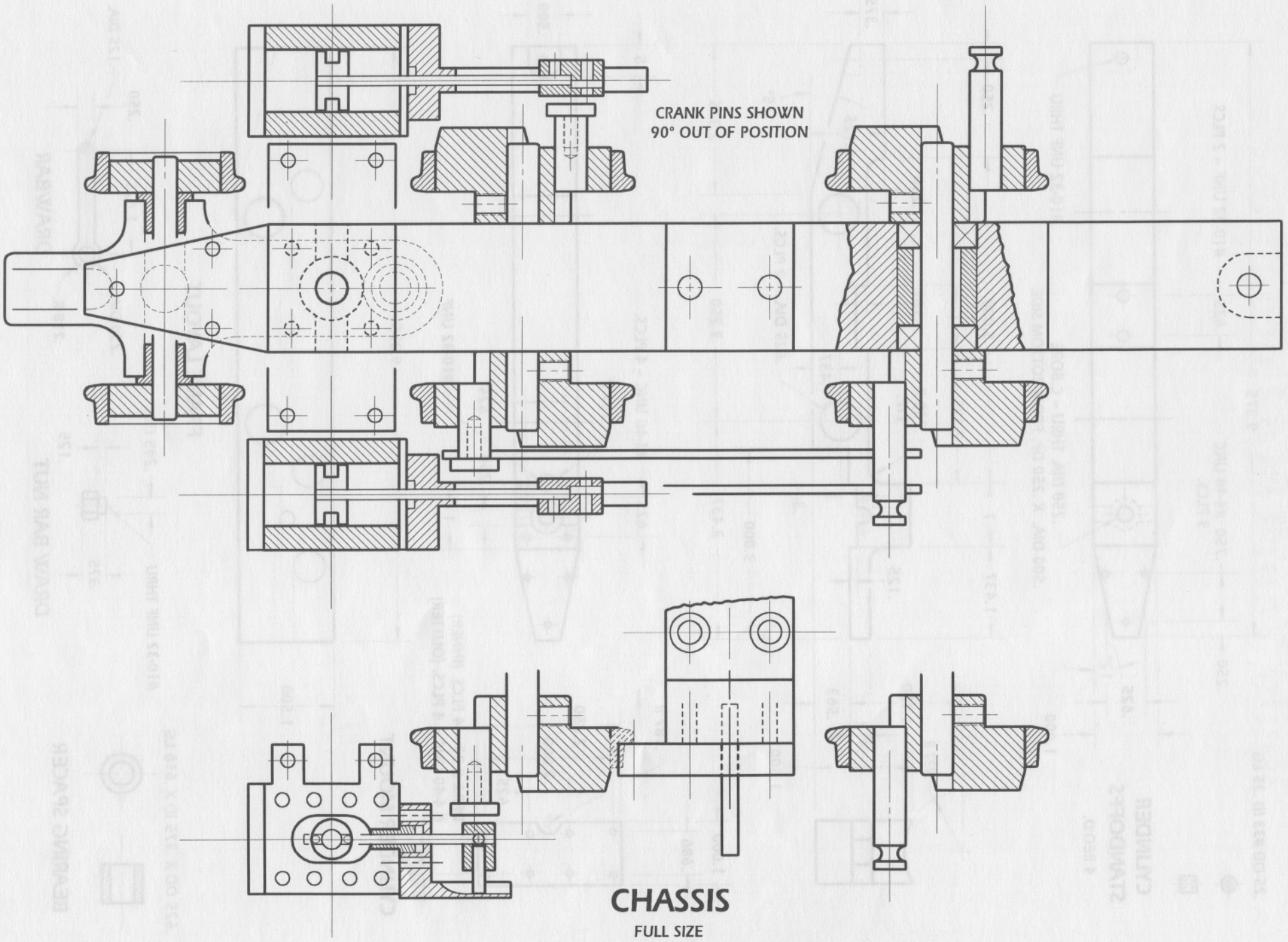
The front truck was milled from 1/2" thick mild steel flat bar, and the truck bearings were turned from bronze. This bearing is a copy of a commercially available sintered bronze bushing. If you can find these bushings locally they are very nice, and they don't cost much.

Note the 3/8" dia. hole in the front truck. This is there so that, should you need to remove one of the flanged truck bushings, you can do so by dropping a 1/4"ball bearing through the hole and then, using a 3/16" rod (axle size), you can tap the bushing out from the back side.

The truck pivot and spacer were turned from brass bar. The entire front truck assembly is held onto the frame with one # 10-32 X 3/4" long socket head cap screw. Be careful when tightening down the screw, and don't use too much torque, as this will seize the truck pivot and jam up the works. This truck needs to swing from side to side, and float up and down freely, so as to stay on the track. The front coupler is carried by this truck, and this engine can push cars around tight curves without derailing them.

Until next time, when we will talk about "Rods and Running".





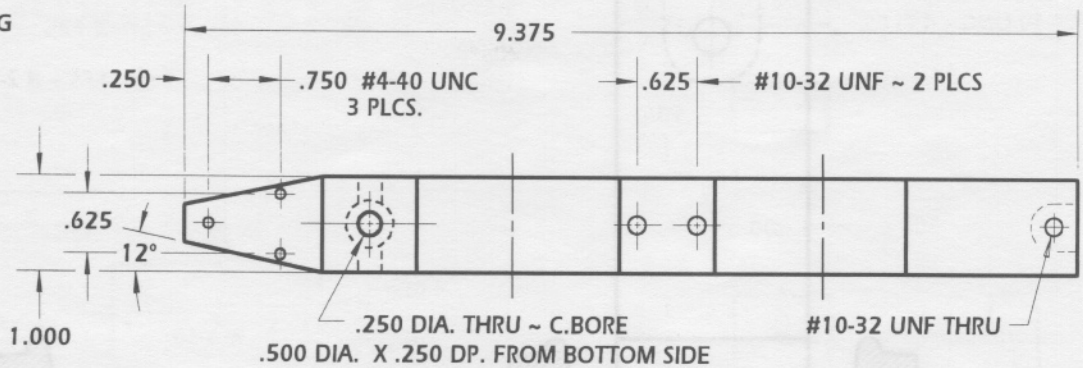
CHASSIS

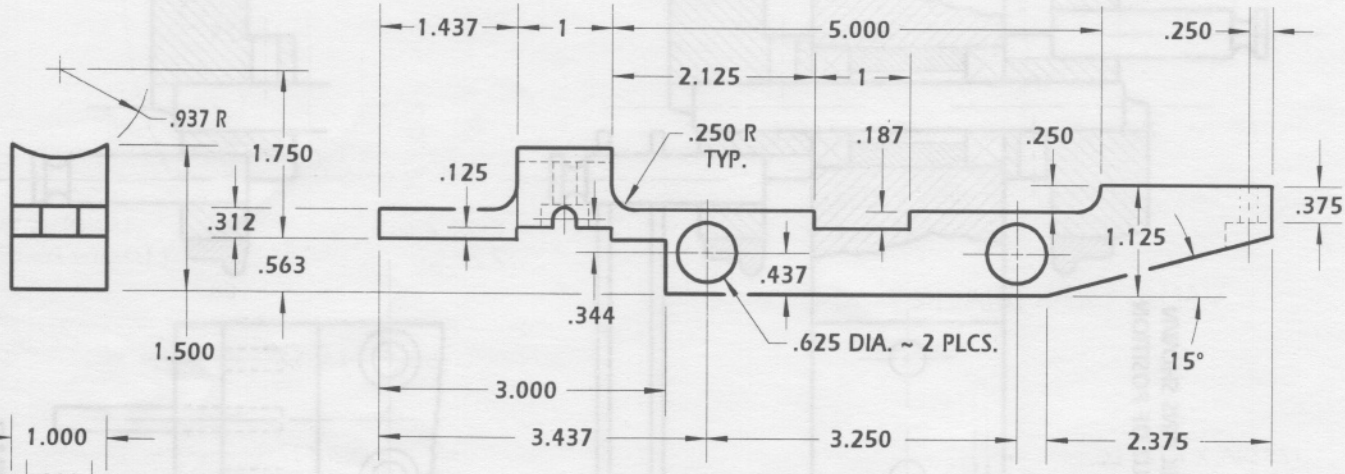
FULL SIZE

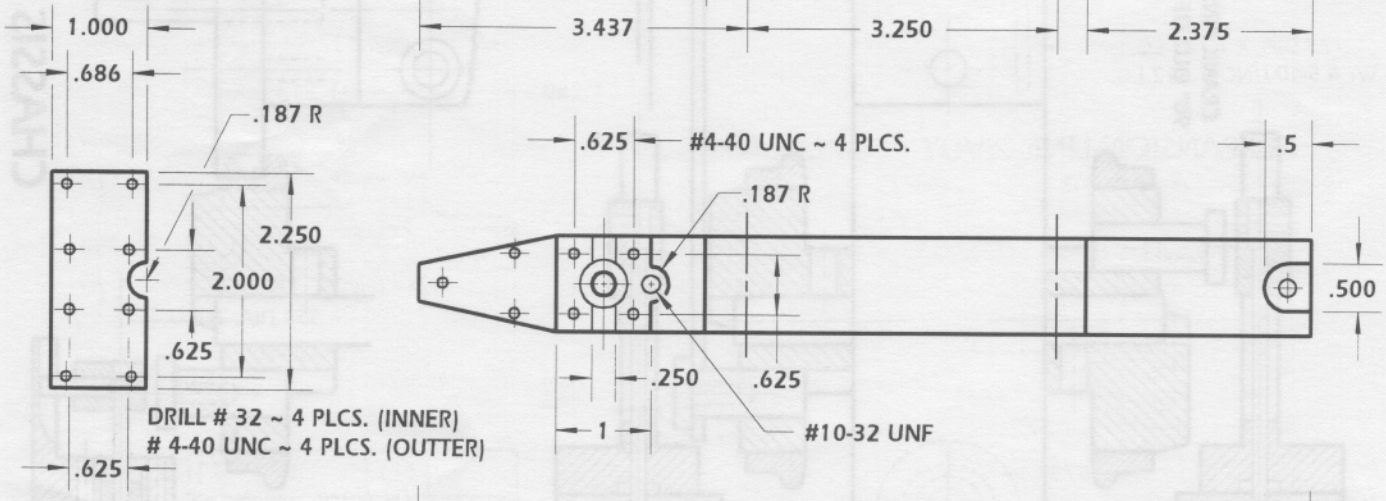
.25 OD #33 ID .25 LG

CYLINDER STANDOFFS

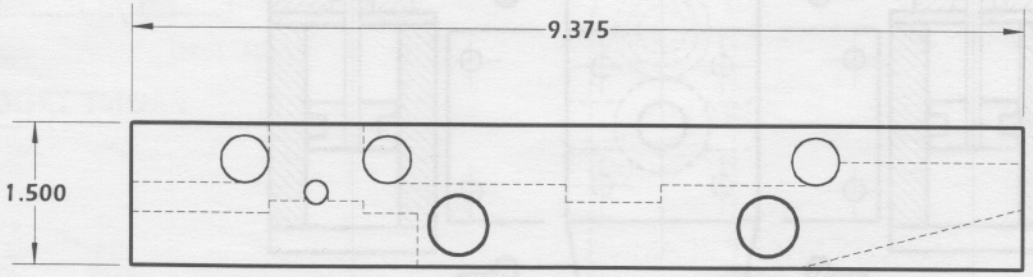
4 REQ'D.





