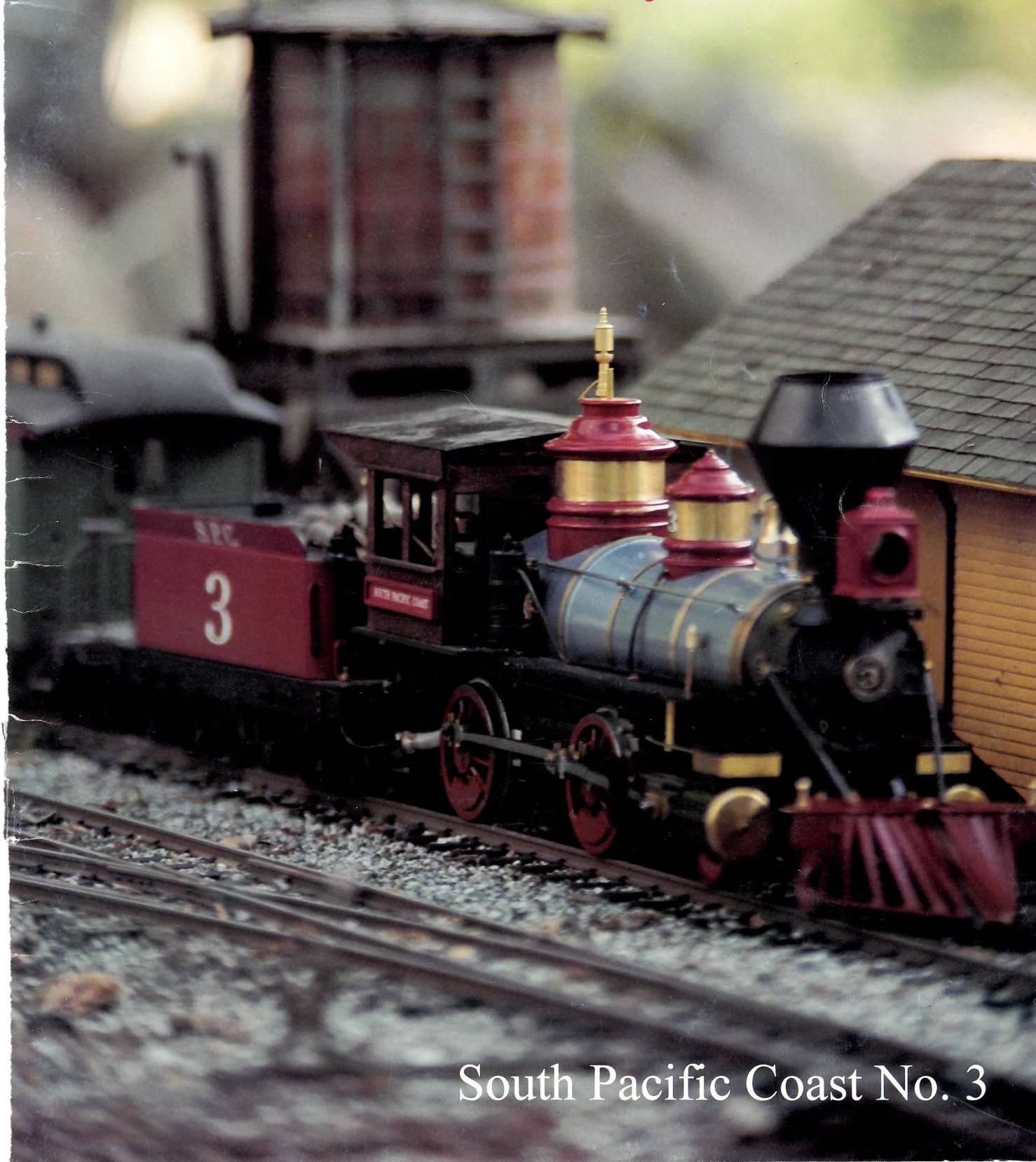


August 1994

23
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Steam in the Garden



South Pacific Coast No. 3

ANNOUNCING... GIANT LITTLE RAILWAYS LIVE STEAM LOCOS... LITTLE GIANT & THE NEW! DIXIE



Little Giant



Dixie

Yesteryear Toys & Books Inc. has been appointed the exclusive North American distributor for 'Giant Little Railways.' 'Giant Little Railways' are manufactured by The American Steam Locomotive Co. Ltd. of the UK (formerly Steamlines Publications & Models).

A NEW GARDEN RAILWAY CONCEPT!

• AFFORDABLE EASY-TO-BUILD LIVE STEAMER KITS AND READY-TO-RUN MODELS (45mm – GAUGE 1) • 3/4" SCALE, A THIRD LARGER THAN LGB • TOUGH ENOUGH FOR THE WORST OUTDOOR CONDITIONS • TAME ENOUGH TO RUN INDOORS
This new and exciting line consists of the high quality and powerful models, the 'Little Giant' and 'Dixie.' Both are available in kit or assembled form.

LITTLE GIANT and DIXIE SPECIFICATIONS:

Kit supplied as an assembled chassis boiler, track tested to pull 30 lbs. before despatch. You fit superstructure, detail parts (all components are unpainted). No problems for the first time builder. Ready-to-run models are supplied with a two-year parts and labor warranty.

Immensely strong construction. A loco is only as safe as its safety valve. Twin safety valves set at 55/60 PSI. The reversing valve also provides an extra margin of safety. Free-steaming copper boiler, internally gas fired, 2" dia. x 6" long, 1.6mm thick, will not dent, double stayed, all joints silver soldered and tested to 150 PSI, working pressure 40 PSI. Tubular copper gas tank, 1.2mm thick, shielded from the burner. Exhaust gases ducted under the smokebox to warm the cylinder block, prevents priming.

Cylinders are 13mm bore (fitted "O" rings), 16mm stroke, double-acting cylinders w/piston valves. Monoblock chassis machined from HE30 aluminum, no frame stretchers. 1.25" dia. wheels, insulated steel tires, 1/4" steel axles run in brass bearing blocks.

A regulator you can get your hands on provides fine control in either direction. Radio operation optional.

Dimensions: 8.25" long, 3.75" wide, 6.75" high, weight 2.65 kg. (5.8 lbs.), will run 2 foot (60 cm) radius curves.

LITTLE GIANT Special features: Steel cab 1.2mm thick high tensile steel. 1 1/8" dia. pressure gauge. Ready-to-run colors: buffer beams, red; chassis, black; cab roof, black; side tanks and cab, maroon, green, or dark blue.

DIXIE Special features: All-wood cab, dummy sand dome, headlamp, tool box, air tank, bell. 3/4" pressure gauge, black livery.

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☐ **Dixie Kit**\$795.95

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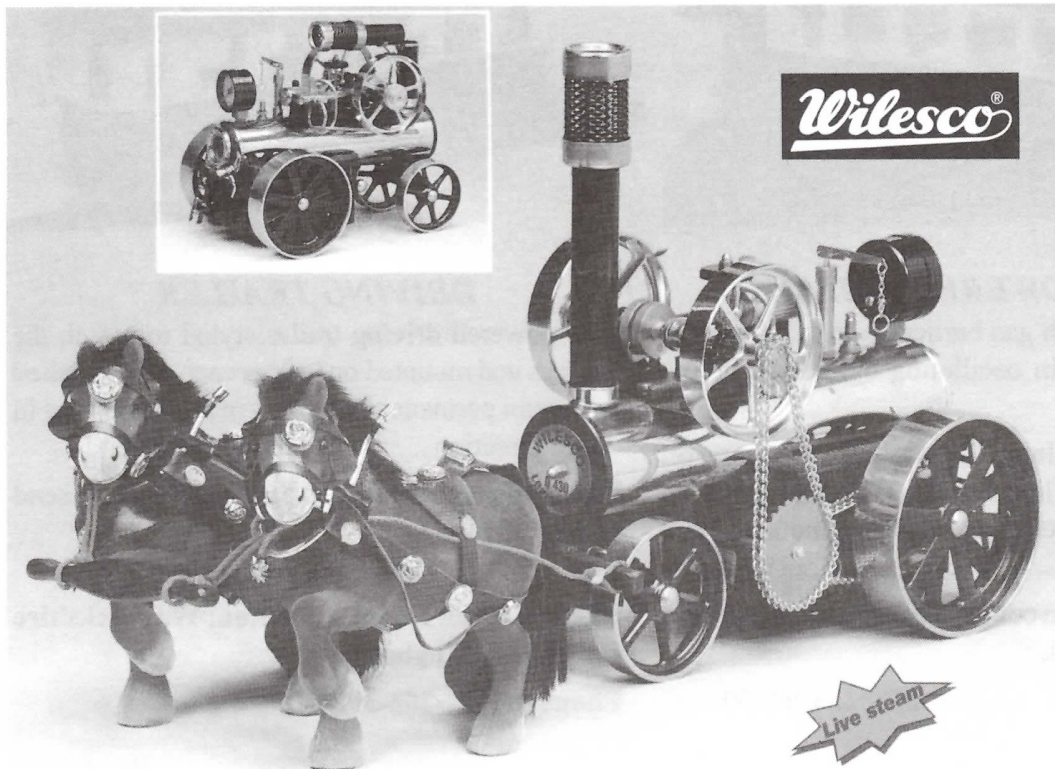
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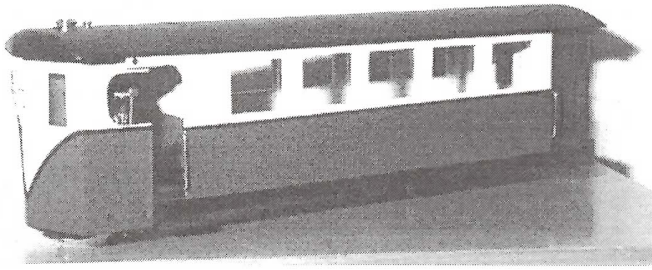
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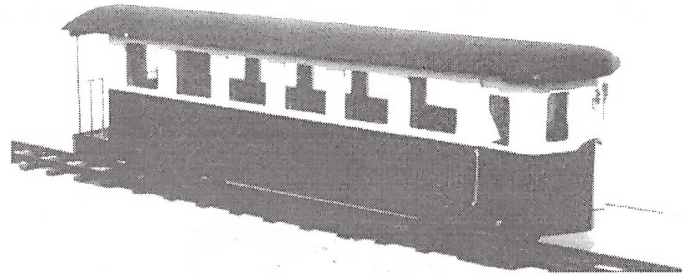
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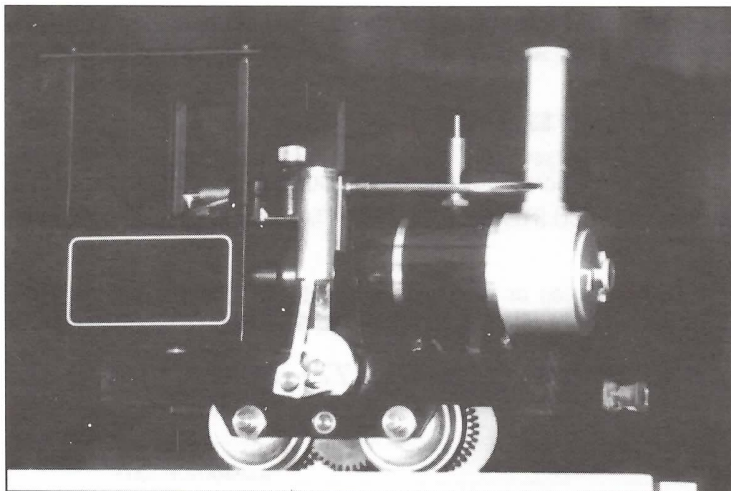
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ON THE COVER:

It's a hot summer day, and South Pacific Coast No. 3 stops to take on water and passengers as it heads south, toward the cool Santa Cruz Mountains and the ocean beach community of Santa Cruz. Read all about this magnificent steam loco in the review of Argyle Loco Works' 1:20 scale model by Gary Broeder in this issue. *Photo by Gary Broeder*

Time Flies...

The old cliché is apparently true...time does fly when you're having fun. And we've sure had a lot of fun over the last four years (can you believe it's been that long?), working on this magazine and enjoying the close contact with plenty of great steamers - both the mechanical and the human variety. It's a real blessing to be able to enjoy our work so much that when takes over our life we don't even complain about it.

During those 4 years, SitG has grown from a tiny newsletter into a real magazine. Beginning with this issue we've added a color cover, thanks to the insistence of our readers and the support of those advertisers who provide the hardware that makes this great hobby so much fun for all of us.

Another big thanks goes out to you, our readers, without whom none of this would be possible...or necessary. THANKS for your continued loyalty and support - and your cards, letters and calls.

The biggest thank you of all goes to those that contribute to SitG so freely and generously with articles, photos, drawings and the words of encouragement that keep us going.

Alas, as SitG has grown in size and content, it has also become much more expensive to publish. Each issue now costs more to print and mail than we get back from subscriptions, a situation that can't be tolerated for long without going out of business. So, beginning with this issue, the price of each domestic subscription copy will go up 50 cents. Foreign and Canadian subscriptions will go up a bit less than that, as we've found a less expensive way to mail them and are happy to pass the savings on to our out-of-country subscribers and readers.

We hope you will agree that SitG is worth 50 cents more per copy now than it was two years ago, and we promise you that we will continue to work hard to keep SitG the kind of magazine that has you waiting at the mailbox for every issue.

Happy Steaming!

Ron

Vol. 4 No. 5 Issue No. 23 July/August 1994

Articles

- 20 ... Loco Review--
Argyle's SPC No. 3
Gary Broeder
- 24 ... Build Your Own Gas Burner
Charlie Mynhier
- 28 Dunkirk --a Little Different
Larry Herget
- 31 Maxitrak Garden Railways
John Masters
- 32 ... Packing Trains For Travel
Jim Grummons

Departments

- 5 Editorial Comment
Ron Brown
- 6 RPO - Letters
- 7 Adventures on the
Castle Pacific
Rick Drescher
- 9 What's New?
- 10 The Steamchest
Marc Horovitz
- 14 The Fitter's Bench
Crankpin
- 18 Gazing Into the Fire
Peter Jones
- 19 R/C Tips & Hints
Ron Brown
- 27 Bubble...Out of Plumb
Anonymous
- 30 Letters From
The Old Curmudgeon
Gene Rutkowski
- 34 Steam Scene...Along the Rails
- 43 Swap Shop
- 45 Calendar of Events
- 45 End of the Line
Ron Brown
- 45 Advertiser Index

Steam in the Garden magazine

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Salem Steam Models, Brynglas, Salem, Llandeilo, Dyfed SA19 7HD
or

Brandbright Ltd., The Old School, Cromer Road, Bodham, Near Holt, Norfolk NR25 6QG - phone 026-370-755, FAX 026-370-424

Items for review may be mailed to P.O. Box 335, Newark Valley, NY 13811 or sent via UPS or Federal Express to 6629 SR 38, Newark Valley, NY 13811.

Questions or comments? Phone us at 607-642-8119 - before 9:00 p.m. Eastern time, please - or send a FAX anytime at 607-642-8978.



R P O Mailbag

Letters from all over

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. 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.

* * * * *

Republic of Ireland

Dear Ron,

Further to our telephone conversation last night, please find enclosed a U.S dollar cheque for renewal to SitG.

As I mentioned, I am very keen to see a series of articles of building one's own steam engine as proposed by CRANKPIN. I enjoy his articles.

All the best from an island that is finally starting to dry out after the wettest winter on records -- time to get out in the garden again without a boat.

All the best from all here,
Finbar O'Connor

Somewhere in England

Ron,

Just a quick note to thank you for mailing my copy of SitG by 1st class mail! One reason that I like to get your epistle while it is still warm is that it gives me a chance at some of the Swap Shop advertisers (such as your ad) hopefully before everything is snapped up. Find enclosed a check for the extra postage and one of the Caterpillar tractors that you are selling!

I've also included a photo of my "other" garden railway -- 50 feet X 3-1/2 inches. Remember the little cartoon on the front covers of Tom Cooper's magazine? "Little Engines -- Bigger Engines..."?

Thanks again, perhaps I'll see you in Denver at the National in August.

Don Beach

Ontario, Canada

Dear Ron,

For some time now I have been trying to find a copy of your magazine to see what it has to offer. I was finally able to purchase a copy last week while at Niagara Hobbies in Buffalo, and was quite impressed by what I saw.

I am close to completing the "Project Locomotive" from the plans put out by the Gauge 1 Model Engineering Society in England, but have been hoping to build another which would be more prototypical of American-style locos. On reading what the future articles are supposed to be covering, I am enclosing a money order for a 1-year subscription.

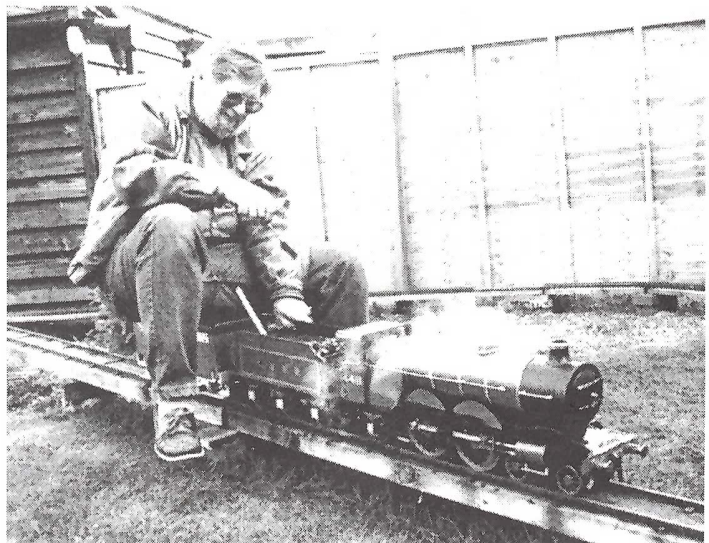
Yours sincerely,
George M. Cockburn

9170 E. Bidwell St.
Temple City, California 91780

Hi Ron,

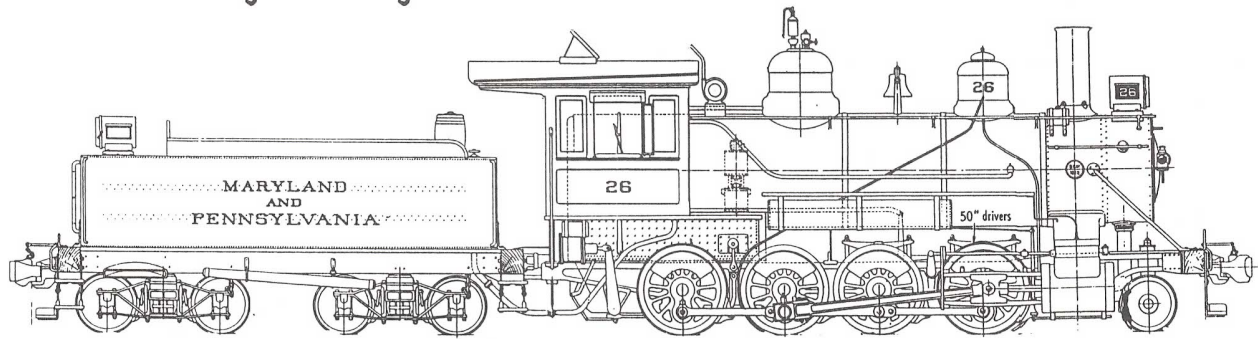
I'd like to meet some live steam enthusiasts (16mm, gauge 0 or gauge 1) near my area; LA County or nearby. You have my permission to include my name on the "junk mail" list.

Sincerely,
Dorian Nakamoto



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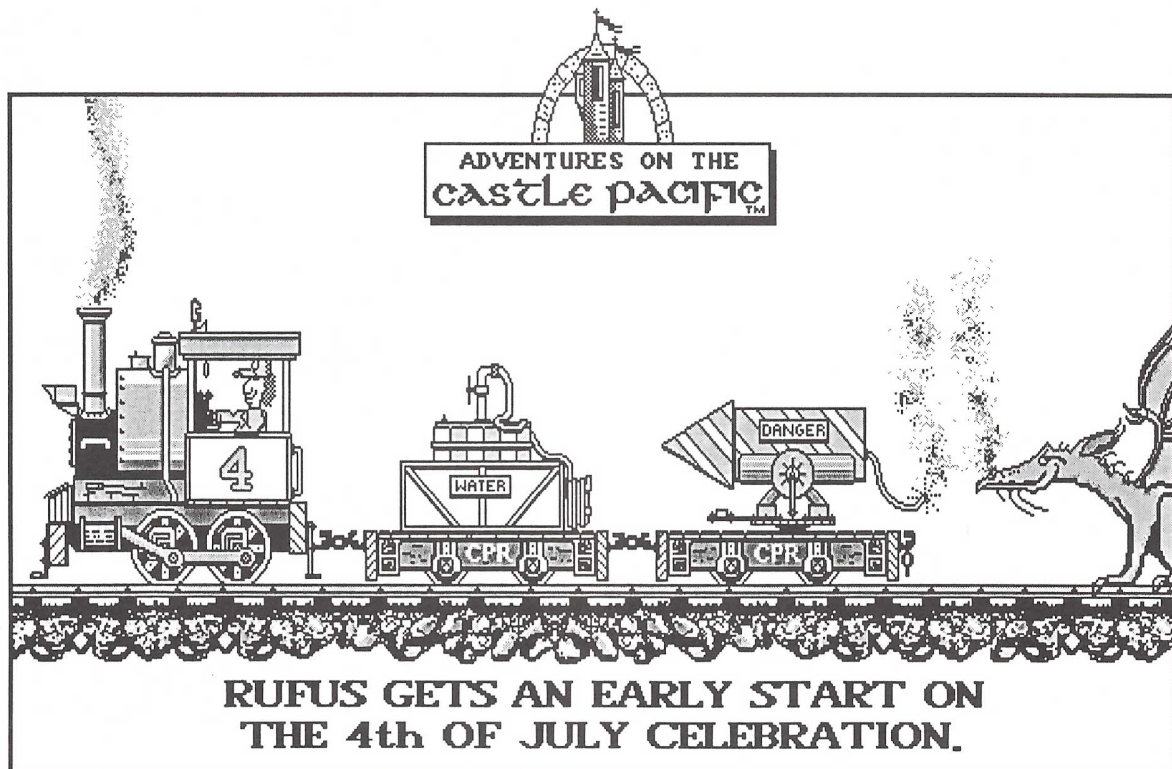
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ROUNDHOUSE

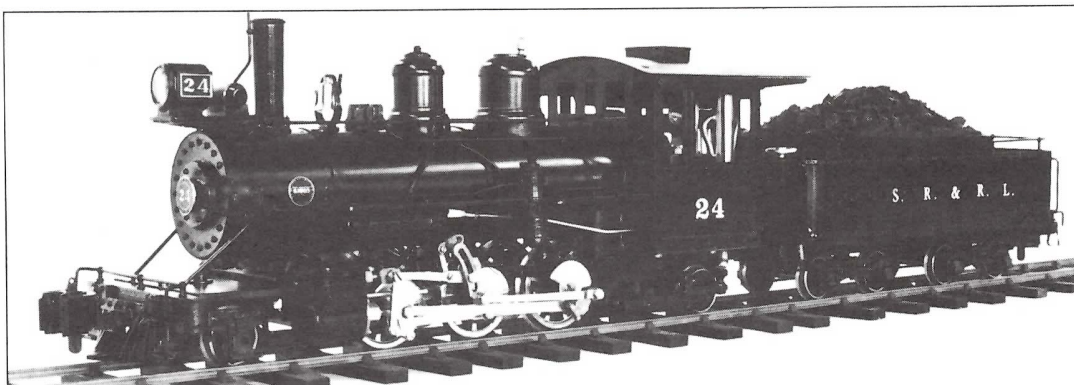
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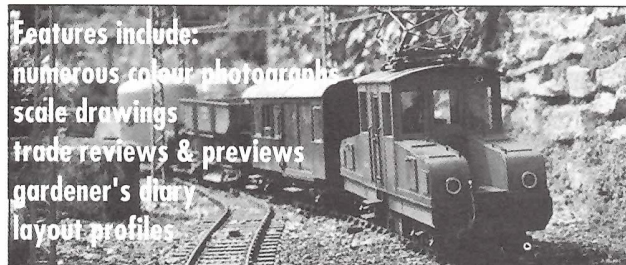
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WHAT'S NEW?



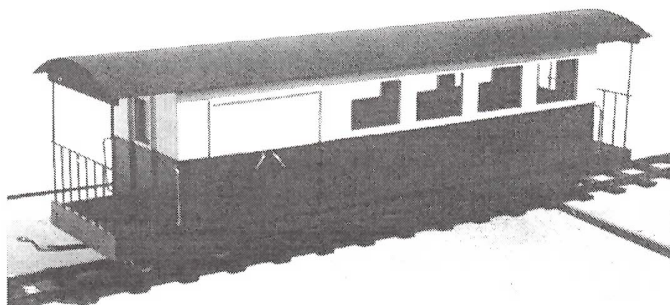
Berkeley Locomotive Works, 2821 Hillegass Ave. No. 22, Berkeley, CA 94705 -- phone 510-849-9284, now has available a nifty little valve, suitable for use with steam, water, gas or air. Our review sample is a two-part inline valve, precision machined entirely of brass and with an O-ring on the needle portion of the valve. The fixed end of the valve is provided with an inlet pipe 5/16" long and threaded 8-32. This could be screwed into a bush soldered into a fuel tank or a boiler, or it could be used to mount the valve to a flange, deck plate, etc., using a nut. The valve is available in 3 configurations: a plain valve (5.00); valve with a 3/32" copper tube 1" long (\$7.00); valve with a 3/32 or 1/8 union (\$10.00). These are very nicely made valves that can be used in a variety of applications.

Garich Light Transport, 14582 Aspen Circle, Huntington Beach, CA 92647 -- phone/FAX 714-893-6540, continues to expand its already extensive large scale indoor/outdoor track line with Dual Gauge Escape and Dual Gauge Transition track sections. These units, engineered and manufactured in the USA, are designed to complement GLT's previously introduced *dual gauge* (Gauge 0 & Gauge 1) FREEDOM FLEX six foot track sections. In common with all previously announced track components, GLT's newest offerings make use of standard proprietary components and are completely interchangeable with all previous offerings.

The **DUAL GAUGE ESCAPE**, which contains no moving parts, is designed to provide an "escape route" for Gauge 0 rolling stock, utilizing the 32mm portion of the dual gauge track. They are available in both right and left hand configurations and utilize GLT's standard #4 frog (14-1/4° angle). Ties are individual solid engineering plastic units fastened to the rails with hand set stainless steel spikes. Tie size, wood grain and coloring match other GLT production items. Future production will also include units based on #6 frogs (9° angle).

GLT's **TRANSITION TRACK**, which also utilizes individual solid ties and stainless steel spikes, is a 4 rail component designed to offset the 32mm track sections between the standard 45mm rails or allow free passage of wider gauge trains. One common use for this unit is in reverse loops, where the return curves move the offset narrow gauge (third) rail section from above the track center line to below the track center line. The transition from above to below the center line is facilitated by two offset and moveable point rails, similar in concept and action to the moveable portions of a common turnout. GLT's TED'S PET switch stand, Del-Aire Products air motors or any of the other popular turnout activating mechanisms may be easily installed on this unique and functional piece of specialized trackwork.

LOCOMOTION, 88 Berrington Road, Nuneaton, Warwickshire, CV10 0LE, ENGLAND -- phone 011-44-203-392277, has just announced a new addition to their steam-powered railbus range. It appears to be an open vestibule combine, but other than a price of £80.00 (plus postage), we have no further information at this time. Send two \$1.00 bills for details of the full railbus line and LOCOMOTION's other products to the address above, and please mention that SitG sent you.



J.M.G. Hobbies, P.O. Box 960, Port Ewen, NY 12466 -- phone 914-338-0817, has ISOBUTANE in 6.5 oz. cannisters and Propane/Butane mix in 7.8 oz. cannisters. These are new cans with the European double skinned valve, which is designed to keep the fuel in the can until you want it out. Call for prices.

Precision Products, 763 Cayuga St., Unit #2, Lewiston NY 14092-1724 -- phone 716-754-2997, announces 2 new additions to their already extensive line of plastic veneer sheets. The new additions are 1/2" scale 6" V-Groove Siding and 1" scale Tile Roofing. This brings the number of PV sheets to 20 different styles in 1/2" scale and 13 styles in 1" scale. More good news is that PP has lowered their prices on plastic veneer sheets to \$7.00 each.

The Steamchest

by Marc Horovitz

Alcohol Firing

Alcohol - or meths, or spirits, as it's called in Britain - has been used to fire small-scale steamers since the dawn of time as we know it. Any type of clean-burning alcohol can be used, although methanol is most commonly used in the USA today. Pure grain alcohol (like Everclear) has been used successfully in engines (as well as their drivers), as has denatured alcohol (engines only). If the fuel burns dirty, though, several things can happen. Your engine's beautiful paintwork will become besmirched and noxious smoke will be let into the air. Perhaps more importantly, though, soot will build up on the underside of the boiler, eventually cutting down thermal efficiency to the point where the engine just won't go.

BURNERS

The usual type of burner for both internally and externally fired engines is the standard wick burner (or spirit lamp, in Britain). This is nothing more than one or more vertical tubes containing some material to act as a wick. The wick, through capillary action, draws the fuel up from the bottom to where the fire is, on top. Alcohol is stored in a tank, usually as far from the fire as possible, if you are relying on gravity alone to supply the fuel to the fire, the upper level of the fuel contained in the tank must be below the height of the top of the wick tube. Otherwise the fuel will overflow the wicks, causing a great fire and your friends to smile behind their hands.

If it is more desirable to raise the fuel reservoir, a secondary control system must be employed. This is most commonly done through the use of a chicken-feed system, although I do have a gauge-three engine that carries a quart or so of meths in its tender. There is a simple ball valve at the forward end that allows the alcohol to simply drip into an open sump connected to the burner. The idea is to open the valve just enough that delivery exactly equals consumption. Good luck.