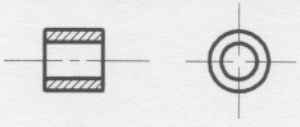


CYLINDER MOUNT

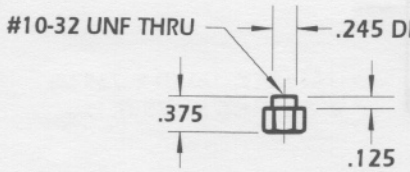


FRAME LAYOUT

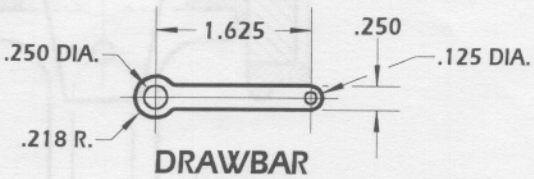
.625 OD X .375 ID X .616 LG



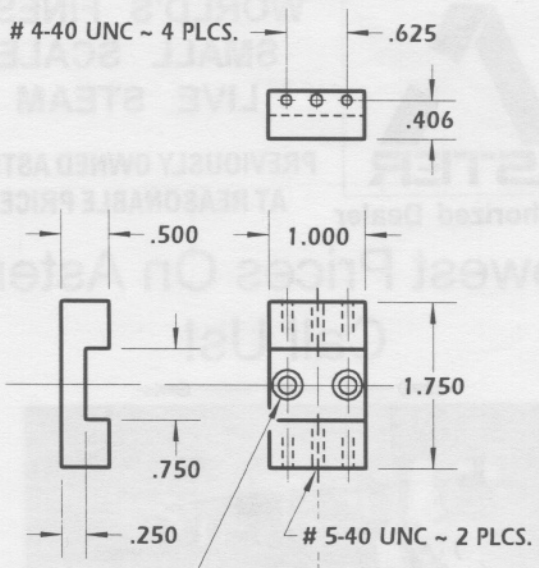
BEARING SPACER



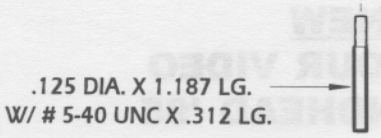
DRAW BAR NUT



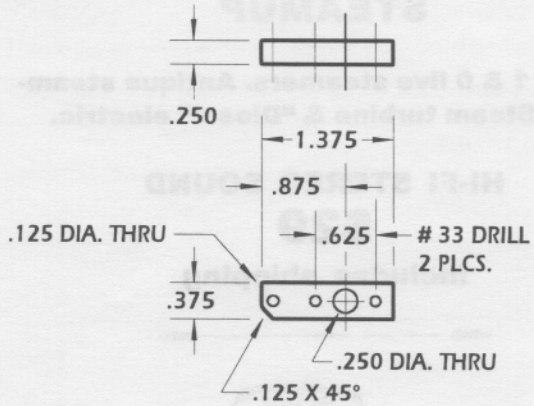
DRAWBAR



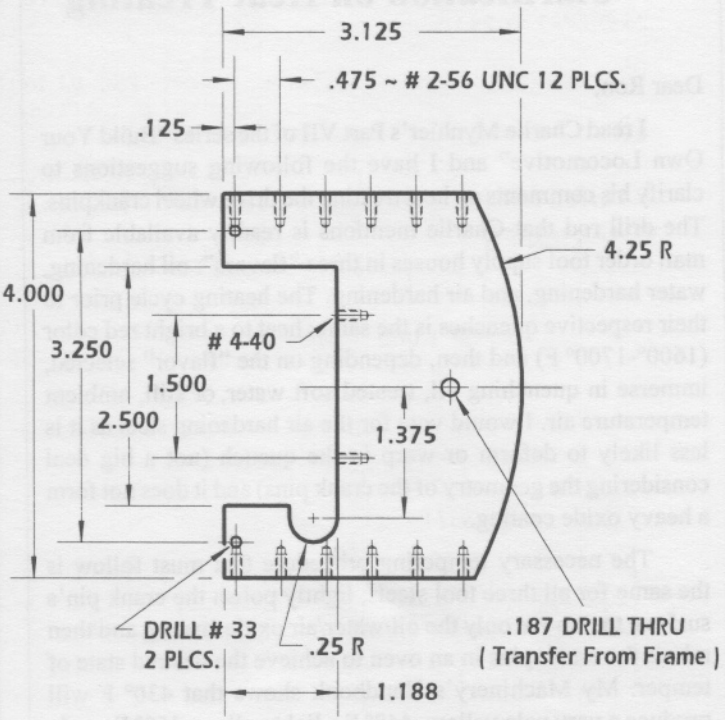
VALVE GEAR BRACKET



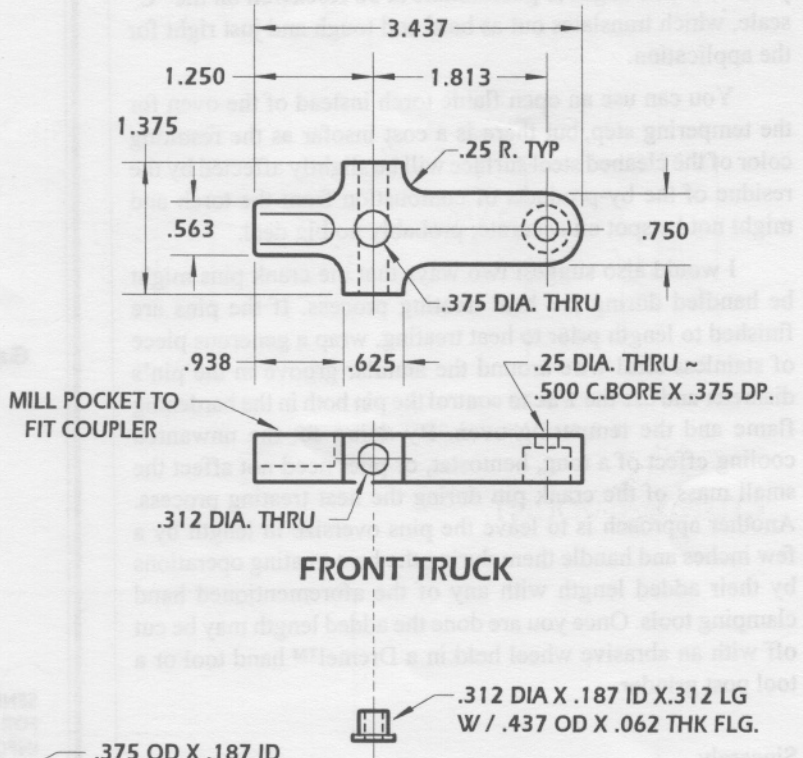
EXPANSION LINK PIVOT
2 REQ'D



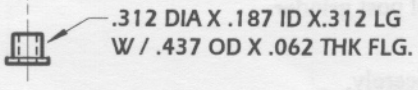
CROSS SHAFT BEARING
2 REQ'D.



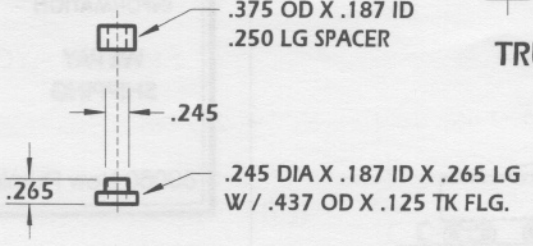
FLOOR



FRONT TRUCK



TRUCK BEARING
2 REQ'D.



TRUCK PIVOT / SPACER

Clarification on Heat Treating

Dear Ron,

I read Charlie Mynhier's Part VII of the series "Build Your Own Locomotive" and I have the following suggestions to clarify his comments on heat treating the drive wheel crankpins. The drill rod that Charlie mentions is readily available from mail order tool supply houses in three "flavors": oil hardening, water hardening, and air hardening. The heating cycle prior to their respective quenches is the same; heat to a bright red color (1600°-1700° F) and then, depending on the "flavor" selected, immerse in quenching oil, treated soft water, or still, ambient temperature air. I would vote for the air hardening steel as it is less likely to deform or warp in the quench (not a big deal considering the geometry of the crank pins) and it does not form a heavy oxide coating.

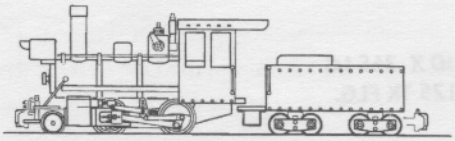
The necessary tempering procedure that must follow is the same for all three tool steels; lightly polish the crank pin's surf ace to remove only the oil/water/air oxide coating and then reheat the crank pins in an oven to achieve the desired state of temper. My Machinery's Handbook shows that 430° F will produce a very pale yellow, 440° F a light yellow, 450° F a pale straw yellow, 460° F straw yellow, 470° F a deep straw yellow, and 480° F a dark yellow. My vote would go to 460° F straw yellow, which ought to guesstimate at 56 Rockwell on the "C" scale, which translates out as hard and tough and just right for the application.

You can use an open flame torch instead of the oven for the tempering step, but there is a cost insofar as the resulting color of the cleaned steel surface will be slightly affected by the residue of the by-products of combustion from the torch and might not be spot on accurate; probably no big deal.

I would also suggest two ways that the crank pins might be handled during the heat treating process. If the pins are finished to length prior to heat treating, wrap a generous piece of stainless steel wire around the annular groove in the pin's diameter and use the wire to control the pin both in the hardening flame and the tempering oven. By doing so, the unwanted cooling effect of a tong, hemostat, or plier need not affect the small mass of the crank pin during the heat treating process. Another approach is to leave the pins oversize in length by a few inches and handle them during the heat treating operations by their added length with any of the aforementioned hand clamping tools. Once you are done the added length may be cut off with an abrasive wheel held in a Dremel™ hand tool or a tool post grinder.

Sincerely,

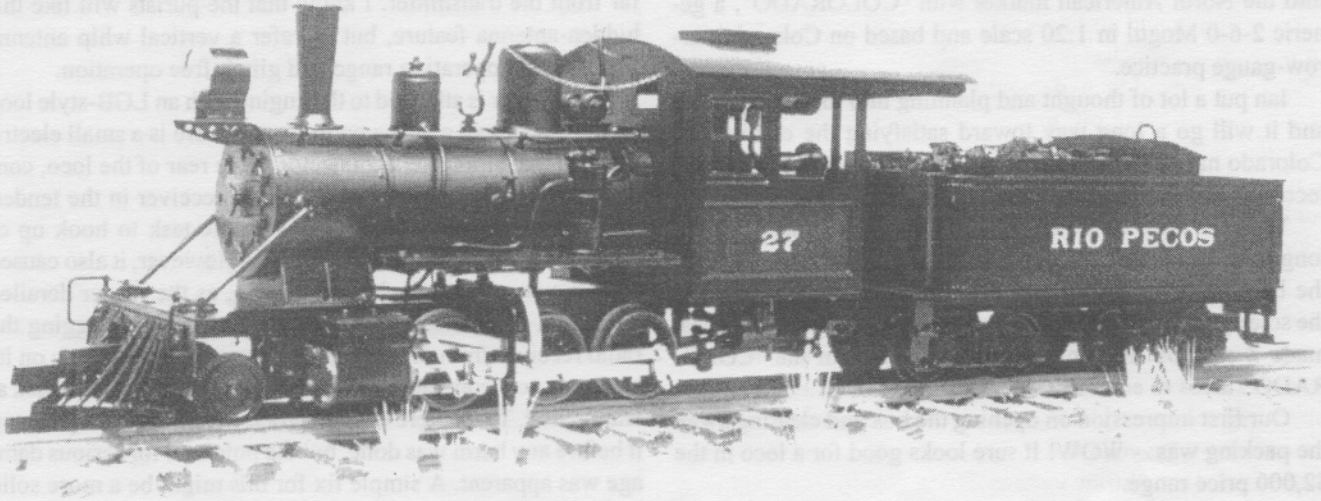
Kevin O'Connor



Locomotive Review

Pearse Locomotives' 2-6-0 Mogul "COLORADO"

by Ron Brown



Technical Specifications

Description:	Generic Mogul, based on Colorado 3-foot narrow gauge railroading practice
Builder:	Pearse Locomotive Works, England
Scale:	1:20.3, 45mm gauge (gauge 1)
Weight:	11 lbs. (engine + tender)
Dimensions:	Length (overall): 24" Width: 4-1/2" Height: 7" from top of rail (over whistle)
Wheel arrangement:	2-6-0
Minimum Radius:	2 ft. (LGB 1100)
Cylinders:	2 -- w/ piston valves
Valve Gear:	Engine is equipped with piston valves & Pearse Speed/Direction valve
Boiler:	2-1/4" dia.; T-Flue design
Firing:	Butane gas
Lubricator:	Displacement type with under-floor drain
Fittings:	Safety valve, throttle, pressure gauge, filler plug, water level valve
Construction details:	Chassis: 2mm thick steel -- Valve Gear: 1.6mm thick nickel plated steel
Couplers:	Knuckle, truck-mounted on rear of tender
Price:	R.T.R., including factory installed R/C, $2175.00 (includes UPS Regular Ground shipping in Continental USA)
Available from:	USA Agent -- Rio Pecos Garden Railroad Co., 27136 Edenbridge Court, Bonita Springs FL 33923 - phone 941-495-0491, fax 941-495-7264. Also available from Brandbright in the UK, or their agent in the USA, Berkeley Loco Works, 2821 Hillegass Avenue No 21, Berkeley CA 94705 -- phone/fax 510-849-9284.

Ian Pearse has been involved in designing and building small-scale live steam engines in England for years. He was responsible for many of the engineering innovations and unique loco designs from Merlin, and more recently he has been building quality locos under the banner of his own company, Pearse Locomotive Works. "COUNTESS" is one of his engines that was very favorably reviewed in these pages by Tag Gorton (SitG № 19, July/August 1993).

Now Pearse Locomotive Works has made a dramatic entry into the North American market with "COLORADO", a generic 2-6-0 Mogul in 1:20 scale and based on Colorado narrow-gauge practice.

Ian put a lot of thought and planning into this locomotive, and it will go a long way toward satisfying the cravings of Colorado narrow gauge devotees for an affordable, attractive locomotive with excellent operating characteristics.

We have been aware of the development of this loco for a long time, and have had our bid in to review it for readers from the beginning. Bob, Fran and Rob Osterhoudt at Rio Pecos, the sole agent for Pearse Locomotive Works in North America, made it easy by shipping us one of the first of the "COLORADO" locos to enter this country.

Our first impression on opening the box and clearing away the packing was -- WOW! It sure looks good for a loco in the $2,000 price range.

Proportions are excellent, with that chunky narrow-gauge look that so many of us love and cherish. A close scrutiny revealed some of the fine engineering and innovations that have become an Ian Pearse trademark. Let's start with the tender, which has drawn a large share of the positive comments we've heard about this engine when we've taken it to steamups for show & tell.

It looks like a real tender, not just a box on wheels, with almost all of the details one would expect on a model of a Colorado narrow gauge engine. I say "almost", because there are some things missing, like a proper wood end beam at the rear of the tender. A simple matter for the average railroad modeler or live steamer to add for himself, but it's a shame that this wasn't designed into the model to begin with.