The chicken-feed system is simple and elegant. It utilizes two tubes (see sketch), a vent tube and a delivery tube, built into an elevated storage tank. The tank itself is airtight. Both tubes extend below the tank into a sump. There is a valve on the delivery tube that must be closed when the tank is filled. Otherwise, all the alcohol will run out, flooding the burner. When the tank is full, the airtight filler cap is replaced, and the valve is opened. Fuel flows through the delivery tube into the sump. The fuel level in the sump raises until it engages the bottom of the vent tube. This creates a vacuum

lock (since no more air can enter the vent to displace the fuel flowing out of the tank), shutting down the system until the fuel level in the sump drops, clearing the vent, which once again allows fuel to flow from the tank into the sump.

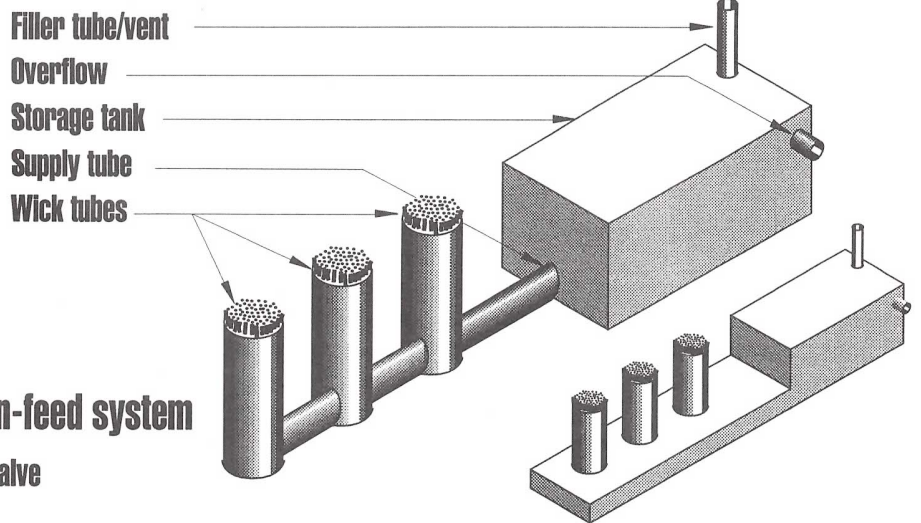
I was at a steamup recently where there was a chicken-feed engine that was having fuel-flow problems. Evidently, the fuel tank had been overfilled, and some fuel had entered the vent tube. The very small amount of surface tension of the fuel within the tube bound up the whole system. This was a lesson in just how small the forces are that make this system work. Once the vent tube was cleared, everything worked normally.

There is another type of burner that sees little use these days, and that is the vaporizing spirit burner. Bassett-Lowke used this type of burner in its 0-gauge locos, and may have used it in larger engines as well (does anyone know?). This burner has a fuel tank that communicates with a wick tube via a feed tube in the usual way (see drawing). The wick is fully enclosed within the tube. Atop the wick tube sits the vaporizer, little more than a hollow tube perforated with tiny holes. There is a secondary, small wick tube - the pilot - that is exposed beneath the vaporizer. It is the job of the pilot to heat the vaporizer. Alcohol boils at a very low temperature, so it doesn't take much to make it vaporize. As the vaporizer heats up, fuel is drawn up through the large internal wick. As it warms, it turns to alcohol vapor, filling the vaporizer tube and finding its way out the holes. When ignited, the result is a large number of tiny, intense blue flames. This type of burner can put out a lot of heat. Its great downfall is that it is exceptionally susceptible to the slightest breeze, and must be very well shielded to perform properly. Bassett-Lowke's engines weren't, and so would only work well on calm warm days. Aster, with its BR-86 2-8-2, solved the problem, and came up with an engine that performs quite well in most weather.

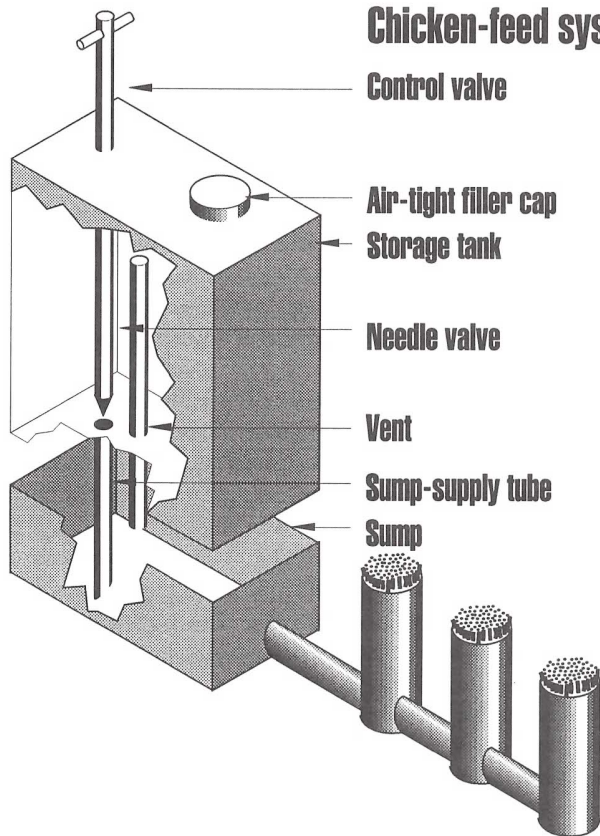
There is one other type of alcohol burner that bears mention here, and that is the pressurized spirit burner. Victor Shattuck, a pioneer American live steamer from the 30s and 40s, developed one to run his gauge 3 locomotives. Aster also used one to power its marine boilers.

This unit requires a storage tank, a preheater, a feed tube, and a burner, often in the form of a blow torch. The alcohol, as it flows from the tank into the feed tube, is preheated, causing it to expand and slightly pressurize the system. When it gets to the burner, the vaporized meths is coming out with some force and, when ignited, produces a powerful flame. You'd need a boiler specifically designed to run with this

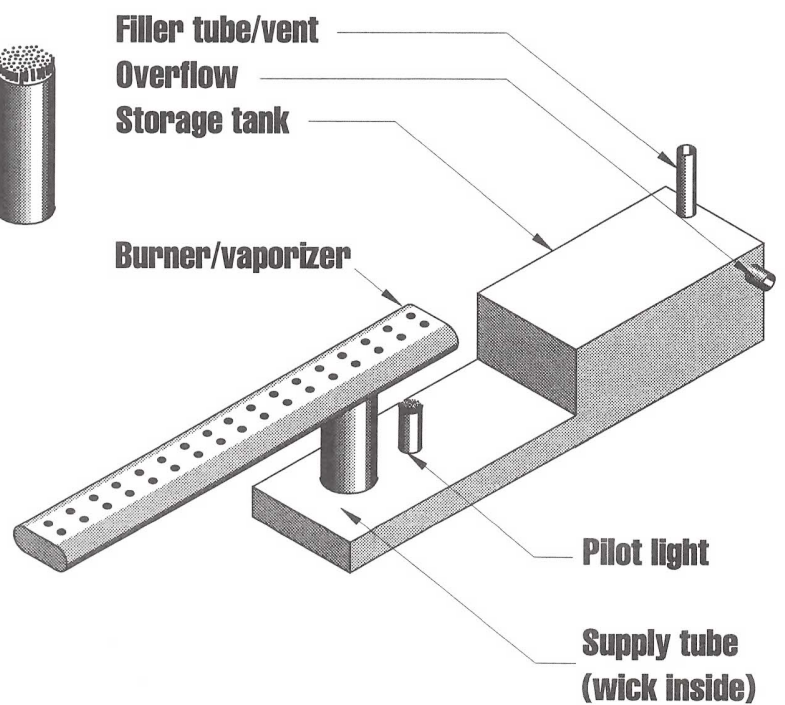
Basic alcohol-firing system



Chicken-feed system



Vaporizing spirit burner



type of burner for satisfactory performance. Because this burner tends to be large and somewhat cumbersome, it sees little use in small-scale locomotives.

BOILERS

Alcohol can be used to fire most types of boilers, including pot boilers, Smithies, locomotive type, Wrighton, JvR types B and C, and others. It is generally not well suited to single-flue boilers intended for gas firing, though this type of boiler could be served by a vaporizing spirit burner.

The size and arrangement of the wicks must be tailored to the size and type of boiler in question. I've an engine that runs quite nicely on a single 1/4" diameter wick, while another requires six wicks. Archangel is famous for (among other things) building large engines that ran very well on a minimum number of wicks.

An integral part of an alcohol-fired system is the firebox or combustion chamber. Enough outside air must be allowed in to support combustion, but not so much that it cools the fire. This is a delicate balance, and if you are scratchbuilding an engine, you'll most likely have to do some fiddling with baffles, deflectors, firebox sides, etc. to achieve the best balance.

WICKS

Wicks can be made from a variety of different materials, including asbestos, cotton, or ceramic fiber or fiberglass. Asbestos yarn is the traditional one, but history has taught us not to play with asbestos. There are, however, still quite a lot of engines out there that use this material, and I believe some are still being supplied with it. Asbestos can be safely handled if a few precautions are taken. Science seems to have proved that it is airborne asbestos fibers that are the main offenders, so the idea is to eliminate them. Soaking the wick material in meths or water should effectively keep loose fibers in place. As additional precautions, you could wear gloves and a mask. Make sure the strands don't dry out while you are using them.

Cotton can also be used as wicking. I used it in the Mamod burners I used to make before I discovered fiberglass. I bought flat kerosene-lamp wicks, cut them to length, and rolled them to fit tightly in the wick tube. Alcohol burns at a lower temperature than cotton, so as long as there was fuel in the tank, the wicks would last a while. The problem came when the fuel ran out and the cotton fibers themselves began to smolder, causing the wicks to disintegrate pretty quickly, necessitating frequent replacement. This can be a tiresome task, especially if the burner is difficult to get to, so cotton is not often the best alternative.

Ceramic fiber and fiberglass yarn – two similar materials – seem to be the products of choice today, nontraditional though they are. I use fiberglass yarn in most of my engines. I buy this in the form of a braided fiberglass rope sold for use as caulking around fireplaces, wood-burning stoves, and other

high-heat applications. When the material is unbraided it yields a yarn made of fine, thin fibers that make excellent wicks.

Other materials can be used. I've heard of people getting good results from tightly rolled fine screen mesh, either brass, bronze, or stainless steel. I've also heard of stainless-steel wool making good wicks, though I've never been able to find this material.

WICK PACKING AND TRIMMING

There is a great deal of unnecessary mystery about getting wicks packed properly in their tubes. In essence, you want them to be packed freely enough to allow the proper flow of fuel. If they are too loose, though, the flames will leap wildly and you may see fire above the vents on a pot boiler. If too tight, the fire will be starved. It is a matter of trial and error.

Asbestos must be packed more loosely than fiberglass. There are so many tiny strands in fiberglass yarn that there is a very large amount of surface area to draw up the meths. For this reason, fiberglass must be more tightly packed. Also, wicks closer to the fuel tank should be packed a little tighter than those further away. It is not uncommon for the furthest wick to feel a little hungry during a run. Sometimes a secondary feed tube is run to the burner's more distant outposts.

When packing asbestos wicks, I cut individual alcohol soaked strands, longer than the tube to allow for trimming later, and place them in the tubes. Care must be taken that the strands not be twisted or tightly mashed together, which will restrict the flow.

If fiberglass yarn is to be used, I wrap it around my thumb ten or fifteen turns – whatever feels right – and then push the bottom of the loop down into the tube. With all wicks, it is important that the wick material extend all the way to the bottom of the tube. Otherwise, if the fuel level drops, the wicks will be left high and very dry. When the bottom of the loop of yarn is seated, the top is then cut open with scissors, and the strands trimmed to length.

When the tube feels like it is properly packed (a subjective thing at best), the wicks are trimmed. There is dispute regarding the proper length. Jack Wheldon used to say no more than 1/16" above the top of the wick tube, and this has worked well for me over the years.

There is a fine balance between length of wick and tightness of pack. The flame must be right, and it is the flame that ultimately dictates the length and tightness. An alcohol flame of the proper proportions has a small blue inner cone surrounded by a larger yellow cone. It is the tip of the blue cone that is the hottest part of the flame, so the wicks must be optimally adjusted so that this tip just touches the bottom of the boiler. Too high or too low, and the fire is not working as efficiently as it should.

A lot of time could be spent working with the wick to achieve the best performance. In actual fact, however, there

is a great deal of latitude, and most wicks will run the boilers they are supplied with. What is lost is efficiency. What could be gained by properly tuned wicks is a longer run between fillings and a livelier locomotive.

ADVANTAGES OF ALCOHOL

Alcohol offers certain advantages over other combustibles. It is the fuel of our forefathers, if that is important to you - it should be, since our hobby is built upon traditions, dogmas, and certain inalienable tenets. That towering motivator aside, alcohol is cheap and easy to obtain. Mechanically, alcohol-firing systems are usually simple to build and maintain, making them pretty reliable.

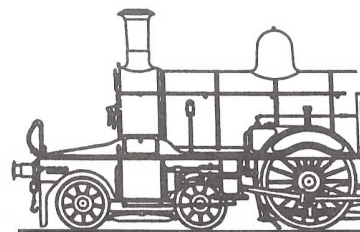
Meths burns silently, so there is no burner-associated noise to the engine. What you hear are pure steam effects. It is also the least hot fuel. The advantage here is that should you be so unlucky as to let your boiler run dry, no serious structural damage to it will occur, as might with gas or coal. The worst you might do is scorch your paint and your pride.

DISADVANTAGES

There are a few disadvantages to this fine fuel. If one tends to be sloppy, alcohol can be messy. It evaporates quickly, but it might take your paint job with it if you've used the wrong kind of paint. A puddle of meths, if exposed to flame, can create a hazard that might not be obvious, since an alcohol fire is invisible in bright sunlight. Many's the time I've watched the wooden ties of my railroad magically blacken under the effects of the invisible fire. Rolling stock mysteriously sinks to the ground as its plastic trucks melt asunder. Hair is seared from knuckles by the unseen flames. It's always a good idea to have a spritzer of water close by.

An alcohol burner cannot be easily controlled mechanically, as can a gas or coal fire, which makes proper wick adjustment all the more important. In some locomotives the flames are so protected and the burner so well designed, that the fire is difficult to extinguish. A spray can of CO₂, intended for blowing the dust off photographs, is a useful accessory. It can be directed down the side vents of pot boilers or down the stack of internally fired engines to do away with the fire.

Make sure you've got the right can, though. I heard a (true) story once about a man (no names today) who off-handedly grabbed a nearby can of WD-40 in an attempt to extinguish his engine's fire. The solvent in this product burns remarkably well, and the fellow couldn't understand the resulting spectacular flare-up. He even gave it a second shot, thinking, perhaps, that he had just misfired the first time. Fortunately there were wiser souls present, and the miscreant was soon shown the error of his ways.