The rear knuckle coupler is truck-mounted, and it appears oversized to me, but I'm a fan of Kadee 820 series couplers and body mounts and may be considered biased in this regard. Couplers are a very personal choice anyway, and truck mounting is a good choice for those who have very tight radius curves on their railroads.

A lift-out coal load (real coal) is easily removed for access to the inside of the tender, which is home to a radio receiver and battery pack with 4 AA dry batteries. The R/C on-off switch is conveniently mounted at the front of the tender. Unfortunately, when the tender is coupled to the loco, the "ON" and "OFF" labels on the switch cannot be seen, which may account for the two sets of dead batteries we've had to replace - one when we first received the loco and another when we inadvertently left the switch in the "ON" position and found the battery pack deader than a doornail upon arrival at Matt Labine's steamup in Connecticut. Though the stockholders in Duracell or Rayovac would certainly dispute this, it might be good practice to unplug the battery pack from the switch harness at the end of a day's steaming....or when storing or shipping the loco.

Another item of note on the tender is the wooden tool box on the rear tender deck. Beautifully done with massive strap hinges and even a padlock, this toolbox is also functional. The top lifts off to reveal the hiding place for the R/C antenna. A clever trick to keep the antenna hidden, but the fact that it is effectively shortened by looping it round and round inside the box makes for plenty of glitching if you let the engine get very far from the transmitter. I know that the purists will like this hidden-antenna feature, but I prefer a vertical whip antenna for extended operating range and glitch-free operation.

The tender is attached to the engine with an LGB-style loop on the tender and a prong on the loco. There is a small electrical plug that slips into a connector at the rear of the loco, connecting the loco-mounted servo to the receiver in the tender. This is a slick setup, making it a simple task to hook up or unhook the tender and the locomotive. However, it also caused an anxious moment during our testing, as the tender derailed on a twig, disconnecting it from the loco and unplugging the radio receiver from the servo. The locomotive ran away on its own, severed from radio control and heading down the track at warp speed. There were enough quick-thinkers close by to stop it before any harm was done, but the potential for serious damage was apparent. A simple fix for this might be a more solid connection between tender and loco, something that could easily be done by the average modeler.

One of the first things I noticed about the loco itself was the complete absence of visible slot-head screws. This helps with the illusion that this locomotive is not a toy, but a model of the real thing.

Visual delights abound, from the absence of a visible safety valve (it's cleverly hidden under the steam dome, and vents through scale-sized pop valves on top of the dome. Neat!)

The whistle and bell both have brass pull-chains leading back into the cab, another detail often missing on miniature steamers. A steam generator, headlight, headlight bracket, beefy "cowcatcher" front pilot, deck braces, sand pipes, steam pump, deckplate with diamond tread and many other details contribute to the excellent appearance of this locomotive.

The cab roof is hinged for easy cab and backhead access, and it even has restraints to keep it from flopping open too far and dinging the paint or bending the sheet metal. Nice touch!

Inside the cab we find well laid out controls, with nonmetallic serrated wheels on the gas valve, steam valve and water level valve. No burnt or blistered fingers!

The gas tank, which is mounted on the left, or fireman's side of the cab, has a nice tall turret to eliminate the spilling of liquid fuel into the lines, and the instant killing of the fire that results.

There is a pressure gauge, mounted so it can be visible through the engineer's side window or from the rear of the cab. A displacement lubricator and a single micro servo occupy the engineer's area, and the lubricator has a drain valve located below the cab floor for easy draining of the contents. The lubricator top is both slotted and knurled for easy removal.

Though the cylinders appear to have slide valves, they are actually piston valves in disguise. A rotary steam valve, lo-

cated up front between the cylinders and under the smokebox, is connected to the servo in the cab and controls both speed and direction. A steam valve mounted on a turret on the backhead gives additional control over the amount of steam taken from the boiler and routed to the rotary steam valve.

Steel spoked drivers with generous flanges are mounted on massive axles, which run in bushings fixed to the frames. The drivers are not sprung.

The front truck pivots behind the cylinders, and is sprung and equalized to maintain solid contact with the rails.

The burner and gas jet are easily accessed from the rear of the cab. A welcome feature after working on engines where the gas jet is buried and can only be accessed by removing lots of bits and pieces.

Okay, we've established that "COLORADO" is well engineered and it looks great. So how does it run? Very well, thank you! The first outing was at a steamup hosted by our friends, Bob & Judy Nowell in Pennsylvania. When "COLORADO" was removed from the carrying case and placed on the table, it generated much interest, so we filled, lubed and prepared it for a run.

Steam was raised quickly, and after clearing the condensate from the cylinders by rocking the engine back and forth on the steaming track a few times, we backed onto a train and pulled out onto the main line.

It was a very hot and humid day, and the steam plume from the stack was excellent. I handed the transmitter to Clyde Metzler, who seemed to be intensely interested in the loco. Clyde ran it for 10 or 15 minutes and was very favorably impressed. I think he gave up the transmitter to me only so he could rush off to call Rio Pecos to place his order for one! Finally it was my turn at the throttle, and I proceeded to put "COLORADO" through its paces.

The safety valve started losing steam at about 20 lbs. on the gauge, and it never quit trickling a feather of steam. One of the drawbacks to the hidden safety valve is that it isn't easy to tweak or adjust, so we put up with the steam loss and just turned up the fire to make up for it. Naturally this shortened the duration of the run, though we still got 20 minutes or so.

This engine has a HUGE boiler, and a conservative estimate on running time with all things working properly would be in excess of 30 minutes. A skillful driver on a level track will certainly do much better than that.

Response to the controls is smooth and satisfying. Slow running and realistic stops and starts are a breeze. This loco is a real joy to operate, and we found no faults with it in this department.

The fuel tank (butane gas) is sized so that the engine runs out of gas before it runs out of water. This gives the operator a measure of confidence and makes up for the lack of a gauge glass, which aren't generally very accurate or reliable in these small sizes anyway.

When a passing thunderstorm chased us into the house, a few of us sat at the table discussing "COLORADO". Bob Nowell made a comment about how nice the valve gear looked, and I casually mentioned that the loco had piston valves. Bob looked up quickly and said, "Do you mean to say that the valve gear isn't actually doing anything on that engine?"

See, I told you that Ian Pearse did a nice job of disguising the steamchests! Yes, the valve gear is just along for the ride, but it has enough bits to make it look quite good, and is interesting to watch when the loco moves by at slow speed.

While we're on the subject of cylinders and valves, I did hear one comment about the appearance of the engine not being quite right. Normally the cylinders and stack would be located so that the stack is centered on the cylinders when viewed from the side. On "COLORADO", the cylinders are set slightly to the rear of the expected position. The offset is slight, and would probably only be noticed by a serious steamophile. To my eye it doesn't detract from the appearance of this beautiful locomotive.

Of the few gripes we had with this loco, none were of a serious nature and some were based solely on personal preference. We give "COLORADO" high marks for engineering, appearance, performance and value, and we recommend it to novice and expert alike.

Bob Osterhoudt of Rio Pecos tells us that Quentin Schleckser, one of the purchasers of a "COLORADO" from the first batch, had the same problem with his safety valve that we did. He dug into it and found that, though the valve is sealed in a tamper-proof box, he was able to adjust it for leak-free operation and correct popoff pressure by manipulating it with tweezers through the holes in the top of the box. Hopefully the factory will take care of this problem so that owners and operators will not be required to take it upon themselves to do so.

Marie and I have just returned from the 1st Annual Steamup at Jim & Joanne Stapleton's mind-bending new track in Virginia, which we enjoyed immensely. John & Laurel Synnestvedt were there with their new Pearse COLORADO, and John really put on a crowd-pleasing show with it both days we were there. Some additional information was gleaned from this that I felt was worth including in this review. By the way -- John has promised to put together a photo/text article for one of our upcoming issues, showing how he added some great extras to his "COLORADO". Things like lighting, improvements to the tender and more.

Items of interest displayed by the Pearse "COLORADO" included a very showy steam plume, among the best I've seen, and this was on a hot, dry day -- power to pull a train of 21 average plastic (LGB) cars with apparent ease -- power to pull a string of gondolas loaded up with ballast to 6-8 lbs. per car -- great stack talk on the grades while pulling both of the trains above (I could actually count the exhaust beats as the engine strained to get the load up the grades) -- consistent, reliable and trouble-free performance throughout the duration of the steamup.

The Lathe-Free Locomotive

by Rob Kuhlman

Part V -- Body Work and the Lubricator

Rob continues his construction series for fellow mechanical neophytes & klutzes

Greetings! Welcome back. You know, by now you're probably getting pretty good at this locomotive fabrication business and you may be allowing your imagination to lead you towards future projects. That's great. I've got this crazy engine in mind, which was used in the northern Pennsylvania woods, called a Sykes — a roofed-over flatcar, with a central vertical boiler, with double trucks chain-driven from a longitudinal drive shaft up on the flatcar deck! One of these days I'll build one. Well...let's finish current projects first.

This time we're going to do some bodywork. Lay out some fuel can tinplate or brass according to Figure V-1. We'll cut out the side tanks first; wear gloves because the tinplate can give you some nasty cuts. By the way, you may need to adjust all of these bodywork sizes if your chassis has slightly different dimensions than mine. Fold the ends of the sidetanks 90 degrees so they'll fit alongside of and cover up the sides of the firebox ends. Now, take some thin 1/4" brass angle (hobby shop brass, not the good sturdy kind) and cut a piece as long as the side tanks are high. Polish up both outside surfaces of the brass angle with fine sandpaper and do the same to an inner corner of your folded sidetanks. Coat the mating surfaces with paste flux (Nokorode or equivalent) and, with a heavy soldering iron or gun and regular soft solder (60/40 or 50/50) solder the angle to the tinplate. Repeat for the other folded corner. Cut a piece of 1/4" brass angle almost as long as the inner bottom edge of the side of the sidetank and solder it on. This piece will be used

Sidetanks (make 2)

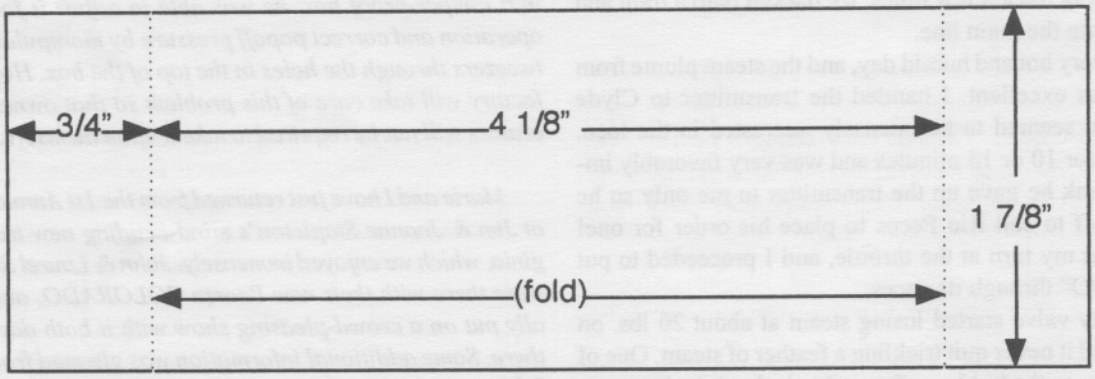
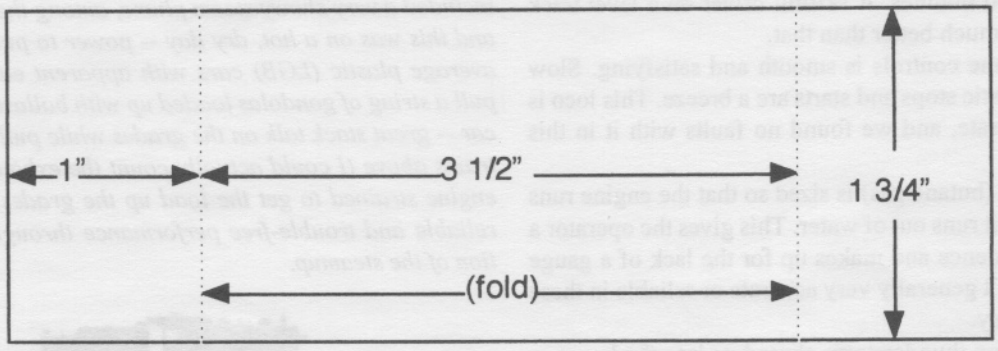


Fig. V-1

Cab



to mount the sidetanks to the deck. At this point lay your folded and soldered sidetank pieces upon a long flat piece of tinplate slightly wider and longer than your sidetanks. This will be the tank top (not the garment kind). While holding the inner edges of the top and ends in alignment, attach the top with a long piece of 1/4" angle soldered between the top and sides and two short (1/4" or so) angles soldered between the top and ends. Trim the top with snips and a file so it overhangs the side and ends by 1/16" or so. Run a "cove molding" of solder along the outside of the seams so any gaps are filled in. Repeat all this to fabricate the other sidetank.

Cut two pieces of 3/8" diameter brass tubing about 1/4" long. These dimensions aren't critical; use whatever tubing you have on hand. Solder each to a square of tinplate about twice as wide as the tube's diameter. When you trim these squares to a round shape and reduce their diameter to slightly greater than that of the tubes, you've made yourself some lids for the tank fillers. Solder these fillers to the tank tops roughly centered from side-to-side and about 1-1/2" forward of the rear end of the tank top. Feel free to solder on small bits of brass for latches/ hinges, etc. I've left these details off my engines.