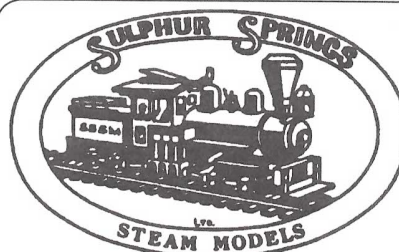
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The Fitter's Bench

by Crankpin

This month I am very pleased to report that several annoying personal and professional tasks which had accumulated during the Winter have now been put to rest. I find to my delight that I once again have several hours each week that are available for Yours Truly to bivouac in the workshop, wherein I can be found applying tool steel to metal from whence cometh piles and piles of chips, and hopefully objects of beauty and usefulness. To paraphrase Robert Browning, "Crankpin's in his workshop, all's right with the world."

In this episode, and the one which will appear in the next issue, I am going to tell you about lathe bearing surfaces, both the revolving and sliding varieties, and why some components of the lathe came to be designed and made the way they are. The underlying theme of this information will actually be our old nemesis Friction, and how we overcome as much of it as possible while retaining rigidity and accuracy. I will focus first on the revolving variety, which would be the spindle and its bearings, followed by a similar article next issue on the sliding ways.

Friction in the Ranks:

There is no perfect lathe design; ALL machine tools designs are intended to provide an efficient response to a specific set of tasks and, with exception of a few machines made for markets where accuracy is the first priority, most common lathe designs must be accepted as a compromise between accuracy, control amenities and end cost. In the amateur's lathe, or should I say those lathes which because of their size, price, or availability are typically found in the amateur's workshop, some amount of structural rigidity (the cornerstone of accuracy) or control has been sacrificed in order to keep the selling price within the reach of its intended market. We should be careful not to think of these compromises as shortcomings or weaknesses but as differences, none of which should prevent us from doing good work if our lathe is in good working order and is used within its intended limits.

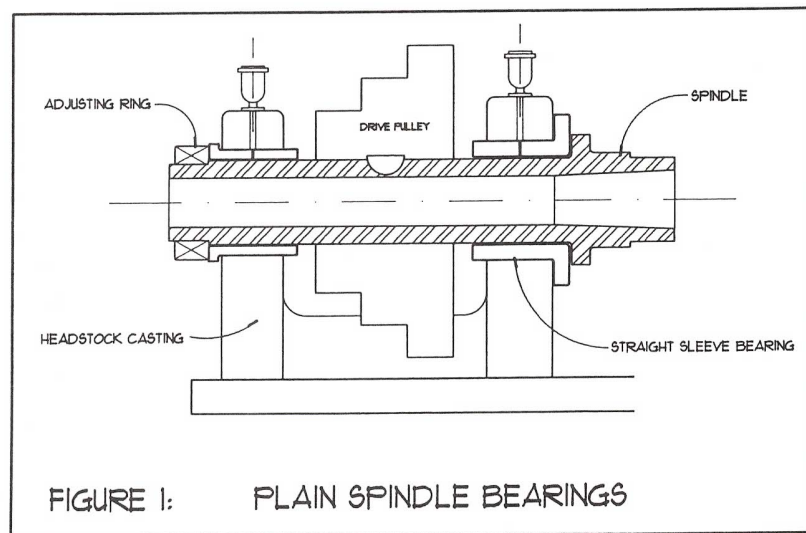
When two materials are placed in contact with each other and have the potential for movement in relation to one another, then a "friction bearing" condition is created. A bit of friction is a very desirable thing to have around, you know, such as between the driver tire and the railhead when you need start a train, or

between the brake shoe and the tire when one needs to stop one. The world we live in could not function without friction; it is friction that keeps the nut on it's bolt and a screw in it's hole.

All of us would agree, however, that in a machine application, where many parts must rub against each other, friction is undesirable. Since friction can never be eliminated (even the finest precision ball bearing has some friction!), one of the challenges for the machine designer or builder has been to develop bearing assemblies that will carry whatever loads are present with the least amount of friction, heat, and wear. All materials have some amount of natural resistance to movement when in contact with other materials and experimentation has proven over the years that certain materials have less friction than others when rubbed together (known as the Coefficient of Friction). In the world of machine tools certain combinations of metals have been found to reduce friction and wear to a tolerable minimum whilst maximizing the rigidity and accuracy of the machine. Let us look closely at a few of these components to see what makes them work the way they do.

Headstock and Spindle Bearings:

If we reduce them to their basic mechanical elements, the lathe headstock and spindle are very little more than a simple shaft supported at its ends by a radial (circular) bearing. These bearings must not only operate at relatively high rotative speeds and within very close tolerances, but they must retain these running qualities whilst resisting the large radial loads



present when the cutting tool is doing its little dance upon a chunk of cold steel, a hostile environment at best. Because they must be made of materials that are strong and resistant to wear, and must be very carefully made and fitted with precision, the spindle and bearings are components which contribute a relatively large percentage to the cost of manufacturing a lathe; this however is money very well spent.

Historically, the most commonly used spindle bearing arrangement for lathes has been the plain bearing, an example of which you will find in Figure 1. The spindle is usually turned from an iron or steel alloy and is set to running in cast iron (yes, cast iron), bronze, or babbitt (white) metal sleeves. The survivors of many years of hard use have proven that these metals provide the best combination of low friction, high load-bearing capacity, and resistance to wear.

Wear is of course inevitable and an arrangement for the take-up of wear in a plain bearing is usually provided in one of two ways. The cylindrical bearing sleeve is often slit along one side and by means of a clamping bolt through a mating slit in the headstock may be taken up by tightening the bolt, thus squeezing the bearing much like a clamp on a rubber hose. The other method is to make the headstock with separate bearing caps which are separated by shim metal, like an automobile crankshaft bearing. When the bearings require taking up, the caps are removed and the shim is replaced with the next size, perhaps 0.0005" thinner. Axial wear is taken up by tightening a threaded adjusting ring at the end of the spindle.

Now for all you nit pickers out there, be advised that on a technical illustration that is faithful in every detail to an actual spindle assembly, you would be confronted with a perplexing array of grooves, rings, steps, pins, seals, and clips of one sort or another. Therefore, the previous illustration and the others which follow have been simplified for clarity...but they do still reflect accurately the working relationships between the spindle and bearing assemblies which they portray.

The next developmental stage of spindle bearing design is the tapered or coned bearing. Figure 2 illustrates a typical

application of this design, which is an opposing cone arrangement where the front cone is formed integrally with the spindle blank and the rear cone is a separate adjustable sleeve. A significant advantage to the coned bearing arrangement was that unlike the cylindrical bearing, all wear, both axial and radial, could be taken up at the adjusting ring.

The coned spindle bearing may be made to extremely fine limits of accuracy, and by the late 1800's bearings of this type had become a permanent feature of the best watchmaker's and instrument lathes, as well as other very high speed and ultra-precision lathes. Many of these bearings were made open, that is without any sort of protective seals, and on some machines a great deal of care is needed to keep dirt and chips out of them and all must always be kept properly lubricated. Although the cone bearing is now rarely found on machines intended for industrial use, two of the world's better model engineering lathes, the Series 90 models by Cowells Ltd. of Norwich and the Series 7 models by Myfords of Nottingham UK (usual disclaimer), continue to employ sophisticated adaptations of the coned bearing in their machines. Although differences in the respective sizes of these machines places them in somewhat different categories of use. Both ranges of machines have a long proven history of faithful service.

The final stage of spindle bearing development came about soon after advances in metallurgy and grinding techniques fostered the appearance of reliable ball end roller bearings in general industry. These bearings were often referred to in those earlier times as the "frictionless" bearing (although we of course know there is no such thing as a frictionless anything!) As a general rule, ball bearings are chosen for applications where the running speeds will tend to be high but the radial load low. Conversely, roller bearings are better suited for applications where the radial load would tend to be high but the rotational speed low. Kept properly lubricated and adjusted, and used within its intended capacity, a roller or ball bearing spindle will last a lifetime.

The spindle and bearing arrangement which is illustrated above is, as I pointed out earlier, modified somewhat primarily to show various part relationships. I don't doubt that there may be lathes in which roller and ball bearings are combined on the same spindle, but in most instances a single type of bearing is selected and the same type used on both ends. In the case of the tapered roller bearing, one bearing will usually be applied to each end of the spindle with the rollers angled as shown, essentially forming opposing cones, and as with the earlier coned bearing, an adjusting ring on the tail end of the spindle will handle any adjustments required. Many manufacturers have gone to fitting roller bearing spindles because bearings of adequate quality for lathe applications are not excessively expensive and they are reliable performers.

Ball bearings, on the other hand, are

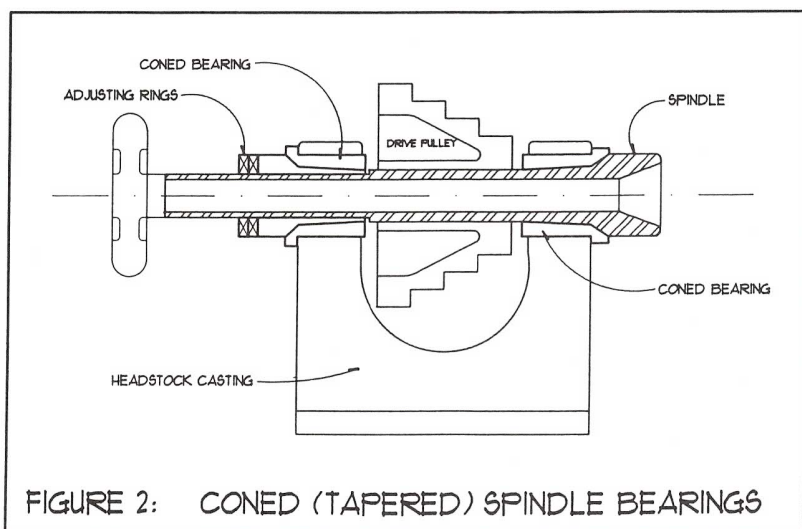
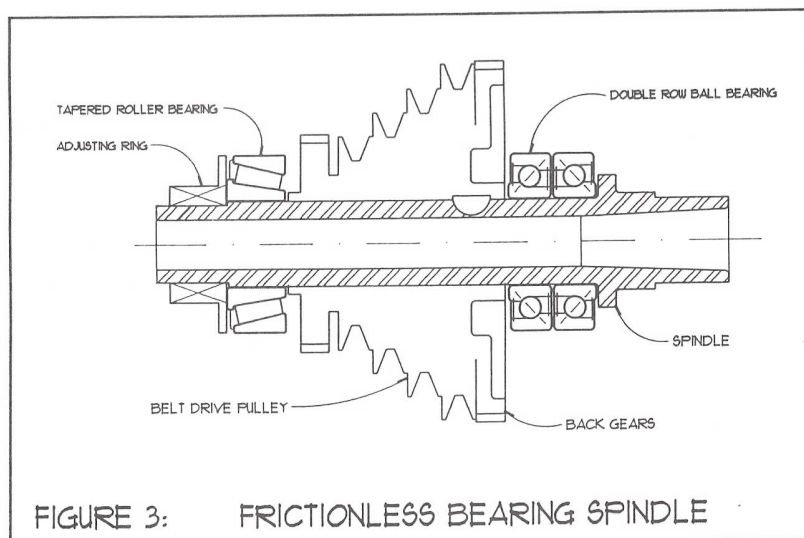


FIGURE 2: CONED (TAPERED) SPINDLE BEARINGS



most often installed in opposing pairs of single row “angular contact” bearings. Figure 3 depicts one set of these bearings in place. The bearings are paired so that each pair has its angle of contact tilted inwards so as to establish the coned condition. Bearings arranged this way may be adjusted against each other, known as “pre-loading”, to obtain the precise running clearances which are necessary for high speed or highly accurate work. This technique further serves to isolate the bearings from the effects of the thermal expansion of the spindle itself. Designs of this complexity, and ball bearings of the precision required for use in lathe spindles, are relatively expensive, quite a bit more than roller bearings on average, and therefore one can expect these machines to cost more.

Every once in a while, when steam curmudgeons gather to discuss such things, one can still hear of disagreements about which bearing is to be preferred for machine tool spindle bearings – ball or roller bearings, or plain bearings. Each one has its advantages and disadvantages, and both will turn out superb work in the hands of a skilled machinist. The arguments for or against one or the other may be like several other things in life, in that we tend to prefer what we get used to, and many old timers (even older than yours truly) have nostalgic preference for plain bearings because that was all that was commonly available in those days. However, the fact remains that the plain bearing is with us still and sentimentality is far from the only reason that it continues to hold its own in a roller bearing world.

For starters, the plain bearing is quiet. Actually, with the exception of the hum of the motor, the hiss of the cutting tool, and the slap of the drive belt, they are virtually silent. Furthermore, when they are properly made, adjusted, and lubricated, plain bearings are thought to be less prone to chatter than the roller or ball bearing, and they are capable of heavy loads, high speeds and very long life. (Chatter, for those of you who are new to these parts, is a harmonic vibration caused by the bouncing of the cutting tool tip against the work, which appears as little ripples in the machined surface.)

Ball and roller bearing spindles, on the other hand, have the advantage of being able to absorb a combination of heavy cutting loads and higher spindle speeds for extended periods of time without maintenance or adjustment. Flip the switch and away you go; topping up the lube oil reservoir on occasion is all that is required to insure trouble-free operation. This is an important advantage in this day and age, since there are precious few of us who know how to adjust and maintain a bronze headstock bearing so that it will continuously turn to within 0.0005" tolerance at 1200–1600 rpm, a very exacting task.

What implications, you might rightfully ask, does all this spindle bearing business hold for me? Probably very little, as far as

the final selection of a lathe is concerned. I know of no one who ever chose a lathe solely on the basis of the type of the headstock bearings fitted. Generally one accepts the machine as a whole with size, condition and price being the primary determinant factors. Yet the headstock and spindle construction can add substantially to, or detract from, the value of a machine, and going armed with the knowledge of what's going on inside will hopefully make you a more informed buyer.

Matters Arising:

In closing for this issue I have a report on the response to my call in the March/April issue for nominations for a future project locomotive. I sense that all the ballots are in but I must say that the response was, in a word, disappointing. There were very few readers who stepped forward with any suggestions at all and a large percentage of those (and I thank you all very much for your thoughts on the matter) seemed to be in favor of something rather on the largish side, such as a 4-8-4! Oy! A bit too optimistic to be of broad interest to a readership whose ranks contain a large percentage of beginners, wouldn't you think lads?

Although our post box will always remain open for your suggestions, the best that I can make of this is that when the time comes I should feel relatively free to choose a subject I like for the project, keeping in mind of course that it should be inviting to both beginner and old hand alike, and appealing to builders on all of the world's shores.



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Gazing Into the Fire

by Peter Jones

Over the last year, the building of the Compton Down Railway has pressed hard on my time, to the exclusion of most else. But the long monotonous jobs give opportunity for the little grey cells to churn over. So when the opportunity presents, I have a wodge of ideas to play with in the workshop.

One line of thought has been into building the typical American Tee boiler. There is a vertical firebox and a horizontal boiler projecting. What triggered off the ideas was staring at what we here in the UK call a reducing tee piece: a copper fitting as per the diagram. It is freely available in small sizes for domestic plumbing, but can be had to special order from an industrial supplier. A tee piece available for the home might have a larger diameter of, say, 22mm and a smaller diameter of 13mm. Because of the cheapness, this is useful for a bit of home experimenting before going on to forking-out for an industrial 3" to 2" reducer.

My mind drifted back to the Mamod model traction engines. There is a plain metal box at the rear which contains the burner. This generates enough heat to boil water satisfactorily, even though half the boiler is just sticking out into fresh air, totally unheated. It seemed to me that this might very well convert to a little tee boiler nicely. So a short boiler that would just slide into the horizontal arm was knocked up. And lo, it was good. There was a very satisfactory generation of steam from a simple round spirit burner in the base of the tee piece. I drilled a circle of holes in the base of the tee piece because I reckoned it was kinda right to do so. All was well.

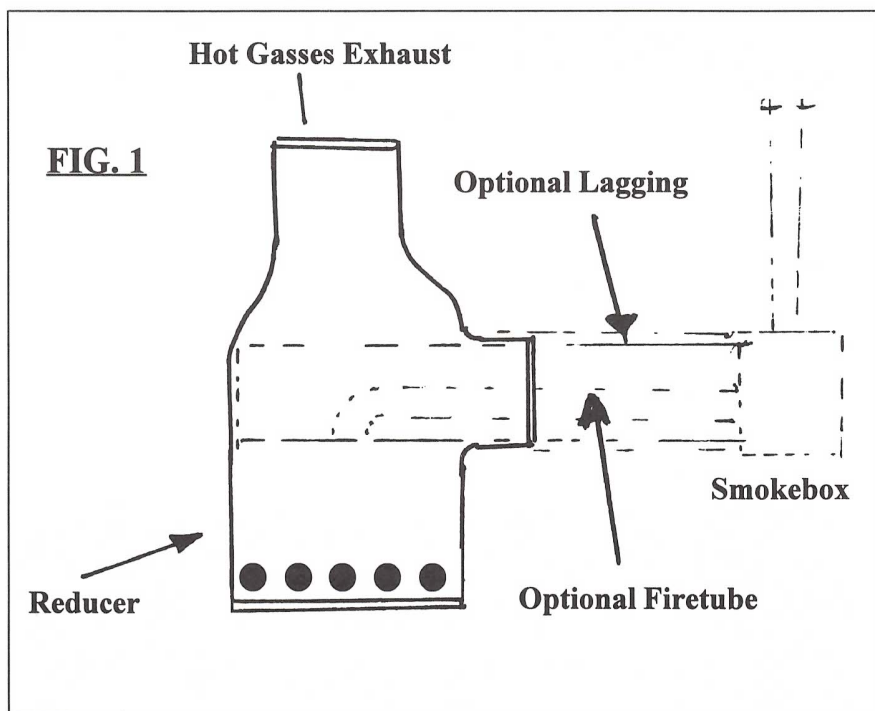
If steam generation had not been adequate I would have put in a single flue tube ala Aster from the underside of the rear of the boiler to the front. The smokebox is just a tight press fit onto the boiler.

Lagging on the boiler is an optional extra, made possible by the fact that the actual boiler is restricted in diameter to fitting inside the horizontal opening.

Needless to say, the firebox gets hot externally. I wouldn't like to put one in an all-timber model of a Cli-Shay whatever. But it appears to make for a good working boiler as-

sembly with the minimum of work and thus worthy of further experimenting.

I now turn to a different boiler altogether. Years ago I wanted a large vertical boiler and was limited to the equipment available to build it. I made the outer shell from a piece of 6" diameter stainless steel tube cuz I had some. Plain steel or copper would have done just as well. I put a top on it with a chimney and clad the thing in stripwood, nicely varnished and held in place with brass bands. Inside this outer wrapper I built a dummy boiler by soldering together a whole nest of



vertical copper tubes that filled as much of the space of the wrapper as possible. Because no tube was bigger than one inch, and because it was joined to its neighbour by cross tubes only half inch diameter, I could hard-solder the lot together with the small blowlamp I had at the time. So I had something that was a cross between a water-tube and a firetube boiler. With its large heating surfaces, it generated steam at a good rate. The only drawback was that the capacity was less than if it were simply a big cylinder full of water. It was powered by a simple single burner gas fired cooker, sold for camping.

I later tried out a variation of this inner boiler when I had a quantity of microbore copper pipe left over from a domes-

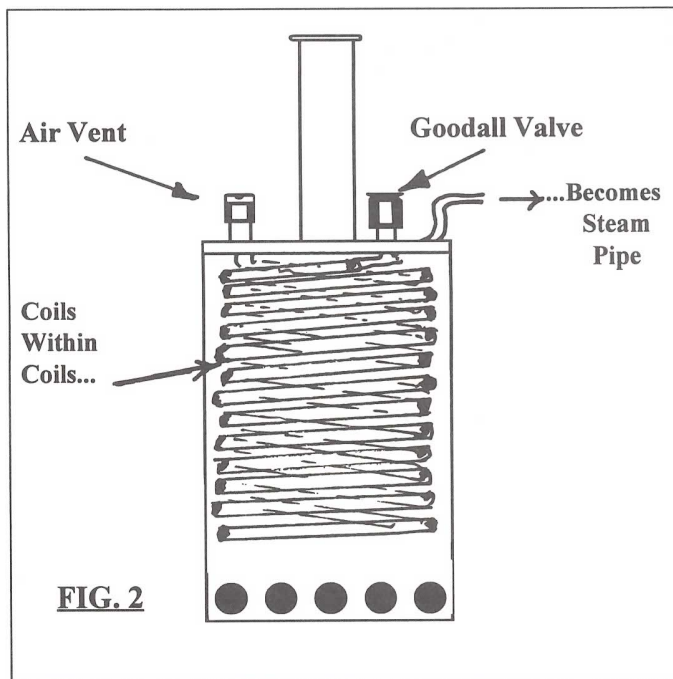


FIG. 2

tic job. I wound this into a lot of tight coils which filled as much of the space as possible. The rate of steam generation was immense because I had built what was, in effect, a flash steam boiler. Capacity was limited as found. For all the boiler was 18" high it would only steam for 15 minutes, until I added a feed pump to the stationary engine it was driving. Filling was difficult until I arranged for an air bleed leg to be added on.

Lately I have tried this on a small scale as a possible alternative for a G scale vertical boiler. The tube was now only 3/16" diameter and had to be filled with a Goodall valve. I arranged things so that the filling and bleeding points were taken off at a separate point from the main coil and that the top of this coil simply became the main steam line to the cylinder.

There was only around 9 minutes running with the assembly I put together, but the Goodall Valve enabled me to keep running more or less continuous. I don't claim that it will ever replace the conventional boiler but it does have the advantage of being very easily built. It's strength comes from the inherent strength of the copper tube itself, and so a complete beginner can make a pressure vessel with confidence. Even if it fails, it would do so at a hard soldered joint and the effect would be the same as opening a valve fully. I know, because I deliberately tested this with a soft soldered joint which I melted under pressure. Again, it all seems worthy of further experiment.



R/C Tips & Hints

by Ron

So you've got a loco that you'd like to fit with R/C, but there just isn't room anywhere to accommodate the receiver, servo(s) and batteries? Take heart! There are some amazingly tiny R/C systems and components available today, and they are very reasonably priced.

Start with your basic 2-channel R/C system by Futaba or any of the other popular manufacturers. Most of them have different size components (receiver, servos), available so look into it before you buy.

If the standard R/C systems don't have components small enough to meet your needs, it's time to look to the after-market specialty companies. As luck would have it, we use the same ground-based frequencies as R/C miniature race cars, so we can take advantage of the huge range of equipment developed for their use.

Novak is one of the companies making specialty items for the R/C racers, and they have a beautiful, tiny receiver (**NER-2X**) that will fit into just about any locomotive -- even the little 16mm gauge 0 Welsh Quarry Hunslets. This is a 2-channel receiver, and Novak also offers a 3 channel configuration. These receivers will work with any of the popular brand transmitters, such as Futaba and Airtronics.

Size of this little gem (in inches) is just 1.10 x 1.28 x 0.53, and it weighs in at .5 oz. List price is \$72.00 and street price is around \$40, which does not include a frequency crystal. Use the crystal from your too-large receiver if you have one, or buy a pair of crystals from your hobby dealer I like to carry crystals for at least two different channels, just in case I go to a steamup and find that my frequency is too crowded.

When it comes to servos for those too-crowded applications, the **Futaba S-133** is the tiniest servo I know of. Street price on the S-133 is around \$28.00.

The last items you might need in the mini or micro sizes is a nicad (rechargeable) battery pack and switch. I've tested battery packs as small as 50 mah capacity, and found that was enough to last for a full day of steaming on a loco with one micro-servo. If your system has heftier power requirements, try a 125 mah or a 250 mah pack.

You can buy nicad packs ready to use, but why not buy the cells and make up your own pack to fit your specific needs and available space? Your local hobby shop should stock quality nicad batteries with solder tabs in many sizes, and also the wire and heat-shrink tubing to make up a pack in whatever size and shape your configuration requires.

Novak offers the smallest ON-OFF slide switch I've seen, period. Another good source for nicad batteries, wire, shrink tubing and mini-sized switches is Radio Shack.

If your loco doesn't have a tender in which to stash the receiver and batteries, get some double-sided servo mounting tape at your hobby dealer and mount them under the cab roof, inside dummy side tanks, against the cab walls or to the cab floor.

Install a Deans base-loaded vertical whip antenna to eliminate glitching and you're ready to enjoy running trains anywhere, even those garden railways with poor access to the track.

The best source for all the items mentioned in this article is your local hobby dealer -- particularly those that cater to the R/C car racing crowd. If you don't have a local source, you can order by mail or phone from GJ's Hobbies, 200 Front St., Vestal, NY 13850 -- 607-754-3003 (usual disclaimer). Ask for Jeff, and tell him *Steam in the Garden* magazine sent you.

LOCO REVIEW

Argyle Locomotive Works South Pacific Coast No. 3 by Gary Broeder

Technical Specifications

Description:	Scale model of a Baldwin Locomotive Works 4-4-0 originally built for the S.P.C. in 1876
Scale:	1:20 (15 mm/foot)
Gauge:	#1 (45mm)
Length:	700 mm
Width:	110 mm
Height:	184 mm
Weight:	5.1 kg
Radius:	2.5 meter (98")
Cylinders:	2-14mm x 16mm (Bronze)
Valve gear:	Stephenson (inside)
Wheels:	Cast iron, all sprung on loco
Boiler:	Silver soldered copper, 40 psi working pressure
Water capacity:	Boiler, 250 ml/8 fluid oz. -- Tender, 250 nil with hand pump
Firing:	Butane gas or alcohol
Lubricator:	Displacement type
Materials:	Frames 4 mm steel -- outer boiler shell and tender shell of .6mm brass -- wood cab and tender frame -- air pump, bell, headlamp, smoke box, cylinder saddle, pilot, valve gear and whistle are brass or bronze investment castings
Couplers:	Link and pin or Kadee on tender -- drawbar on pilot
Price:	\$2620.00
Available from:	Argyle Locomotive Works, 72 Garland Road, Bundanoon, NSW 2578 Australia -- Phone/Fax 048-836-787. In the US call Sulphur Springs Steam Models Ltd., P.O. Box 6165 Dept. RB, Chesterfield, MO 63006 Phone/FAX 314-527-8326. Railway Garden Ltd., 4210 Bridge St. #5, Cambria, CA 93428 Phone/fax 805-927-1194.

The Prototype

Ever since I saw a photograph of S.P.C #3 in Bruce MacGregor's book "South Pacific Coast" (Howell-North, 1967 -- now out of print), I have wanted a model of this fine looking 36" gauge locomotive. That this little 8 wheeler was narrow gauge didn't dictate an austere appearance, quite the contrary. She was delivered to the SPC in 1876 dressed out with wooden cab, polished brass fittings and elegant paint work of carmine (lake) red with gold trimming. The boiler was finished in Russia iron. Number 3 had 12" x 16" cylinders, 42" drivers, and weighed 43,000 lbs in her stocking feet. She started life, as did all of SPC's locos, burning wood and in later years was converted to coal.

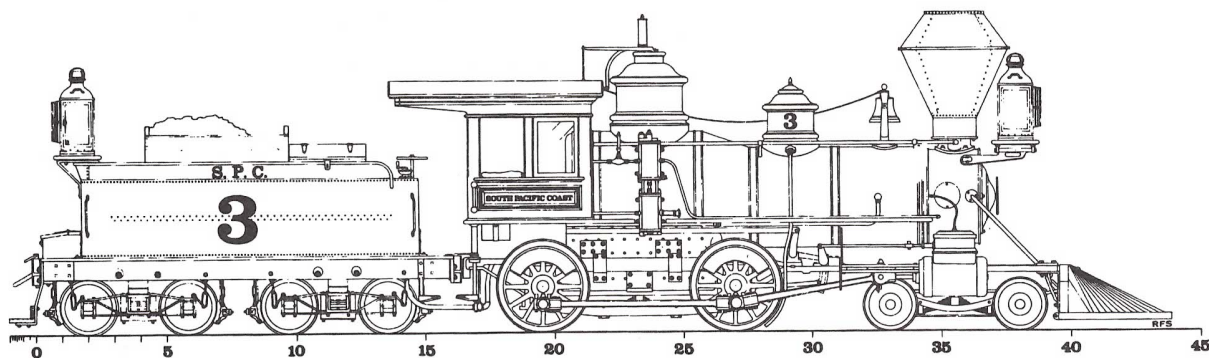
In their 1880's heydays, these Baldwins were at the head end of almost every "express" passenger train running from

Alameda, near Oakland, California, to the beach town playground of Santa Cruz and return. With a typical consist of 6 yellow first class "duckbill" coaches and a baggage car, what a sight they must have been.

The Model

Builder Gordon Watson, of Argyle Locomotive Works fame, has done an excellent job of capturing the look and mass of the prototype locomotive. Detail abounds, from the massive lost wax cast cow catcher and full working Stephenson valve gear between the frames to the real wood framed tender with correct "bent coal scoop" footsteps.