Take your sidetanks and slide them over the firebox sides so that they're flush with the outer edges of the deck pieces. Mark the locations of the mounting holes in the deck upon the undersides of the brass mounting angles and drill these holes out. Solder 2-56 nuts onto the upper surface of the brass angles centered on these holes. The side tanks can now be mounted. But...before you do, wash them off thoroughly to get rid of the residue of flux. Use hot water, soap, and perhaps even some baking soda to neutralize the flux acids.

When things are dry you may wish to cement some woodstove door fiberglass rope gasket to the inside of the sidetanks. If you have a stove in you home, you know the stuff that I mean. If you don't, go to you local fireplace/stove shop and ask for fiberglass door gasket rope. 1/4" to 1/2" diameter would be fine. The idea is to insulate the firebox to minimize heat loss to the sidetanks and the outside world. In reality, the tanks will still get mighty hot, but I'm sure they'd get much hotter without the insulation. Butter the inner surface of the sidetanks with "door gasket cement" or plain old furnace cement and then drape the rope back and forth to uniformly cover the inner surface. When things are dry (a day or so) you can attach the side tanks with 2- 56 bolts driven up from underneath the deck.

Let's make a cab for the engine driver. Fold up a piece of tinplate cut to the dimensions shown in Figure V-1. Rather than run angles down the folds as we did on the side tanks, we'll attach 1/4" brass angles along the three bottom edges and then add 3/16" brass angle (1/4" would work as well, but I ran out once, substituted 3/16" instead, and liked it better because it was less conspicuous) horizontally across the top edge of the cab rear and a piece vertically down the middle of each cab side. Mark the location of the two 2-56 bolts used to attach the deck to the chassis ends, drill out the holes, solder on 2-56 nuts, and the cab is done. Except, if you want to get fancy, try this: Find a piece of insulated single strand copper hookup wire — you know the kind you used to use to wire your HO trains back in the old days? Strip off the insulation from about 18" of it. Grab one end in your vise, the other end in your pliers and pull hard to straighten out the kinks. While it's still stretched, clean it real well with fine sandpaper and then coat it with flux. Heat up your soldering gun, melt a blob of solder on the tip, and slowly wipe the solder down the length of the wire. This is called tinning. Now, similarly clean up the outer edges of the cab, then flux and tin them as well. We're now going to solder the wire to the cab edges as beading. Hold the cab in your vise, get your gun good and hot, and melt a blob of solder on the tip. Place the end of your tinned wire onto the front bottom edge of the cab side. Touch the gun to that location and then pull the gun away; the wire should have grabbed onto the cab side front-bottom edge (of course you know where I mean?!) When the solder has cooled lay the wire up the height of the cab side's front edge and wipe a "cove moulding" of solder into the joint. Bend the wire to follow the cab side's top and wipe the solder onto that joint. Bend the wire around the cab back's top edge, solder it on, and then the other side's top, and finally down its front edge. Go back and refill any solder voids, and then file down any rough solder spots. Go ahead and admire your work. If you want to really dress things up, bend up some handgrabs out of 3/64" or 1/16" brass or steel wire. Drill holes in the cab sides' front edges and attach the hand grabs onto the sides by soldering from the inside. Good job.

Let's work on the lubricator next. Displacement lubricators are available from several commercial sources, though making one from scratch at this point is well within our capabilities. First we need a body. Browsing through the racks at a hardware store or home center can yield much fruit for loco construction. I've made lubricators from elongate hexagonal cylinders which have inside threads at both ends — I think they must be threaded rod connectors — just make sure you can get a wide-headed screw to fit the threads. I've also recently made several lubricators from 3/8" o.d. galvanized pipe nipples (threads on outside). Try to find one at least 2" long; I get the 4" long jobs and cut them in the middle to make two bodies. Make sure you can get a hexagonal end cap (with inside threads) which will mate with the nipples. Screw the end cap on and note how far down the threads the cap extends. At least 1/4" below that point centerpunch and drill a 1/8" hole through that side and out the far side. These holes will be for the steamline. Next, about 1/ 4" up from the bottom of the body, and at right angles to the previous pair of holes, centerpunch and drill a drain hole. Drill #50 and then tap 2-56 (don't forget to lubricate and back the tap out frequently to clear the chips). A 2-56 screw will serve as the drain hole screw. We need a washer for this screw. Several SitG advertisers sell great assortments of fiber washers and rubber 0-rings, though a dandy 0-ring just the right size can be unearthed within the Mamod whistle by pulling the brass whistle body off the threaded boiler mounting stud. Nip off the end of the slender brass whistle valve stem and you've got your 0-ring.

Cut a piece of 1/8" copper steam pipe at least 1-1/4" long

from the Mamod assortment, or alternatively, 1/8" brass tubing from the hobby shop would work just fine. Push it through the continuous 1/8" hole in the lubricator body so an equal length is poking out each side. Silver solder it in place.

Next, cut a 3/4" X 1" piece of 1/16" steel to serve as the lubricator base. Drill a 3/32" mounting hole centered at one end, about 3/32" in from the edge. Silver solder the lubricator body to the base, making sure there will be ample space for a 2-56 mounting nut and bolt. To make the lubricator support, cut two more pieces of steel 3/4" X 1". Position one of these so that its upper 3/4" edge is about 1/16" above the chassis engineer side and the piece is centered over the lubricator mounting holes (marked "L" on Figure I-1); transfer the locations of these holes to the steel. On the remaining steel piece mark a location for a 3/32" hole centered along the 3/4" edge about 1/4" in from the edge; this will be for the single lubricator mounting hole in the lubricator body's base. Drill out these holes and then silver solder the two steel pieces at right angles to one another. I'm sure you'll agree that life would be a lot easier if we cut all these pieces at the same time and did all of our silver soldering at the same time as well. It wouldn't have been quite as easy to tell the story that way, however.

Drill a teeny hole (1/32" or so) down through the top *(and only the top)* of the steamline inside the lubricator. That enables a bit of steam to leak out into the body and steam oil to leak in. When you're all done, clean everything really well (no flux inside your lubricator, is there?) and mount the support to the chassis with two 2-56's and mount the lubricator to its support with a single 2-56. A photo of the mounted lubricator appears in Figure IV-2 (SitG July/August 1995 -- issue Nº 29).

We're really in the homestretch now; next time we'll assemble the gearing, build our burner, and fire it up. See you then.

Sources for items mentioned in this construction series:

Diamond Enterprises, Dept. SitG, Box 537, Alexandria Bay NY 13607. Phone 613-475-1771 FAX 613-475-3748. Mamod & Wilesco Stationary Engines, Traction Engines & lots more. Phone, fax or write for catalog & information.

Micro Fasteners, 110 Hillcrest Road, Flemington NJ 08822. Phone 800-892-6917. Great source for fasteners of all types and sizes. Ask for their FREE catalog.

Sulphur Springs Steam Models, Ltd., PO Box 6165, Dept. RB, Chesterfield MO 63006. Phone/fax 314-527-8326. Excellent source for many scratchbuilder and kitbasher items, including soft-soldering and silver-soldering torches and supplies, hard-to-find items like BA fasteners, taps, dies, boiler filler valves, safety valves, wick packing and lots more. Send $2.00 for their catalog.

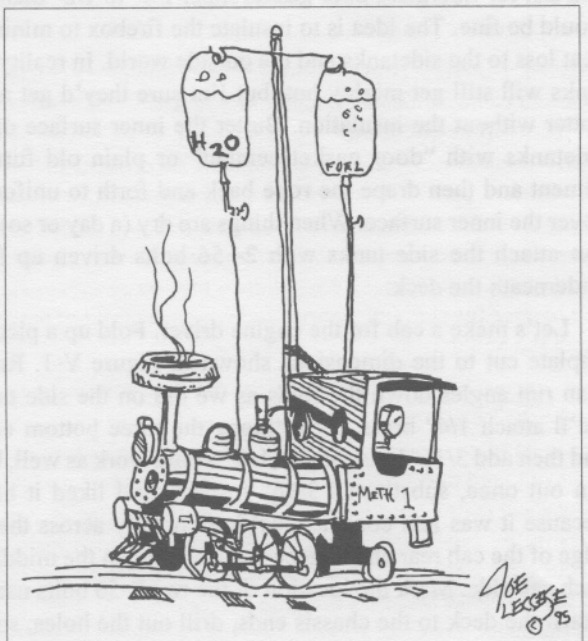
Berkeley Locomotive Works/Brandbright, 2821 Hillegass Avenue Nº 22, Berkeley CA 94705. Phone/fax 510-849-9284. Wide range of valves, wick packing, pressure gauges, and everything under the sun. Send $5.00 for their catalog.

Mike Chaney, 116 Vicarage Road, Chelmsford, Essex CM2 9BT, England. Phone 011 441 245 260 096. Mike manufactures and sells safety valves, boiler filler valves and just about every other kind of valve you can think of. Also wick packing, steam regulators, replacement boilers, lubricators and a whole lot more. Send a $1 bill for a catalog.

Serv-O-Link, PO Box 100542, Ft. Worth TX 76185-0542. Phone 817-732-4327. Source for chain & sprockets, as mentioned in text.

Stock Drive Products, Box 5416, New Hyde Park NY 11042-5416. Phone 516-328-3300. Great source for chain, sprockets, gears, belts, bearings, couplings, etc. **Their catalogs are a wonderful reference.**

When contacting any of these firms, please let them know that you saw them mentioned in Steam in the Garden magazine. Thanks!



For you "medical types" here's a way to increase your engine's *running time.* Just watch those tunnels!

Americanizing the Lady

Part II of a Series
by Don Beach
drawings from Don's original sketches by Harry Wade

Don gets into the nitty-gritty of his Roundhouse Lady Anne to American 2-6-0 conversion

Okay, we did plenty of talking in the last issue, now it's time to get our hands dirty! Find yourself a box to put the small bits into as you remove them. Start by taking the bright red buffer plates off each end of the frame. This is done by removing the two screws on each plate.

Now the real fun starts! The cab/tank assembly needs to be removed from the chassis. Remove the roof from the cab by taking out the nuts and bolts securing it to the rest of the structure. Undo the two nuts and bolts at the ends of the sidetanks and the two beneath the cab on either side fastening the cab to the frame. Disconnect the reverser pushrod at the servo (remember where it was set so that you can hook it up correctly when it is reinstalled).

Very carefully disconnect the pipe fittings from the gas tank, pressure gauge and regulator. Remove the radio receiver wires and cut the antenna near the hole where it goes through the roof. Remove all of the radio gear and disconnect the displacement lubricator. At this point you should be able to lift the entire cab/tank assembly from the chassis. There will be a support beneath the boiler that held the front of the tanks -- save this as you will use it again. You will also find that the boiler will want to come out of the smokebox -- don't let it. The idea is to disturb the mechanical workings of the engine as little as possible so that adjustments will not be necessary when the conversion is completed.

Remove the gas tank by loosening the nut on top of the sidetank. The round brass window frames and builder's plates are glued into place. Very carefully pry these loose with a sharp knife.

Cardstock patterns should be drawn up at this point (I used the cardstock that came inside a new shirt). If you use my dimensions the finished loco will be about the size of a Delton C-16. I wrapped the cab pattern around the existing cab to mark any sheet metal that needed to be removed. You will also find that cardstock is easier to take on and off as you make decisions about window size and the location to drill holes, etc. Please note that the patterns are cut on the solid lines and folded on the dotted lines! When I drew my cab pattern I used the cab itself to trace the curve of the roof and where the front of the cab is cut around the boiler.

When you are happy with the way the new cab pattern looks it is time to take the "step of no return". Decide which portions of the old cab need to be removed and mark them out using the pattern as your guide. I have found that a jeweler's saw is one of the most useful tools for cutting sheet metal (see ***"How to Use a Jeweler's Saw"*** in Part I of this series in the July/August issue). Take your time and make sure that you cut away only as much as you need to. I started by cutting the ends off the sidetanks and then the little fences that held the coal load on top of the tanks. Try to do a smooth job here as this area could show through the new paint when you are finished. Don't forget to cut off the whistle flush with the front of the cab. The edges of all cuts should now be smoothed down with a file. Take some time at this point to gather your nerves - honest, the whole thing will all come back together again soon!

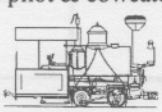
Use your pattern to draw out the new cab onto a piece of .020 brass sheet. Remember that the dimensions are to fit OUTSIDE the remains of the old cab, so allow for the extra material needed to make the folds where the cab front and sides bend around. Use your saw to cut out the cab. Take your time and try to make the cuts as straight as possible. A straight cut means that you will have less filing to do to make things look good! While you're at it, cut out the roof and hinges as well. Do not drill the hole for the displacement lubricator at this time. We will make the hole later when we are putting everything back together and have repositioned the lubricator.