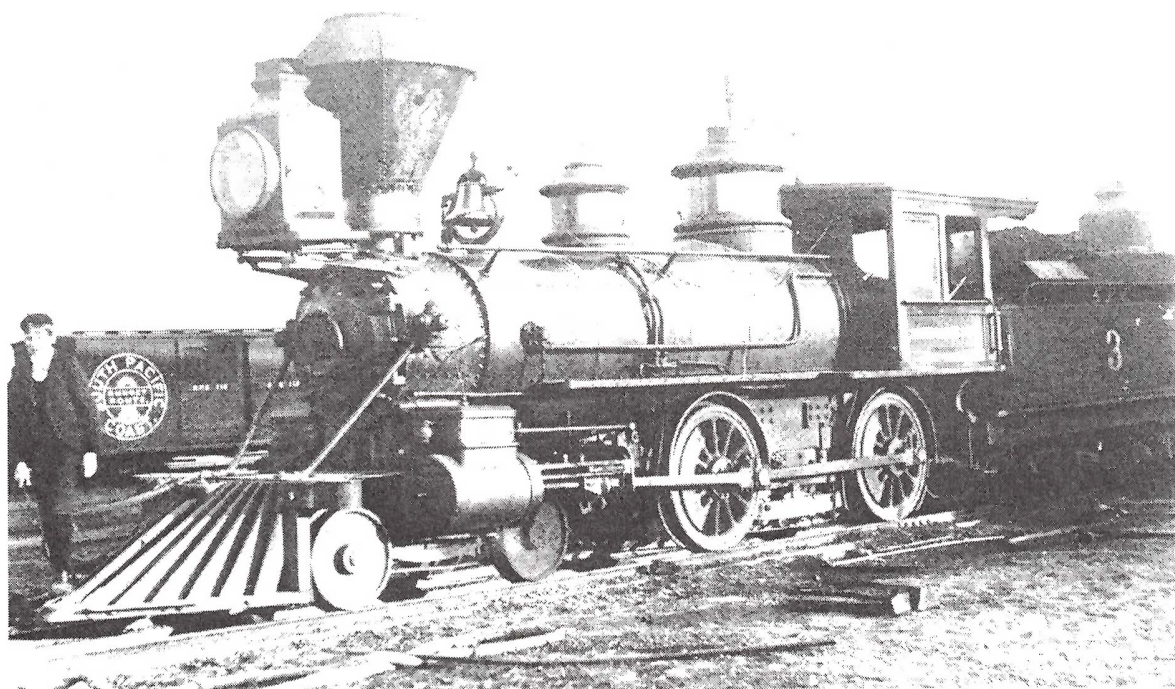
This model loco was built to the scale of 15 mm per foot, or 1:20 scale proportion, for which 45 mm gauge 1 track represents the correct 3 foot distance between the rails. I call



SOUTH PACIFIC COAST RAILROAD No. 3

Built by the Baldwin Locomotive Works in 1876

BLW No. 3971 Type: 4-4-0 "AMERICAN" Weight: 44,300 lbs. Drivers: 42" Cylinders: 12" x 16"



The three spot was one of a pair of Centennial Baldwins delivered to the South Pacific Coast in 1876 -- twenty-two ton machines with 42" drivers designed to burn wood -- that wound up switching hitting on construction trains until the first revenue service began in 1878. They were general service engines, designed for light freight or passenger service, and were among the most graceful engines Baldwin ever designed. They came equipped with solid ash or walnut cabs, deep lake and gold liveries, brass dome casings and cylinder bands. And while most of the original eight wheelers met with severe cosmetic surgery over the years, losing diamond stacks and old style domes, the three

spot miraculously kept her good looks until 1901 (above), when she was photographed at Alameda Point. It was a wonder, considering what the engine had been through.

Affectionately called the "hoodo" after falling through the Webster Street drawbridge in 1890, the Newark shop crews restored the three spot after the engine spent a full week submerged in the salt water of Oakland estuary. Engine crews, from that day on, adamantly claimed they wouldn't run an engine that couldn't swim.

Photo, line drawing and text on this page are from "A Centennial -- South Pacific Coast", and are used with the permission of the author, Bruce A. MacGregor.

it a model because it is just that, a scaled down version of the real thing. And it does measure out very close to the prototype drawings I have. The only major compromise I noticed was that the cylinders were set a bit wide in the saddle to allow the pilot truck enough swing to negotiate an 8 foot radius curve. Sure, it could go around said curve, but it does look a bit awkward and would be wasting power in doing so. The 3 Spot is much happier on a 10 foot radius curve.

The loco is available with a choice of butane or meths firing, and comes fitted with whistle, pressure gauge, and water glass with blow down. The displacement lubricator resides in the cab on the fireman's side, and has a convenient drain that is easy to reach. The throttle is interesting in that it is located on the engineer's side of the cab and swings in a fore and aft arc for opening and closing just like the real thing. I like it!

The butane burner is not too noisy as burners go, but here I must admit I do have a slight preference for alcohol fired locos. They are quite silent, thus enabling one to listen to more interesting sounds, like that of water boiling in the boiler or the lovely hiss of steam from the blower! Although I have never had anything close to a paint-crisping meths fire, perhaps it was the off chance of seeing the lovely wood cab in flames that persuaded me to order this loco with gas firing.

Gordon has earned a bit of a reputation among the live steam fraternity for his ability to artfully transform raw materials into a living, breathing machine. And as with any complex mechanism there is the chance of a screw working loose or a part coming off. I am aware of these things, and so I checked over the loco upon delivery, looking for anything that might cause a problem. Everything seemed fine and there were no steam leaks upon firing up. The loco steamed very smoothly right out of the box, and with it's fully sprung chassis it seems to float along the rails.

I did have one slight problem with a screw coming loose on the second outing. This particular set screw holds the piston rod into the crosshead. In order to tighten it up I had to disassemble the 4-bar crosshead support and remove the bearing pad. This was easily done, though, and the loco was back in steam in about 20 minutes. I had a chance to test the pulling power of the 3 Spot at the National Gauge 1 Steamup in Mississippi this past January and was amazed to see it pull in excess of 20 cars with ease.....on level track, of course.

Number 3 is a powerful, graceful runner, and watching her side rods rise and fall as she glides around the garden is a joy to behold.



NEW!

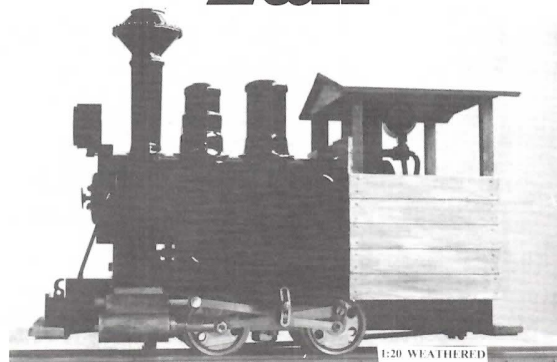
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Build Your Own Gas Burner

Part II of a series

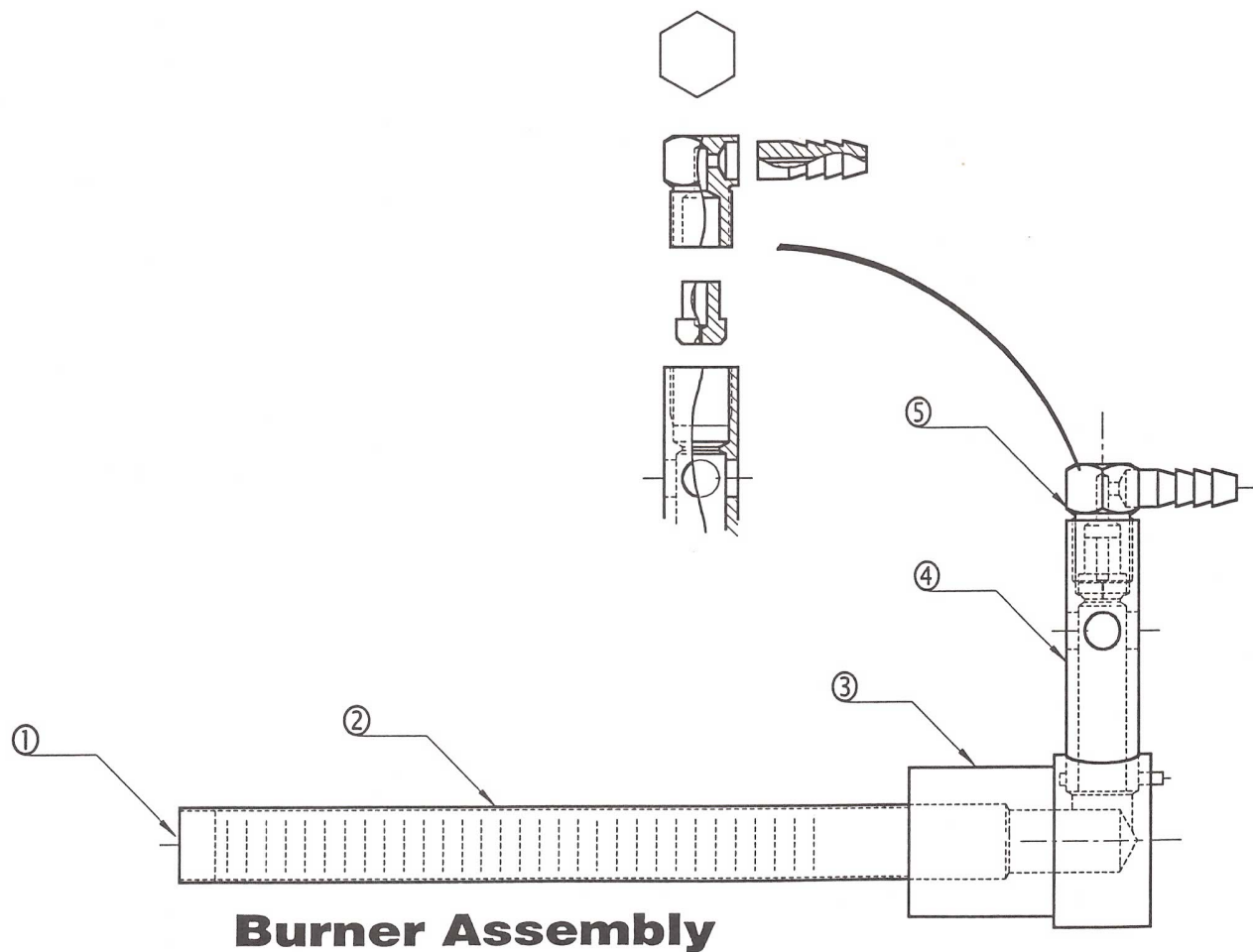
by Charlie Mynhier

drawings by Kathy Hammett

This burner is designed to burn in a flue made from a 3/4" type "L" copper pipe. You may notice the complicated dog-leg shape and decide to re-design it so that everything is in a straight line. If you do, you will run into trouble because of the high pressure of the propane gas. High velocity through the orifice is created by this high pressure, and it will blow the flame right off the burner tube! So we take advantage of the 90 degree turn between part #3 and part #4 to slow down the gas so the flame will settle on the burner tube and it will burn properly.

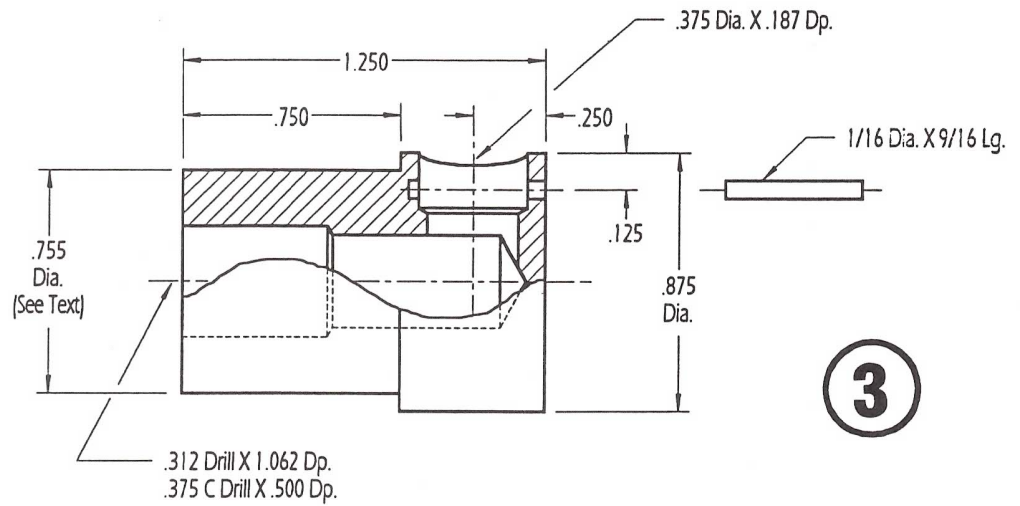
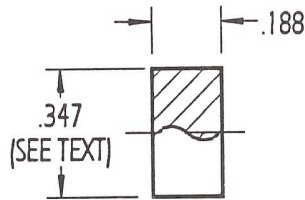
The flue will have one hair-pin superheater in the upper half above the burner tube because this is where the hottest gasses are. We don't want the flame to blow directly on the superheater, so we will put the burner slots on the bottom of the burner tube.

The burner is made from stainless steel and brass tube. Brass could be used throughout if you wish. I spent about 8 hours making a saw fixture for my lathe to cut the .015 wide slots in the stainless steel burner tube. I also spent about 30 minutes cutting the slots with a razor saw in a brass tube, and it worked just as well though