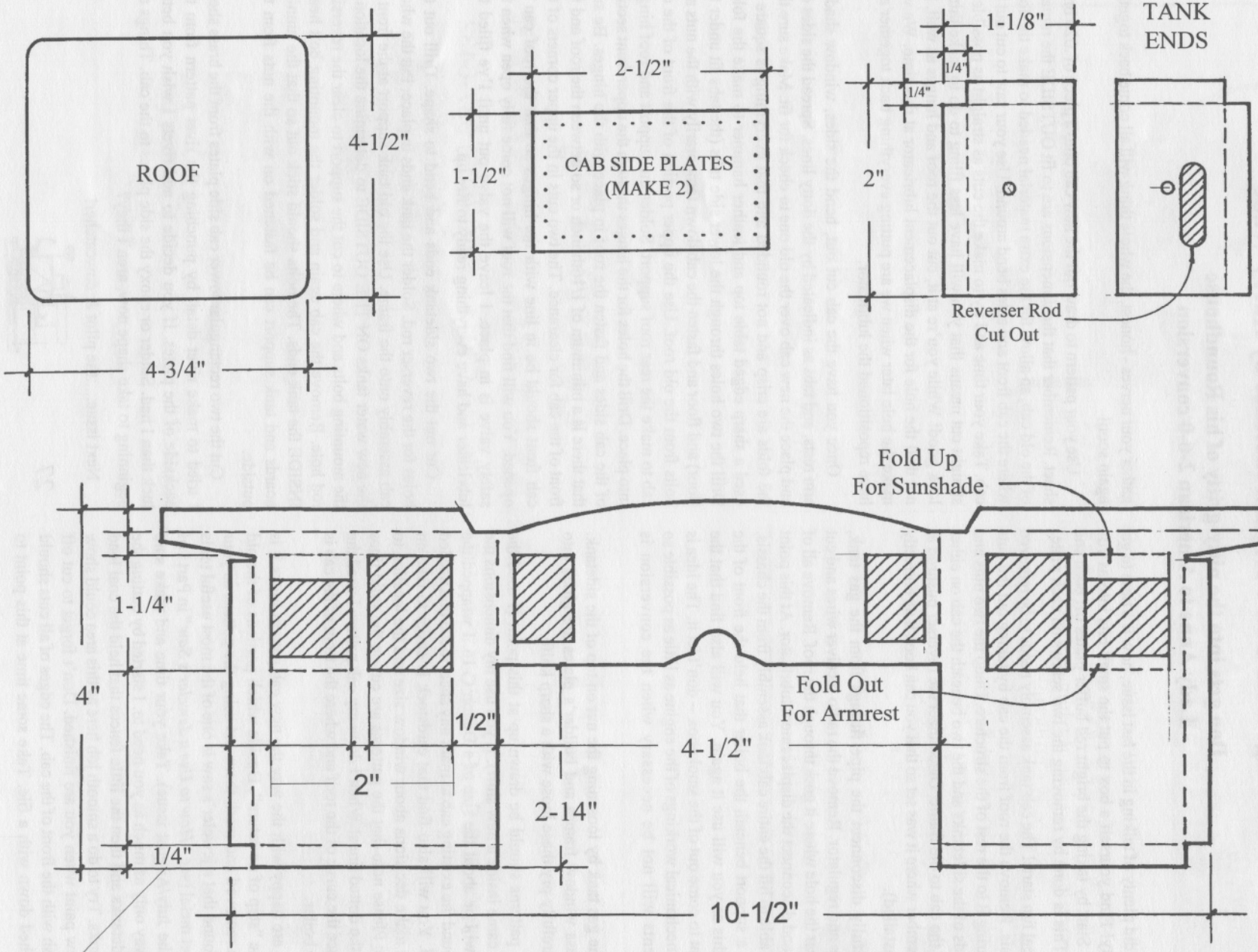
Once you have the cab cut out, bend the sides, window shades, arm rests, and tabs as indicated by the dotty lines. Spread the sides out and place the new cab over the old one to check for fit. Make sure that the folds are crisp and not rounded and that everything is square - I used a sharp edged table top and leather hammer to make the folds. Drill the two holes through the lower side tabs (the tabs fit under the floor) and floor and fasten the cab down temporarily with the nuts and bolts from the old roof. Use the upper portion of the front of the old cab to make the rear roof support. Solder the support and roof hinges into place. Drill the holes for the hinges through the upper front section of the cab sides and fasten the roof in place with the hinges. Be sure that there is a minimum of 1/16th inch or so between the roof and the front of the cab for clearance. The two cuts in the upper corners of the cab front should be in line with the hinges so that the roof can be opened. You will find that the roof will not come fully open when the safety valve is in place. I leave the valve out until I've filled the lubricator and have everything ready to fire up.

Cut out the two sidetank ends and bend to shape. Drill out the holes for the reverser rod. Solder the tank ends in place. Put the whole cab assembly onto the frame. Use the old tank support at the front of the new water tanks ON THE OUTSIDE to determine the location of the mounting bolts and where to cut the support to clear the reversing rod hole. Remove the cab again and solder the mounting bolt heads INSIDE the tank ends. The bolts should stick out so that the running boards and tank support can be fastened on with the nuts from the outside.

Cut the two rectangular lower cab side plates from the brass sheet. I tried to make rivet detail by punching the rivet pattern from the backside of the plates. If you decide to add rivets I wish you better luck than I had. Solder or epoxy the side plates to the cab. Things are beginning to take shape now, aren't they?

Next issue.....the pilot & cowcatcher!





DRAWINGS NOT TO SCALE

NEWS FLASH!

We are pleased to announce that, effective immediately, Tony Walsham of Remote Control Systems will be distributing SitG to our friends and fellow small-scale steam enthusiasts in Australia. Contact Tony at PO Box 1118, Bayswater, Victoria 3153 AUSTRALIA. Phone/fax is (03) 97 62 77 85.

MIKE CHANEY

ENGINEER & MODELMAKER

Specialist manufacturer of **live steam locomotives** for garden gauges

Gauge 1 models currently in progress through our workshops include:

Hunslet "WARIL" class 0-4-0 well tank in 1" scale (coal fired)

L.N.E.R. 0-6-0 J15 "Little Goods"

L.M.S. 4-4-2T "Tilbury Tank"

H.R. 4-6-0 "Jones Goods"

As part of our expansion programme, laser-cut frames and side rods for some of these locos will shortly be available.

Send $1 bill today for our 1995 catalogue of live steam fittings and accessories.

WORLDWIDE MAIL ORDER

MasterCard VISA

116, Vicarage Road, Chelmsford, Essex, CM2 9BT, England
Tel: 011 441 245 260 096

Books and Videos for the Beginning Machinist

Send one dollar for our information packet on books and videos for the home machinist. Everything from home foundry to lathe and milling machine operation. We have just the kind of information you need to get started.

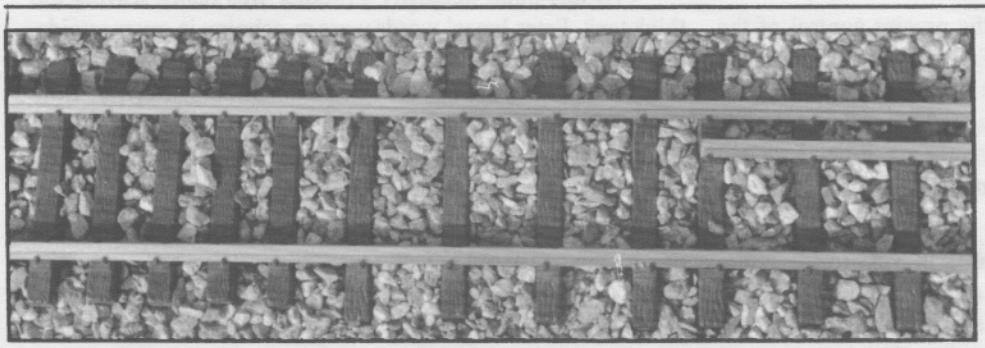
We also have EMCO-MAIER and SHERLINE lathes, milling machines and tooling. Let us know your needs and we will put together a package to fit at a fair price.

Basic Metal Lathe Operation (and More) Video
A master machinist discusses and demonstrates metal lathe fundamentals. Layout, setup, facing, offset turning, boring, thread cutting, tool grinding, and more. Also, a discussion of recommended tools to get started. Drawings and a chart are included. *VHS 61 min. $34.95 ppd.*

Visa and MasterCard
Canadian orders please add $2.00 additional shipping.
Info packet $1.00 purchase refundable.
MO residents please add 4.725% Sales Tax.

Bailey Craftsman Supply
P.O. Box 276 - Dept. SIG
Fulton, MO 65251-0276
Phone (314)642-5998 - FAX (314)642-2936

GARICH LIGHT TRANSPORT



ASTER

We Are Proud to Announce That We Are Now an ASTER Dealer

Experience design FREEDOM with a Complete Code 250 Rail System

SPRING TRACK SALE!

I Rail Choices: Aluminum, Brass, Pre-Weathered Nickel-Silver

I Tie Style Choices: Mainline, Branchline, Dual Gauge

I Turnout Choices: Numbers 3, 4, 6, 8, 10, Small Wye, Large Wye, 3 Way

CHECK OUR PRICES!

• Distributor for Sherline Lathes & Milling Machines •

AND, as you should expect, a complete line of fasteners and accessories to compliment your installation.

#1 SCALE G SCALE

Available NOW, from stock OR at your Dealer
52¢ LSSAE for Information and Sample

New address & phone ↓

Co Design SV RR

GARICH LIGHT TRANSPORT
13428 - 209th SE, Issaquah WA 98027
Phone/FAX: (206) 255-2453

How to Tame a Wild Aster

or any other brand of locomotion

by Kevin O'Connor

drawings by Harry Wade

Realistic speeds from our tiny steeds

The very first small scale live steam locomotive that I had ever seen was Maelor Davies Gauge One 0-6-0 British "Austerity" tank locomotive in October of 1994. Maelor ran it on his line in his back yard one evening after I had written to him, introducing myself and asking for some guidance. I had just ordered an LGB FRANK S. and did not have a clue what to do with what I then thought was an 0-4-0 LGB live steamer. Maelor soon set me right about the FRANK S. wheel arrangement and its true pedigree, and invited me over to see a live steamer that very night.

Needless to say I was enchanted and went home blissfully aware that things would never be the same again. When I met my oldest daughter for breakfast the next morning I had her in hysterics visualizing the sight of two grown men prancing round a dark backyard with a five cell flashlight/torch watching a locomotive and a rake of goods vans race around hither, thither, and yon.

A week later my FRANK S. arrived and I met up with Maelor at his house for the maiden run. All went well and the hook was set right up to the barb. The FRANK S. has given me many miles of enjoyment and has served as a test bed for the ideas that came to me as I learned about small scale steam locomotives.

One of these ideas concerns the precise control of the speed of lightly loaded locomotives. From the gitgo I was aware of the problem. On the first night that I saw Maelor's Austerity steam locomotive run, prototypical speed control was an iffy situation without a bunch of dead weight aft. When I visited Diamondhead '95 1 also observed limited prototypical speeds without a good sized consist.

I read a statement by Peter Jones in SitG to the effect that prototypical speed control was a long standing problem that could use some attention. Peter said something about the model airplane community's use of needle valves in the control of fuel to their internal combustion engines. This got my attention because my hobby background prior to discovering small scale live steam consisted of 45 years of R/C stand off scale model airplane experience!

For a long time this information soaked in my think tank until once again innovation was mothered by necessity. I had been influenced by Maelor's tutoring to become a hands on Casey at the bar and to forego my early inclination to clutter up the FRANK S. cab with R/C wizardry and the pink bunny with the drum in the coal bin. Maelor is a stickler for prototypical operation, and this appealed to my anal retentive nature so I followed suit. When I tried to emulate the slow speed characteristics of the real FRANK S. I ran into problems.

Pure and simple, the immediate problem was that even though the thread on the throttle is a pretty fine pitch, the adjustment is gross when it comes to gas or steam flow modulation. Full open to full closed for speed control purposes is less than half a turn. The lighter the load, the more evident the problem. The real FRANK S. probably tugged four to six four wheel coaches or vans day to day, and to recreate this consist with prototypical speeds was giving me problems.

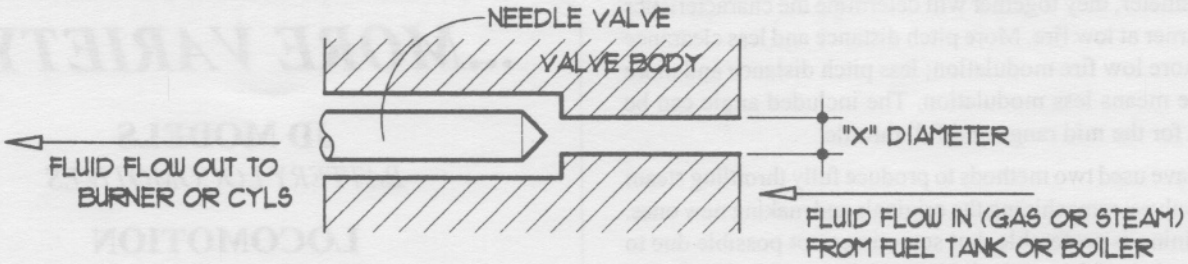
Another pinch point was the O-ring around the throttle spindle. In the very beginning I did not know of its need for lubrication; kinda like the upper ball joints on my Olds. When I would try to fine tune the throttle setting, the O-ring would be in contact with the inside diameter of the throttle valve and the minor diameter of the valve spindle O-ring groove. It would give a little and then spring back (commonly known as rebound effect.-ed.). So I'd try again, with the same unhappy result. A drop or two of 3 in 1 oil helped, but not much since the elasticity of the silicone O-ring was still in the equation.

I was also having the same kind of throttling problems with the butane gas control valve. I like to operate at 1 to 1-1/2 kg/cm2 maximum boiler pressure, but that's a story for another time.

At this point necessity's mother was really stirring the think tank, Peter Jones' words were re-echoing in my mastoids, and so I was moved to act. I will not bore you with all the theories of gas dynamics or Reynolds numbers or orifice flow characteristics that I briefly considered. My slipstick (yes, I am of a certain age) was not giving me many significant digits and so I enrolled in the school of trial and error.

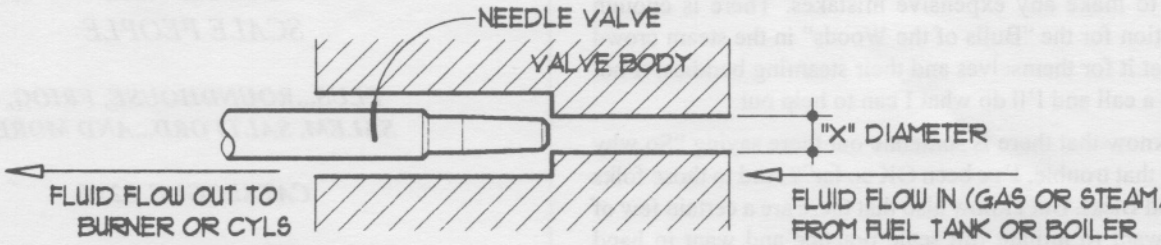
Cutting to the chase (I just found out that SitG doesn't pay by the word), what I discovered was that the thread pitch on a valve spindle, within reason, does not much contribute to modulating gas flow. What it does do is to allow graduated movement to a shaped nib, or needle, which obstructs the flow of gas or steam out of an orifice created by the geometry of the valve body. More simply put, with apologies to the blonde boy on the paint can, it's like sticking ones finger into a hole in the dike; the further in, the less the flow, the further out, the more the flow, And like the finger, the included angle is very small.

I have included a sketch with some general guidelines on it that I hope SitG improves on prior to printing *(redrawn on CAD by Harry Wade)* that shows the nuts and bolts of the design basics. The first is the constant diameter of the nib from the base of the 45 degree spindle seat to the start of the one degree included angle. All those zeros are significant and, in combination with the length in thread pitches of the constant



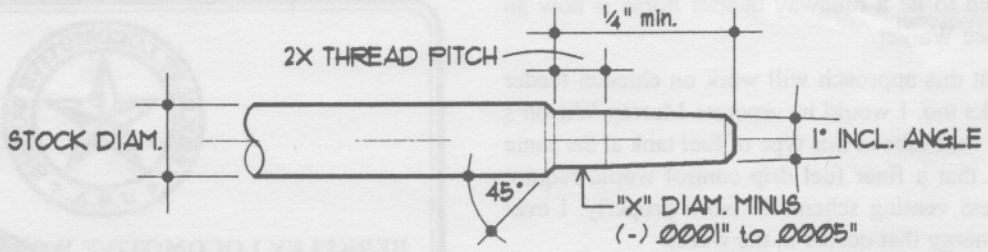
TYPICAL STOCK VALVE SECTION

NOT TO SCALE



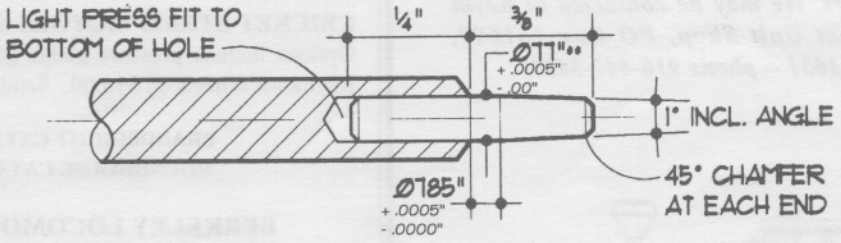
MODIFIED VALVE SECTION

NOT TO SCALE



MODIFIED VALVE DIMENSIONS

NOT TO SCALE



"FRANK S" MODIFIED VALVE

**CHECK AGAINST ORIGINAL VALVE GAS PASSAGE O.D.

NOT TO SCALE

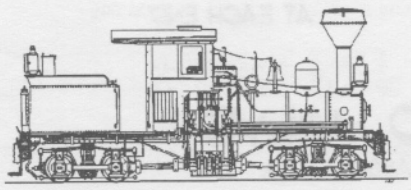
diameter, they together will determine the characteristics of the burner at low fire. More pitch distance and less clearance equals more low fire modulation; less pitch distance and more clearance means less modulation. The included angle can be adjusted for the mid range and full throttle.

I have used two methods to produce fully throttling steam and gas valves; remachining the originals and making new ones. Remachining is preferable, but sometimes not possible due to the constraints of the original. I have included a sketch of what I did to my FRANK S. The throttle now is fully adjustable through three rotations of the knob, and I have performed similar surgery on other locomotives. I've avoided the how-to part for good reason; it is not something that a novice to machine shop practice should try, and I don't want to be encouraging anyone to make any expensive mistakes. There is enough information for the "Bulls of the Woods" in the steam crowd to have at it for themselves and their steaming buddies; if not give me a call and I'll do what I can to help out.

I know that there is someone out there saying "So why go to all that trouble, I've been OK so far"? And to those folks I say God Bless. But I know also that there are a certain few of us that want to imitate full scale practice and want to hand operate our locomotives in the most prototypical fashion that we can master. To do that we must be able to easily control our speed over the rails and our boiler firing rates. This valve modification will allow us to do just that. I recently finished up a triple valve conversion on an Aster C&S Mogul; both the liquid and gas butane metering valves as well as the throttle valve. What used to be a runaway quarter horse is now an elegant Tennessee Walker.

I think that this approach will work on chicken feeder alcohol fuel tanks too. I would incorporate Murray Wilson's alteration of the vent tube in this type of fuel tank at the same time, as I think that a finer fuel drip control would require Murray's faultless venting scheme to work properly. I ever marvel at the synergy that occurs in the world.

Kevin O'Connor may be relatively new to small-scale steam, but he has a lengthy background in full-size steam, engineering and machine shop practice, and he has many ideas for improving the operation of our little steamers. Kevin is recently retired from the U.S. Coast Guard, and is now providing unique and wonderful modifications and add-ons for small-scale steamers. He may be contacted at Kevin O'Connor's "S" Street Unit Shop, PO Box 161697, Sacramento, CA 95816-1631 -- phone 916-447-5433.



BOOK REVIEW

by Chip Rosenblum

GETTING THERE:
The Epic Struggle Between Road and Rail
in the American Century
by Stephen B. Goddard
Published 1994: Basic Books

This is an amazing book. It is simultaneously entertaining, edifying, and disturbing. The treatise, for that is what it is, presents the cultural, economic, human, and political interactions of the last 1-1/2 centuries in this country. It is a history of the railroads in America, but not from the perspective of the railroad buff. Rather, it is the narration of greed, duplicity, marketing genius and political maneuvering that led to the rise, fall, and rebirth of the railroad industry. It is the story of the evolution of the automobile and trucking ascendancy, not from the perspective of a driver or carrier, but rather from the manipulative forces that drove competition and led to the saturation of America in exhaust fumes. It is the story of the creation and origin of our road, highway and interstate system, and the knowledge of the basis for their creation that leads one to loathe their existence.

The narrative begins in the fall of 1829 in England, with the "Stephenson Rocket" spewing thick clouds of black smoke and racing along the new iron tracks of the Liverpool and Manchester Railway. The story does not, however, continue in the fashion of most of the transportation histories that we're used to reading. It provides all of the background information that was missing from the glossy calendars of the driving of the Golden Spike, and presents the real-world slash their purse, steal their wallets, and throw them into the snow barefoot approach to business and political practice in America.

A railway example of this abuse of power coupled by duplicity and machination is found in the description of the general counsel of the Santa Fe Railroad holed up at the Copeland Hotel in Wichita, Kansas, with instructions to dole out from $500 to $2,000 to each legislative leader who earned three dollars a day - as a retainer if he was a lawyer, as expense money if he was not. *"Needy pastors were hurriedly converted to steam, and they presently could see God's hand on the throttle."*

The railroads were not the only group to receive the scathing gaze of truth into motivations in Goddard's presentation. Those who wanted to develop the automobile and trucking industry, referred to as *"The Highwaymen"*, have presented as great a degree of avarice, cunning, and political manipulation in the pursuit of their monopolistic goals.

It is noted that although California was known early in the century for the best development of the trolley and interurban, where many could get to work on one motor, by deceit and manipulation the automobile culture and roadway industry managed to eliminate that mode of transportation and create a fume-laden gridlock of one person - one car. That this is to date a self-perpetuating economic web is noted by the statement that *"By 1968, one in six Americans made, sold, maintained, or drove motor vehicles for a living"*.

The real impact of ***Getting There*** is in the depth of knowledge it provides those interested in rail. It provides information missing in most other compilations of the building of railways, and that information can be used not only for our own knowledge, but to lobby for increased commitment to rail in the future.

This book is a well-researched and documented history of transportation in America, both its successes and problems, and the overlooked solutions. I found it an invaluable adjunct to the time line type of histories we're used to seeing of the mechanical development of one railroad or another, or of a particular type of motive power. For anyone wishing an in-depth understanding of the real evolution of transportation in America, I recommend reading ***Getting There***.

LETTERS FROM THE OLD CURMUDGEON

If all the nation's economists were laid end to end, they would not reach a conclusion.

George Bernard Shaw

The Old Curmudgeon

My latest project was a rounding-off (radius) jig that really works. Since I had designed and built two other rounding-off jigs that didn't work all that well, this one is something of an accomplishment.

Every engine and locomotive has lots of links, rods and similar things that have holes at each end and need to have a radius around the hole. Setting up a rotary table on a milling machine or drill press to do this is usually time consuming. Expensive too, if you don't happen to own a rotary table. I've enclosed a set of drawings for this gadget.

My design (see Assembly Drawing) started with a small table (4" X 4") of steel or aluminum about 1/8" thick. Screwed to the bottom of this table is a small aluminum block about 2" X 1-1/4" x 1/2" which can be gripped in a small milling or drilling vice. I drilled a 1/2" hole through the 2" length of the block. On one of the 1-1/4" X 1/2" faces I cut and filed a 90° slot about 1/8" deep. This slot should be square with the sides of the block and the 1/2" hole. This block was tapped for four 6-32 machine screws to attach it to the table.

I cut a 3/8" slot in the table reaching back to the point of the V groove in the block. The table was then attached to the block with four flat head screws. (Make sure these don't protrude above the surface.)

Now, get a 1/2" bolt long enough to make the clamp screw as shown. Cut off the bolt head leaving a shank with a total length of about 3". About 1/2" from the head end, cross drill this bolt with a 1/4" diameter drill.

After assembling the parts, when you want to round the end of a locomotive or steam engine rod or linkage just do the following:

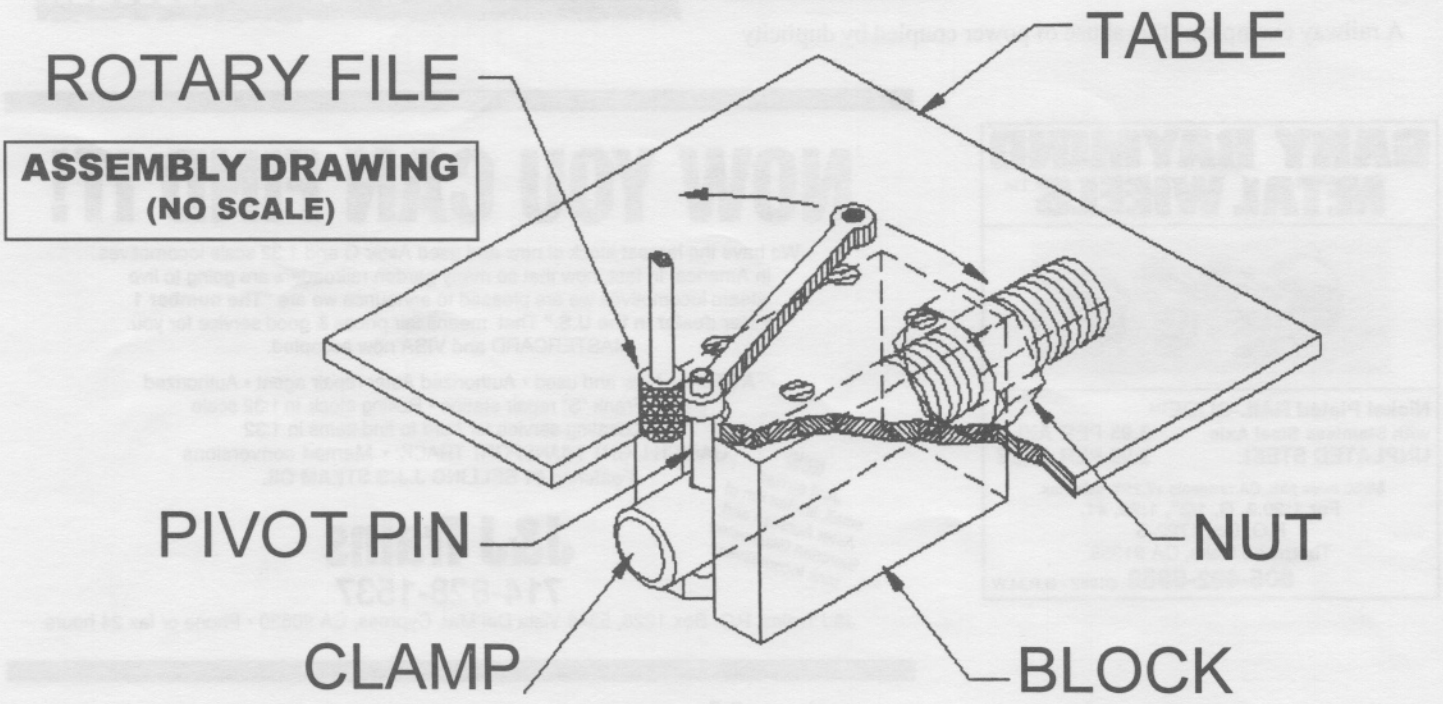
1. Mount your vise for the UNIMAT or other machine as for milling and put a small rotary file in the machine chuck.
2. Get a pin which fits the hole in the linkage and place it in the 1/4" hole through the clamping bolt, projecting above the table top, and tighten the nut to hold the pin securely in the V-groove.
3. Put the link on the pin. Lower the rotary file through the table slot to a position somewhat lower than the table top and slowly feed the work into it while swinging the link back and forth to round the end.