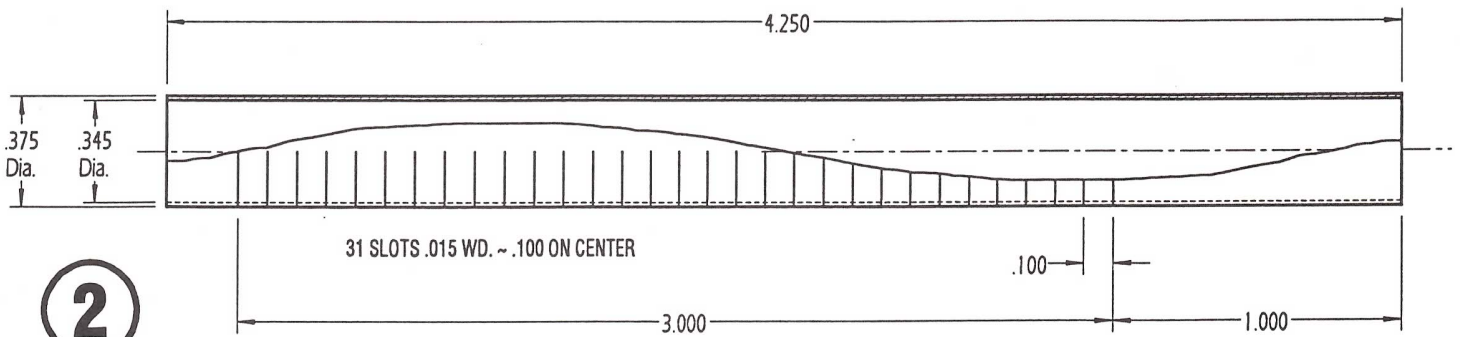


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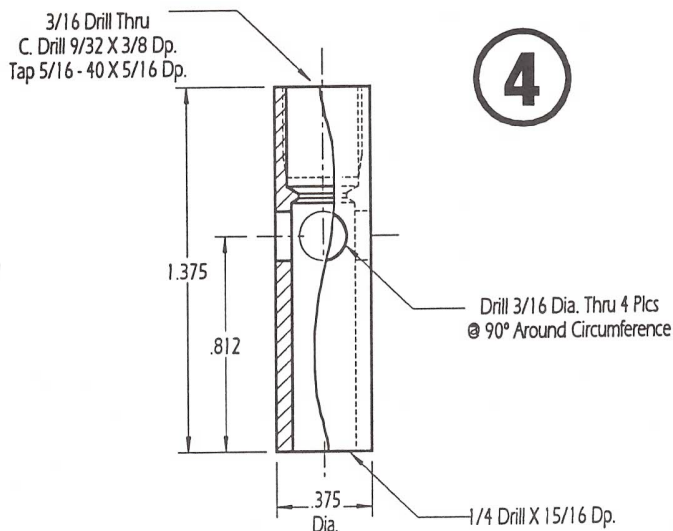
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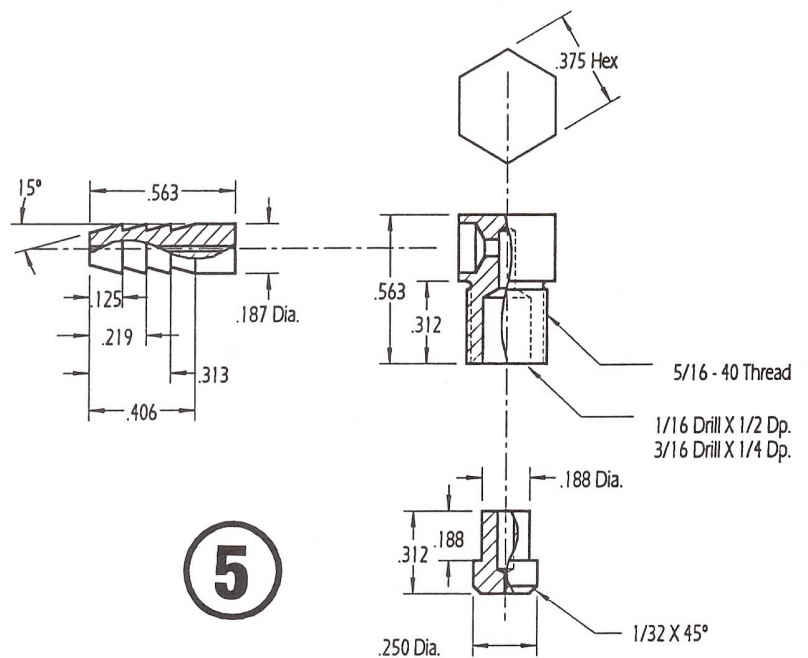
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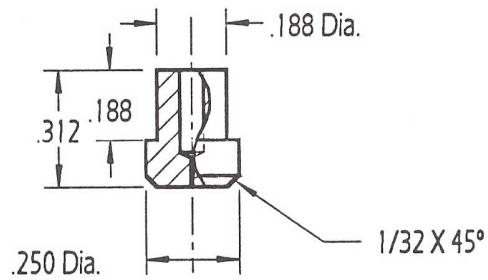
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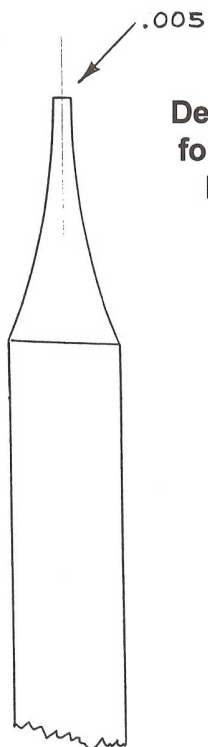
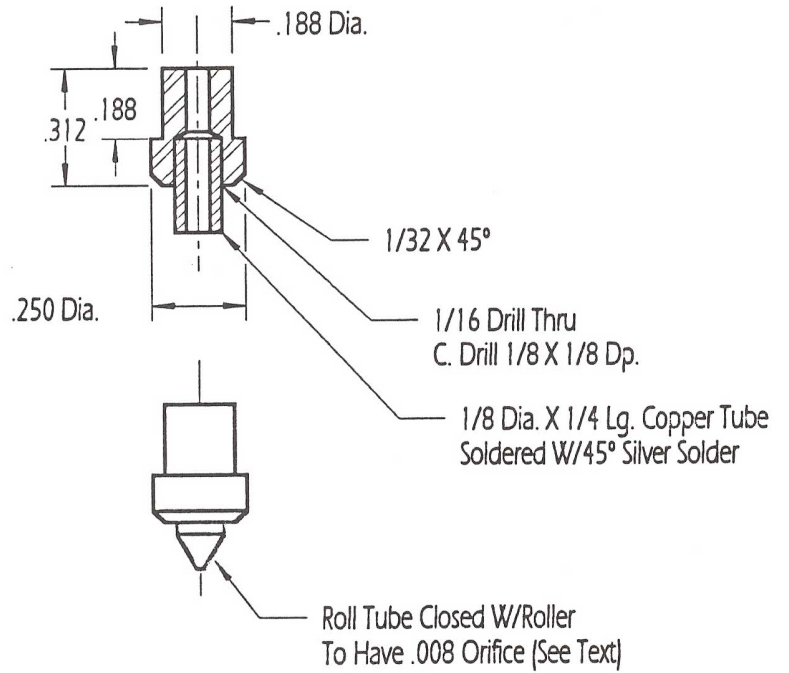
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DRAWINGS NOT TO SCALE

Orifice Option #1

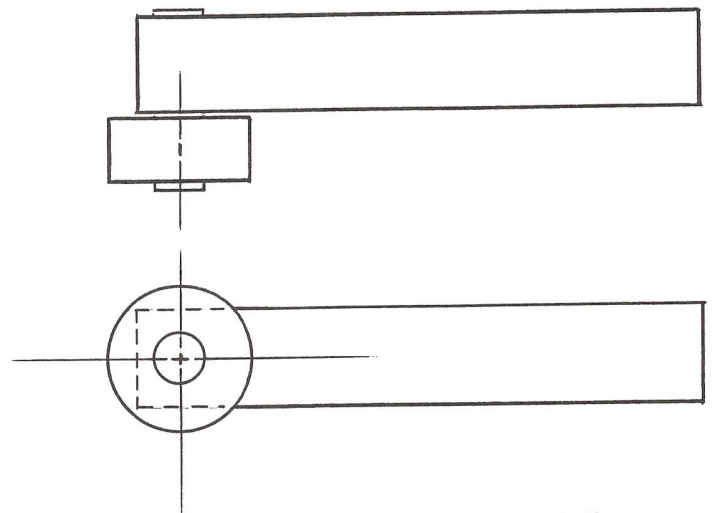


Orifice Option #2



Detail of needle tip
for making orifice
hole in gas jet

(See Text)



Roller Assembly

it did not look as good (stainless steel tube is highly recommended for this part because brass tends to warp in the high heat).

The first thing we need to do is measure the inside diameter of our flue and turn the burner body (part #3) .005 smaller than this measurement. If necessary, adjust the .755 diameter shown on the drawing for this part to suit your own flue tube dimension.

The important thing is the width of the slots, they need to be about .015. I have experimented with wider slots, and found that when the burner gets hot, the fire starts burning inside the tube, producing a loud, ugly, gurgling noise and not producing much heat. I also experimented with drilling lots of holes instead of slots, and discovered that this produces a tube that whistles and screams.

The end plug (part #1) presses into the burner tube (part #2), so it should have about a .002 interference fit. If brass is used for the burner tube, you will need to put a sliding sleeve over the mixing tube (part #4) so you can adjust the air fuel mixture. If too much air is drawn in, the flame will be so hot it will melt the brass. You can check for this condition by examining the slots. They will start to become wider and the edges will become rounded.

About that little orifice – the hole needs to be about .008. This is a #92, or a .2mm, drill. If you can't get a drill this small you can make a roller out of a bearing. Grind a needle with a very sharp point and make your orifice like this.

I used a 1/2" x 1/2" x 3" piece of mild steel, a 1/4" dowel pin, and a 1/4" i.d. X 3/4" o.d. bearing to make my roller. Commercial dowel pins are slightly larger than their nominal size, so a 1/4" dowel pin will press into a 1/4" i.d. bearing. Also, the pin will press into a 1/4" reamed hole. See the drawing for the roller assembly.

The needle is made from a 1/16" dia. x 1-1/4" long piece of music wire. Hold the wire in your lathe or drill chuck and spin it as fast as the machine will turn. At the time, hold a die grinder, or motor tool with a small stone in it, so that the surface of the stone is turning the opposite direction to the surface of the wire. Grind the wire so that the point is .005 dia., as shown in the drawing.

Now that you have made your necessary tools, you can proceed with making the orifice. The body is made from 1/4" dia. brass, as shown in the drawing. A piece of 1/8" dia. copper tube, 1/4" long, is soldered into the body with 45% silver solder.

Now the orifice assembly (or gas jet) is held in the

lathe with the copper tube protruding toward the tail stock, and the roller is held in the tool holder with the axis of the bearing approximately 30 degrees off the axis the lathe. While the orifice assembly is turning, feed the roller into the copper tube, closing up the hole.

Remove the orifice assembly from the lathe, hold it up to the light at arms length, and look through the hole. The hole should look like a medium bright star on a clear night. You see how scientific we are!

If the hole looks like a faint star, it is too small. If it looks like the moon, it is too large.

Take a caliper, or micrometer, and set it on .008. Now push the needle into the gap, and remember how far it went in. Now, while rotating the needle push it into your orifice this same distance. This will open up the hole to the correct diameter. If the hole is too large, then you can put it back into the lathe and close up the hole with your roller. You can experiment with different diameters until you find the one that works best for you.

Soldering the small piece of tube into the orifice body is done like this. Insert the tube into the body and use a tooth pick to spread flux around the tube. Cut a very short length of silver solder (1/16" diameter x 1/32" long) with your wire cutters and use tweezers to place the solder in the corner where the tube enters the body. Set it up on a fire brick and heat with a torch until the solder melts and flows into the joint. There should be a bright silver ring all around the tube, and the job is done.

Next time we'll tackle the boiler!



**STEAM...Just Half-A
Bubble-Out-of-Plumb
by Anonymous**

One of the more fascinating developments in the prototype railway industry has been undergoing trials on the west coast. It's called the California Wonder and, typical of that area, it's Empowered by Self-Esteem...

DUNKIRK

Something a Little Different

by Larry Herget

Geared locomotives are popular with railroaders in all scales and gauges. The Shay, Climax and Heisler each have their fans, and examples of each are on display and running on tourist lines around the country. Small-scale live steamers are just as enthusiastic about geared locos as anyone, and models of each of the Big 3 have been built, and are currently being built, to run on gauge 1 track.

One geared locomotive that has been largely ignored by small-scale live steamers is the DUNKIRK. Larry Herget likes geared locomotives, and he likes to build unique models, and so the Dunkirk was a natural choice for him.

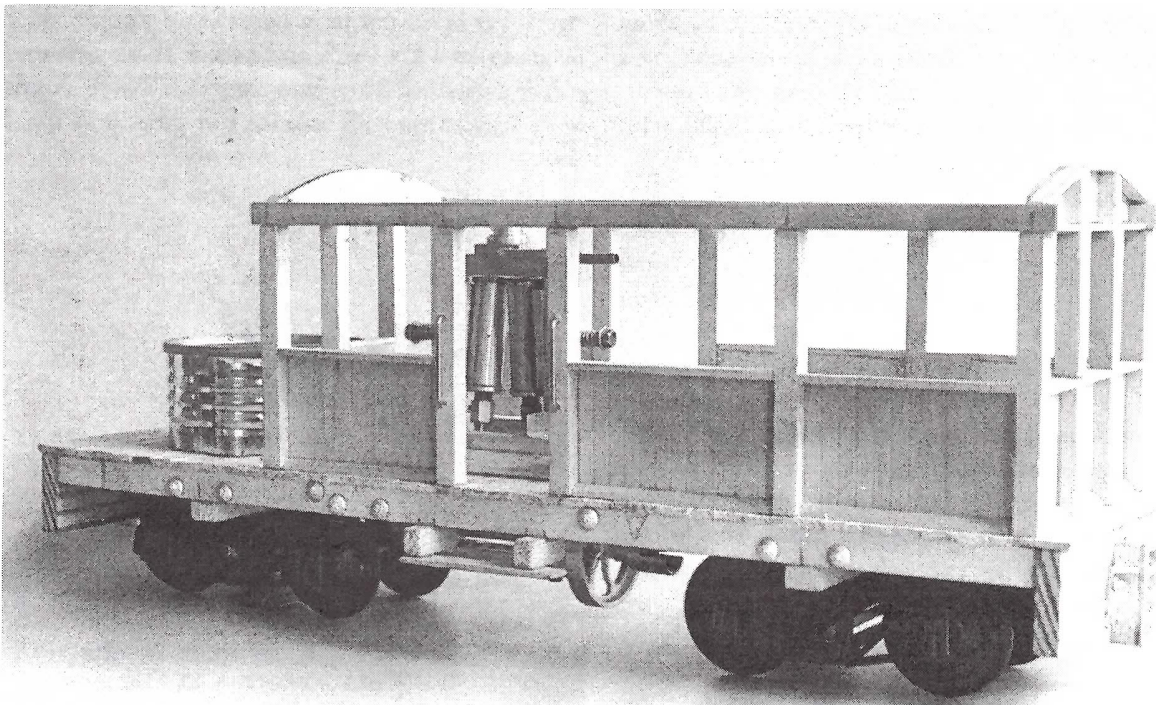
Larry's Dunkirk isn't quite completed yet, but when we saw these photos we knew we couldn't wait to share them with you. Larry has promised that photos of the finished

model will be forthcoming soon.

Everything on this locomotive has been scratchbuilt by Larry, including the 2-cylinder oscillating engine and reversing valve, which was built entirely from brass and stainless steel bar stock.

That tank on the front was formerly a soup can, but is now an alcohol chicken feed tank. Gearing is through Zebco 33™ fishing reel gears for a 3.5:1 ratio.