Once made, this little beauty will encourage you to finish off those rods and links with proper radii. A set of small clamps which can be used as rotation stops are a good idea so you don't overshoot on your cuts.

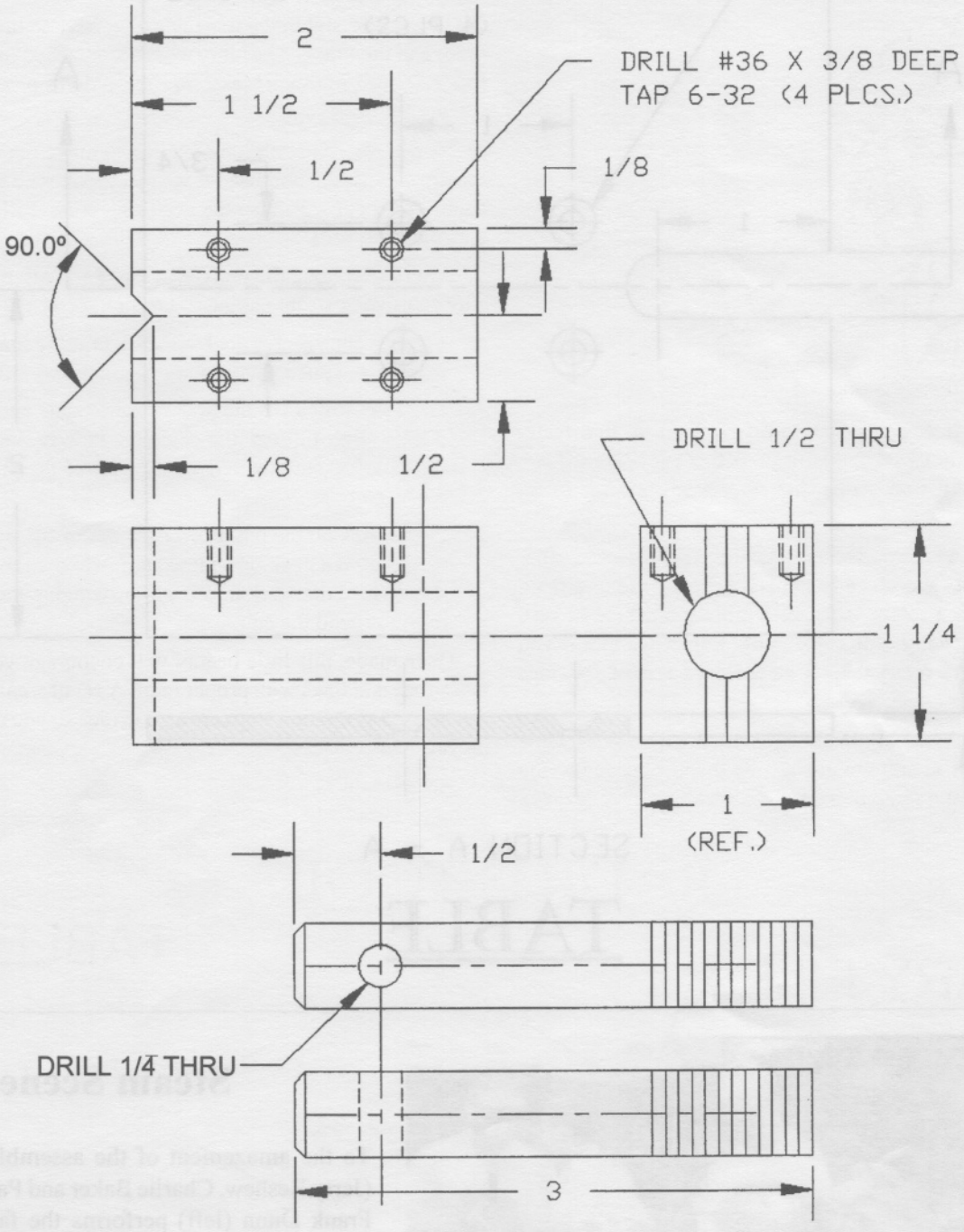
Keep turnin'

Marv

RADIUS TOOL

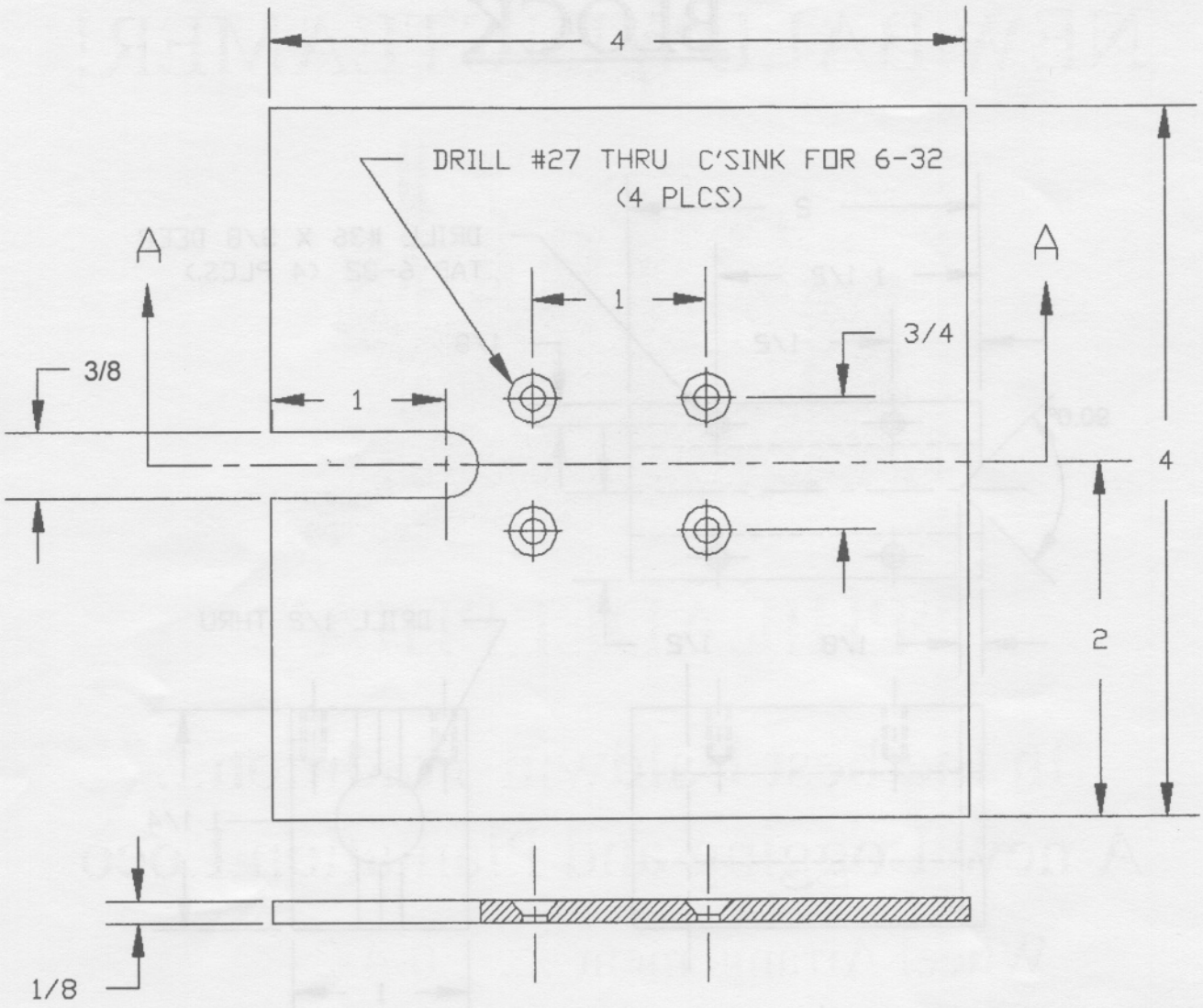


BLOCK



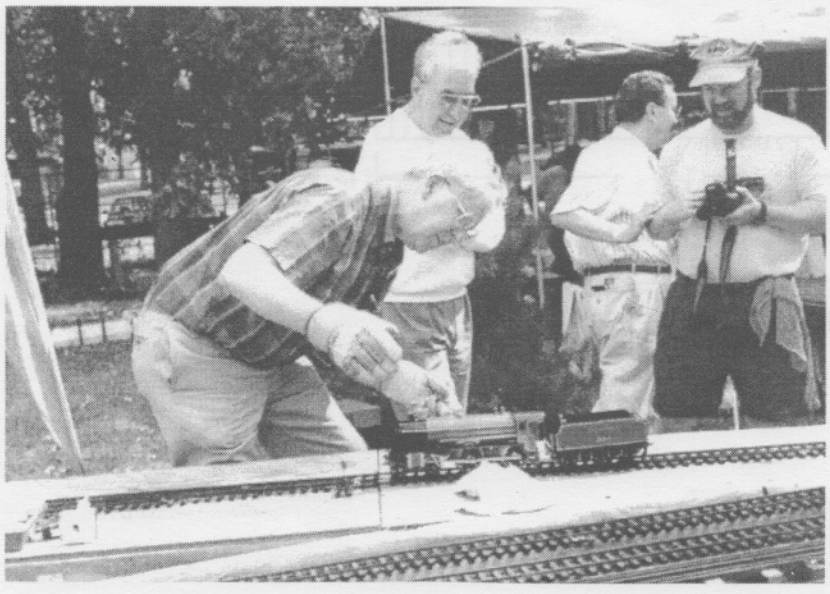
CLAMP

MAKE FROM 1/2" BOLT



SECTION A - A

TABLE

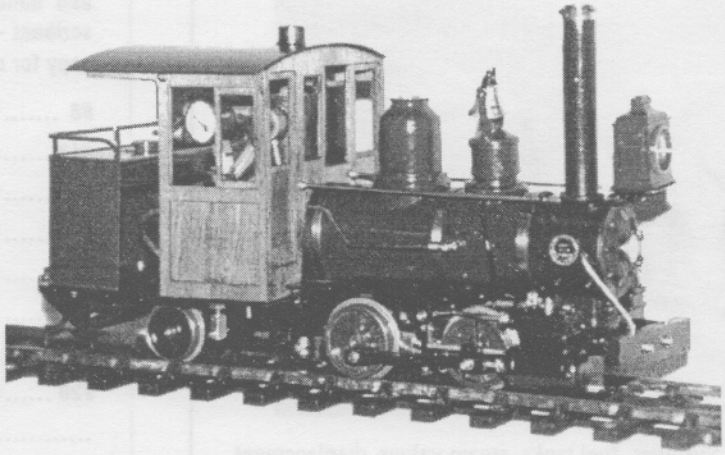


Steam Scene

To the amazement of the assembled onlookers (Jerry Reshew, Charlie Baker and Paul Wortham), Frank Dunn (left) performs the fabled ASTER dance to encourage a reluctant ASTER Schools Class steamer. The park-like setting is the Indiana Transportation Museum at Noblesville, Indiana, and the event was the 1994 ITM Steamup.

Photo by Bill Hendrick (who says that John Bloxdorf tells him his wicks are packed too tight)

NEW BALDWIN STEAMER!



"PHILADELPHIA"

In the best Baldwin Tradition...
A new Logging and Plantation Loco

Wheel Arrangement..... 0-4-2
Scale..... 1:20
Gauge..... 45 or 32 mm

Like the prototype, it will handle your trains round sharp curves -- 3 foot radius. Robust, easy operation and handsome in dark green, burgundy or black paint with polished brass fittings and timber cab. R/C can be fitted.

Enquiries & Reservations to:

USA: Sulphur Springs Steam Models -- Bob & Carol Paule -- phone/fax 314-527-8326
UK: "WRIGHTSCALE" -- Malcolm Wright -- phone/fax 3398-86494
or
Argyle Loco Works -- 241 Belgrave -- Gembrook Road, CLEMATIS 3782, VICTORIA - AUSTRALIA -- phone/fax 011-61-59-686-573

SitG Back Issues

CURRENTLY AVAILABLE

Prices shown include 1st Class postage and handling for North American subscribers - all others please add .75 per copy for overseas surface mail.

#8 ..... 5.00	#21 ..... 5.50
#13 ..... 5.50	#22 ..... 5.50
#14 ..... 5.50	#23 ..... 5.50
#16 ..... 5.50	#24 ..... 5.75
#17 ..... 5.50	#25 ..... 5.75
#18 ..... 5.50	#26 ..... 5.75
#19 ..... 5.50	#27 ..... 5.75
#20 ..... 5.50	#28 ..... 5.75
.....	#29 ..... 5.75

Send a list of issues requested with your check or money order to:

Steam in the Garden Magazine
P.O. Box 335
Newark Valley, NY 13811

For reprints of sold out back issues, contact:

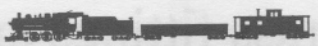
Sulphur Springs Steam Models, Ltd.
Dept. RB
PO Box 6165
Chesterfield MO 63006
Phone/FAX 314-527-8326

Steam Scene

(Photos inside front cover)

Top: A Geoffbilt Shay clatters out of the tunnel, into the bright sunshine and through the flowers somewhere deep in the heart of Texas.

Photo by Carl Malone



Bottom: On the opposite side of the country in New Jersey, a Roundhouse TAW rolls noisily over a fragile bridge with a rake of Tenmille coaches built by Barry Harper.

Photo by Marty Maloy

HAPPY HOLIDAYS!

Gauge "1" live steamers make the perfect gift!

We offer the finest quality and workmanship from the U.K.; superb performances! RTR (ready to run)

•SPECIAL OFFER•

Bonus of a MH Refillable Fuel Tank with a RTR PORTER

OR

Engineer "Iron Mike" with a PORTER Kit

All Models in stock for IMMEDIATE Delivery!

(Offer expires 12-31-95)

Full line of Maxwell Hemmens Model Boat Kits and Marine Engines

---

•WE SERVICE & REPAIR LIVE STEAMERS•

"Stocking Stuffers"

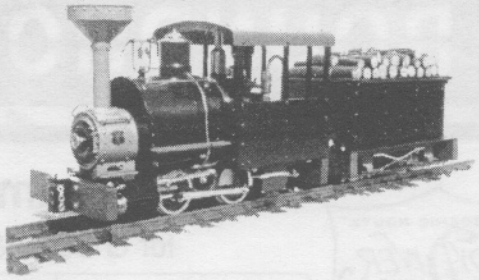
- Engineer "Iron Mike" for MH PORTER $25.00 p.p.
- Building Blueprints
- Smokestack "CAP" for MH PORTER $20.00 p.p.

CATALOGS (all prices include shipping and handling)

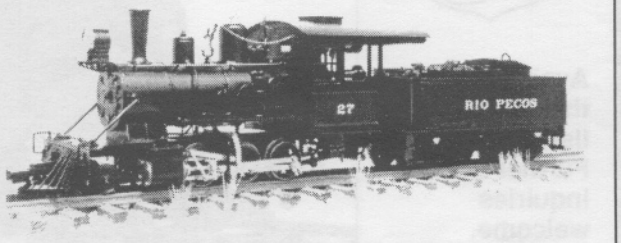
6th Edition Aster Color	$30.00
4th Edition Roundhouse	6.00
Pearse (photo-copy)	1.50
4th Edition Rio-Pecos	3.00

RIO PECOS
GARDEN RAILROAD CO.

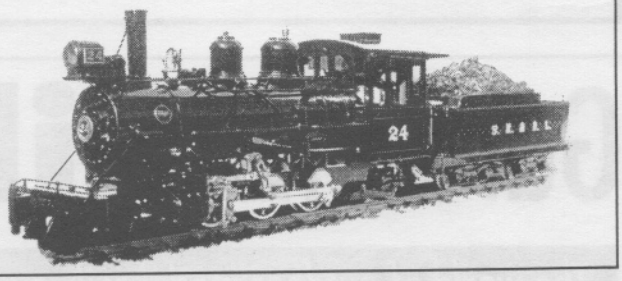
27136 Edenbridge Ct. Bonita Springs FL. 33923
Phone (941) 495-0491 Fax (941) 495-7264



MAXWELL HEMMENS model of a generic 0-4-0 saddletank locomotive built by the H.K. PORTER CO. Pittsburg, PA. U.S.A. Call for a deal NOW!



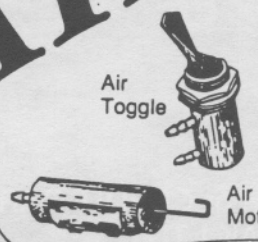
The PEARSE "COLORADOS" are HERE! They run beautifully with the"chunky narrow-gauge look we love so much" A GREAT BUY!



Baldwin S.R. & R.L. #24 *An American classic built by time-proven ROUNDHOUSE ENG. CO. England*

AIR!

THAT'S RIGHT- *AIR* IS ALL YOU NEED TO POWER YOUR TURNOUTS!



A simple Air Motor, an Air Toggle, some tubing and an air supply are all you need. There's NO wiring, NO soldering, NO electricity! Easy to install with proven reliability. Guaranteed for life!

WRITE, PHONE OR FAX TODAY FOR INFO

Del-Aire Products

321 N. 40th St., Dept. SG, Allentown, PA 18104
Phone/Fax (610) 391-0412, 24 hours/7 days
DEALER INQUIRIES INVITED

Del-Aire Products work with any gauge turnouts!

SWAP SHOP

Wanted: J&M freight cars as in old Gauge One America catalog. Aster N6b Pennsy caboose. LGB 2' radius switches, older style with short moving points. Figure sets 5042, 5047, 5039. J. Hyde, 89060 NRR, Jewett OH 43986 -- 614-946-6611.

For Sale: Complete set, Steam in the Garden issues #1-28. First three issues in newsletter format hole-punched for three-ring binder. All other issues, including single consolidated reissue of #1-3, in excellent condition. Offered only as complete, intact set. $115.00 firm includes surface UPS. Frank Rushton, 128 Woodcreek Drive, Dothan AL 36301-6206 -- phone 334-794-4728. If necessary, please leave message on answering device and your call will be returned.

Wanted: Aster kits to buy or build. Experienced craftsman, reasonable prices. Virgin kits only, please! Allan Caperton, 8202 Wolf Pen Branch Road, Prospect KY 40059 -- phone 502-228-1235.

For Sale: Attention Scratchbuilders, kitbashers & craftsmen. **⊕n Mark Optical Center Punch** -- unique design, highest quality, consistent accuracy to .002" guaranteed. Great gift for any craftsman. Satisfaction guaranteed! $49.95 ppd. Check or money order to Steamchest Publications, PO Box 335, Newark Valley NY 13811. NY State residents please add appropriate backbreaking tax.

For Sale: Aster Baldwin 0-4-2T (green) with water car and hand pump. Hardly used. $1250.00. Call Joe Macaluso after 6 pm eastern time -- 404-736-9167.

For Sale: Aster 2-6-0 JNR 8558 Mogul, 1:32 scale, alcohol fired, single cylinder version. Requires 2 meter radius. Fired 2 times. Asking $1000.00, includes shipping. Bob Simpson, PO Box 21, Mount Dora FL 32757 -- 904-383-4991.

For Sale: INDEX TO FIRST FOUR VOLUMES OF STEAM IN THE GARDEN MAGAZINE. Indexed by author, subject & contents. Send $4 (cash, check or money order) to Ricky Morningstar, 11 Kimberly St., Riverview NB, CANADA E1B-3P8.

For Sale: Gauge 1 Hyde live steam Shay loco with R/C and beautifully modified (marker lights, valves, tanks, etc.). Run less than 1 hour. $1100.00. Contact Tom Flair, 3265 Lake Winnipeg Drive, Harvey, Louisiana 70058 -- phone 504-367-9992.

Wanted: Aster/J&M green Spruce Falls boxcar. Call Jerry Hyde, 614-946-6611.

Wanted: Ride from west coast to Diamondhead in January. Would prefer sharing the cost of a compartment on AMTRACK. Arnold Hoffman, 2970 Ramona Road, Atascadero CA 93422 -- phone 805-466-2398.

For Sale: 1979's, 1980's, 1990's Live Steam magazines, $2.00 each. Send your list or contact Stan Grebas, 2037 Jackson St., Scranton PA 18504 -- phone 717-346-9087.

For Sale: Two (2) Maxwell Hemmens Porters -- one is brand new, the other has been run but is in excellent condition. Ron Brown, PO Box 335, Newark Valley NY 13811 -- 607-642-8119.

For Sale: Back issues of Model Engineer and Live Steam magazine. Model engineering books and videos. Send SASE for complete list. Frank Waters, 648 Mercer St., Albany NY 12208.

Wanted: Mamod cast "O" gauge track. New or used. Willing to pay reasonable price. Call Herb Grassel, 301-942-3314 after 6 pm eastern time, or send list to 12838 Flack Street, Wheaton MD 20906-3877.

Wanted: Used Aster locomotives: Old Faithful 0-4-0T -- Alisan Shay -- GER/ETAT/OUEST Tank 0-6-0T and Glaskasten 0-4-0T. Contact Kevin O'Connor's "S" Street Unit Shop, PO Box 161697, Sacramento CA 95816-1697 -- phone 800-442-9897.

For Sale: Hartford Products Barnhardt Log Loader kit. Untouched. $300 includes shipping. Rich Chiodo, 9 Janvrin Road, Hampton, NH 03842 -- phone 603-926-4858 between 7:00-9:00 pm eastern.

For Sale: FRANK S., original paint, garaged, oil changed regularly, original wheels, one owner. Perfect box condition.....with the box. $1342.78. Bill Chamberlain -- 407-884-9325.

***Swap Shop** listings are offered at no charge as space permits. No phone-in ads, please! Send your listings to SitG, PO Box 335, Newark Valley NY 13811, or fax to 607-642-8978 (24 hours). Ads must contain sellers name, plus address and/or phone number.*

In 1881, the Prussian State Railways ordered their first T-3 locomotives, not knowing that this classic design was destined to become world famous. To many railfans, the thought of the T-3's silhouette still conjures up romantic visions of lonely branch line operations with the tiny locomotive hauling a string of four wheeled coaches into yesteryear. While it may be difficult to pinpoint exactly what endears the T-3 to railfans, there is no doubt that the locomotive's reliability and operating characteristics endeared it to both its engineers and owners. A total of 1550 T-3's were built between 1881 and 1906, with 1345 of these going to the Prussian State Railways. The remainder were used on privately owned lines in both Europe and abroad. The T-3's reputation was based on her simple yet ingenious design. The boiler was exceptionally efficient and generated fairly dry steam in spite of not having a superheater. The firebox grate area, originally 1.2 square meters, was later increased to 1.35 square meters; the firebox squeezed in nicely between the last set of drivers. The 1100mm diameter drive wheels were supported at three points, making the locomotive quite stable. The ancient Allan valve gear was almost humorous in its operation, but did its job well. However, time eventually caught up with the T-3; when branch line speed limits were raised from 40 to 50km per hour, her speed capability of only 45km per hour relegated her to yard duties for the remainder of her career.

Now ASTER, builders of quality locomotives treasured and cherished by model railroad collectors and operators around the world, brings all the romance and nostalgia down to size with this exceptional Gauge #1 (45mm) model of the T-3 in 1:32 scale. Contact your favorite ASTER dealer (listed below) for more information, or to place your order for one of these beautiful working models. Production is limited, so don't delay and miss your train!

J&J TRAINS
5348 Vista Del Mar,
Cypress, CA 90630
714-828-1537
Fax 714-828-1537 24 Hr.

EASTERN RAILWAYS
RD1 Box 254,
Beech Creek, PA 16822
717-387-8602

CROSS CREEK ENGINEERING
P.O. Box 191,
Spencer, OH 44275
1-800-664-3226

SAN VAL TRAINS
7444 Valjean Avenue,
Van Nuys, CA 91406
800-423-3281 Nat.
800-924-9658 CA Fax 818-786-9072

HYDE OUT MOUNTAIN
89060 New Rumley Road,
Jewett, OH 43986
614-946-6611

GAUGE ONE LINES
10 Porter Street,
Stittsville, Ontario K2S1P8
Canada
613-Tenmill

NORTH JERSEY GAUGE ONE
8 Spring Valley Road,
Park Ridge, NJ 07656
201-391-1493

PETERSON'S TRAINS
2710 Old Lebanon Rd.,
Nashville, TN 37211
615-391-3516
615-391-0556 Fax

ASTER HOBBY WEST, INC. P.O. Box 1226 Cypress, CA 90630 **714-828-1537 24-Hour Phone/ Fax**

ASTER

LLAGAS CREEK RAILWAYS

NOW IN OUR 8TH YEAR

★★★★★★★★★★★★

For our new Gauge 1 track products catalog,

please send LSASE with .52 postage.

For a catalog and sample of our code 215 or 250 track send $2.00.

Llagas Creek Railways Dept. SG

2200 Llagas Road, Morgan Hill, CA 95037-9429

Phone/FAX 408-779-4391