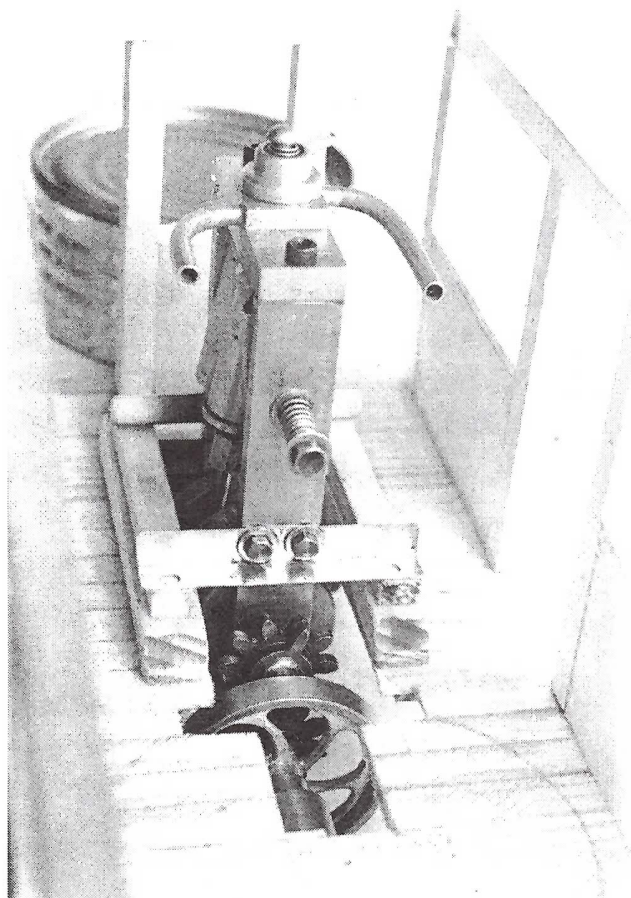
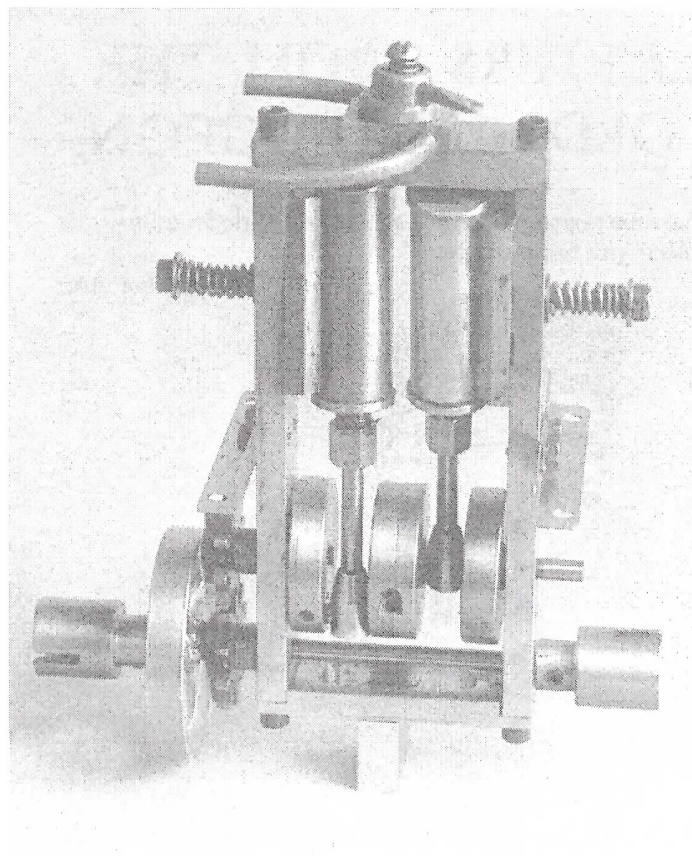
Steam testing is already underway, and it won't be long before this steam locomotive is ready to start hauling logs out of the Ozarks and into the sawmill.



1891 Class A 13-Ton DUNKIRK body with trucks in place and steam engine temporarily in position. The soup can fuel tank is clearly visible in this photo.

Photo by Glenn Owens

Right: Side view of the author's scratchbuilt 2-cylinder oscillating steam engine, with speed control and reversing valve at top. Larry uses an ingenious porting jig to get the steam ports in exactly the right location -- and to maintain exactly the right relationship between the ports, the cylinder pivot and the crankshaft.



Left: Locomotive interior, showing steam engine mounting arrangement. Notice the gear drive from crankshaft to driveshaft, located just behind the flywheel. This is not a reduction drive, but is simply to get the drive shaft lower, so the angle won't be so severe, and hence so hard on universal joints.

LETTERS FROM THE OLD CURMUDGEON

Age loves to give good precepts to console itself for being no longer able to give bad examples.

La Rochefoucauld



The Old Curmudgeon

Dear Gene -

You asked about cutting fluids in your last letter. Well, I usually use dark (sulfurated) cutting oil for everything that I machine except brass and aluminum. This stuff is cheaply available from your local machinist supply store. For aluminum I find that "Tapmatic for Aluminum" works great for both machining and tapping aluminum and leaves a nice finish, too. For brass no cutting fluid is needed, but remember to use "zero rake" tools. I also found that plain old kerosene, the kind used in my shop heater, works as a lubricant/cutting fluid for lots of my machining.

There are lots of ways to use cutting fluids on your lathe or mill, ranging from a simple squirt oil can to more elaborate (and expensive) pumped fluid systems most often found in big production shops. For my work, I rigged up an adjustable holder to hold a small brush in contact with the work to keep it supplied with cutting fluid. My brushes are the cheap type you find in the hardware store which have a handle made of a hollow, rolled tin tube. I fill the hollow tube with cutting fluid and bring the brush down on the work just ahead of the tool. This has worked so well I have stopped thinking of more elaborate ways of doing this job.

You might want to try rigging up a cutting oil feed using those miniature plastic valves and fittings they make for drip feed irrigation of houseplants. Try a sample of the tubing with your cutting fluid first to see if they are compatible.

I don't use the water based cutting fluids. They may be fine for a big shop where cost is important, but getting water on my lathe ways just doesn't appeal to me.

Keep turning -
Marv

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Maxitrak Garden Railways

by John Masters

A look at garden railroading in the larger scales

These days boys usually want to be Pop Stars or Space Men. When I was young it was every boy's ambition to be an Engine Driver. Who could not envy that Giant amongst men, taming his fiery steed like Saint George and the Dragon?

Once hooked on steam in general and railways in particular it is a difficult job to give up. Many enthusiasts enjoy dabbling in model railways while others get a whiff of steam by working on preserved full size lines. There are very few amongst this happy band who manage to drive their own steam engine, emulating the heroes of old. Amongst those who do drive their own locos are the passenger carrying garden railway enthusiasts.

The intrepid railway entrepreneur, having received royal assent for the line from "her indoors", will be looking for track, rolling stock, and above all, locomotives.

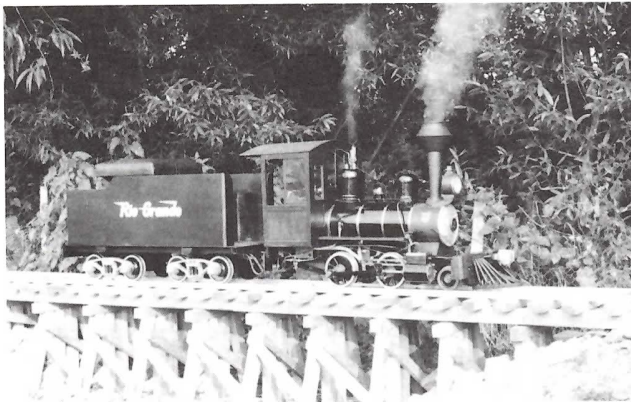
Track is supplied in kits 8 feet long, with aluminum or hardwood sleepers. This works out at a very reasonable price...cheaper than some G Scale track systems!

Rolling stock comes in a variety of types; freight, passenger or 'sit astride' types all being available as kits or in ready to run form. For the more adventurous we can supply wheels only or bogies (trucks) to suit a variety of different vehicles.

This leaves only the motive power requirements to be filled. Like most small full-size railroads, the management will be looking to buy locomotives rather than build its own from scratch.

This means that you will be either digging deep into your pocket for a commissioned "one-off" or chancing your arm on a second hand locomotive. There is a third alternative now becoming currently popular, this is to build from a fully machined kit.

We at Maxitrak have a wide variety of locomotives in various scales and gauges to suit the most discerning Rail-



Li'l JO, a 2-1/2" scale, 7-1/4"/7-1/2" gauge steam locomotive offered in kit form or ready to run by Maxitrak.



A pair of 4-3/4" gauge Maxitrak "RUBY" steam locomotives take on water while their friends queue up behind them at a garden railway meeting in England.

road Customer.

There are British, German, and American prototypes to choose from in "living steam", and a range of battery or gas/hydraulic powered "Diesels" suitable for those occasions when time, weather or youthfulness of the engineer prevents the use of steam.

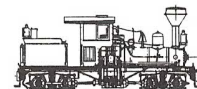
Steam locomotive kits are reasonably easy to build; anyone who has managed simple jobs on the car should be able to tackle one. Once the engine has been finished the motive power department will know what makes the wheels go round and can tackle maintenance or overhauls without any qualms. An added bonus is that when asked "Did you make it?", the owner can quite legitimately say "Yes!"

Diesel engines are easier to build and are quite a lot cheaper than steam, making an economical start for the under-funded railroad builder.

For those who cannot put together a kit for one reason or another, we can supply any locomotive from our range ready to run and painted in the railroad colors of your choice.

Unlike other model owners, the locomotive engineer can experience first hand the thrill of driving his own engine, shovelling the coal and twiddling all the knobs and levers. This is in contrast to the scenic railroad, model car, boat or plane builders who find themselves just a spectator controlling the model from afar. If your idea of heaven is a whiff of steam up your nose and a cinder in your eye, then dive in! There is nothing quite like it.

See our advert for catalogue details -- and happy steaming with the big boys.



Packing Trains For Travel

A Crash Course

by Jim Grummons

This course will not be repeated!

One of the most fascinating aspects of our hobby is the opportunity to display and share our prized possessions with each other at steamups, conventions and such. Often, not enough attention is given to the proper preservation of our trains while "in transit". As we all know, these trains are not cheap, and we must do something to protect our investments.

This fact was forcefully brought home to me recently on my return from the National Gauge One Steamup in Diamondhead, Mississippi in January. A group of fellow enthusiasts from the East Coast used various forms of transportation to attend the Steamup. We thoroughly enjoyed showing and sharing "our toys", were able to receive much helpful information and instructions regarding our trains, met old and new friends and a great time was had by all.

As I had travelled there by car, I was able to bring back many of the steam locomotives and rolling stock in the car. This helped my friends who were returning by train and had limited storage space. We thought everything was packed in well and should arrive safely. As inevitably happens, we were not completely prepared for the unexpected.

Coming up the Coast I was joined by a friend who helped with the driving. Outside of Petersburg, Virginia, when he was passing another car, a pickup truck came up behind us as we were getting back into the right lane. The pickup truck struck our left bumper sending us into the guard rail where we promptly did a 180°, hurtling into the trees in the middle of the Interstate. The 1994 Corsica was completely totalled, and the velocity of the crash caused extensive damage to my cargo and myself. The driver was thrown clear, but had it not been for my seat belt I might today be in a lot worse condition. As it was, my arm was broken in two places, the femur bone in my right leg was cracked, my shoulder dislocated and I had multiple face lacerations. I crawled out the rear window dragging my telephone, then dialed 911 and passed out. When I came to I was laying on the snow covered ground (the temperature was 1° F) and my clothes were being cut off me. Someone was declaring I was dead, but the next thing I knew was being carted off in a cold ambulance. All I could think of was my precious cargo which was in the wrecked car!

Fortunately, the next day I was able to make it to the salvage yard to retrieve that cargo. As it's value had not been recognized it was still intact. As I carefully removed each precious piece the value of proper packaging was made forcefully clear. The trains in custom-built wooden boxes packed internally with Turkish towels or foam for protection sustained no damage. The velcro tie down strap attaching points in one style of box broke



The author's vehicle after the crash. It's easy to see why a proper transport box, lined with dense foam rubber, is not only a good idea, but a very good investment!

Photo by Peter Jobusch

loose, which demonstrated that in the future they should be screwed (rather than glued) to the bottom of the case. Packed in the car along with the wooden cases were cardboard boxes which suffered severe damage. Styrofoam packing helped to provide a crunch zone, lessening the damage to the engines themselves.

The rolling stock, which had less material allowing for a crunch zone, were all damaged to some degree. In many cases the styrofoam itself was not enough for complete protection.

Miraculously, I was able to retrieve and salvage all my cargo, with only one steam engine suffering total destruction. There were some valuable lessons learned from this experience, and I want to pass this information on to SitG readers.

1. *Wooden boxes should be used for transportation. Cardboard is not sufficient.*
2. *A crunch zone area must be allowed for. Turkish towels and foam rubber make good packing material. Styrofoam helps, but is not sufficient in itself.*
3. *Velcro tie down straps help to absorb the shock, but must be securely attached to the case bottom.*

I hope that this crash test will not have to be repeated. If it does, I will be asking for volunteers!



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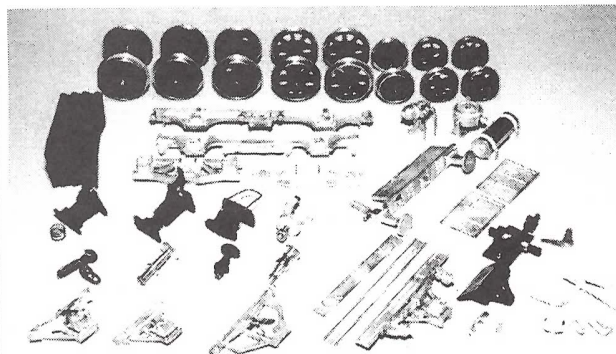
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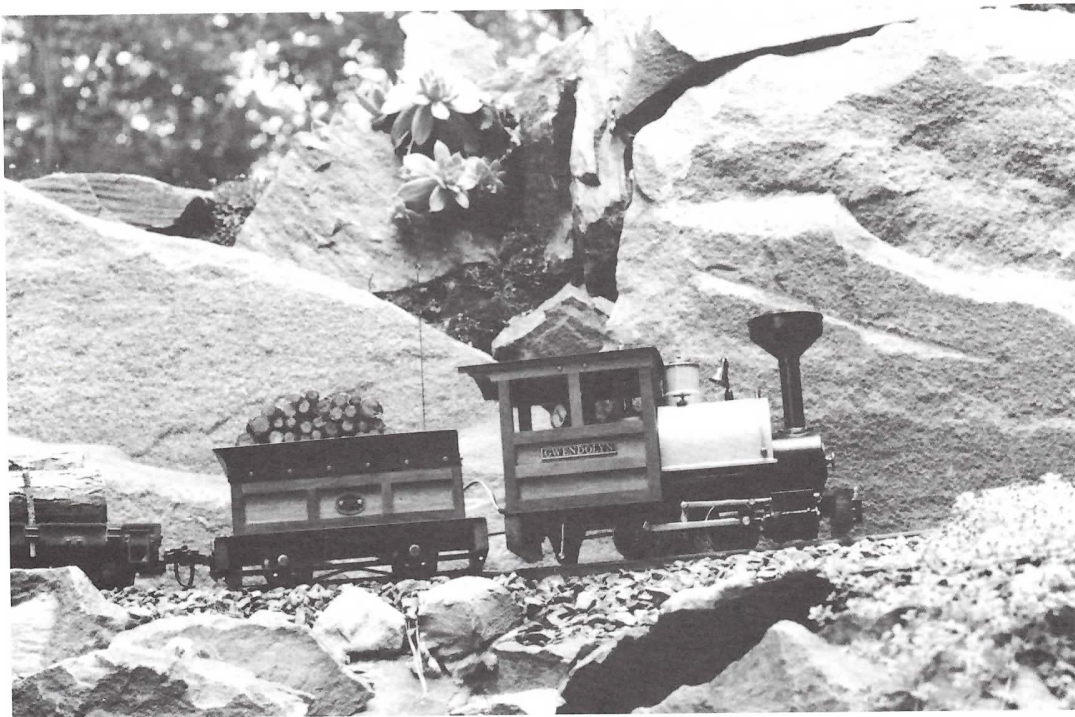
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Steam Scene.....Along the Rails

We invite you to send in your favorite photos for this feature, always labeled with vital information like photographer, subject, where, when and why. Mail them in to SitG, P.O. Box 335, Newark Valley NY 13811. Please include a SASE with sufficient postage if you'd like your photos returned.

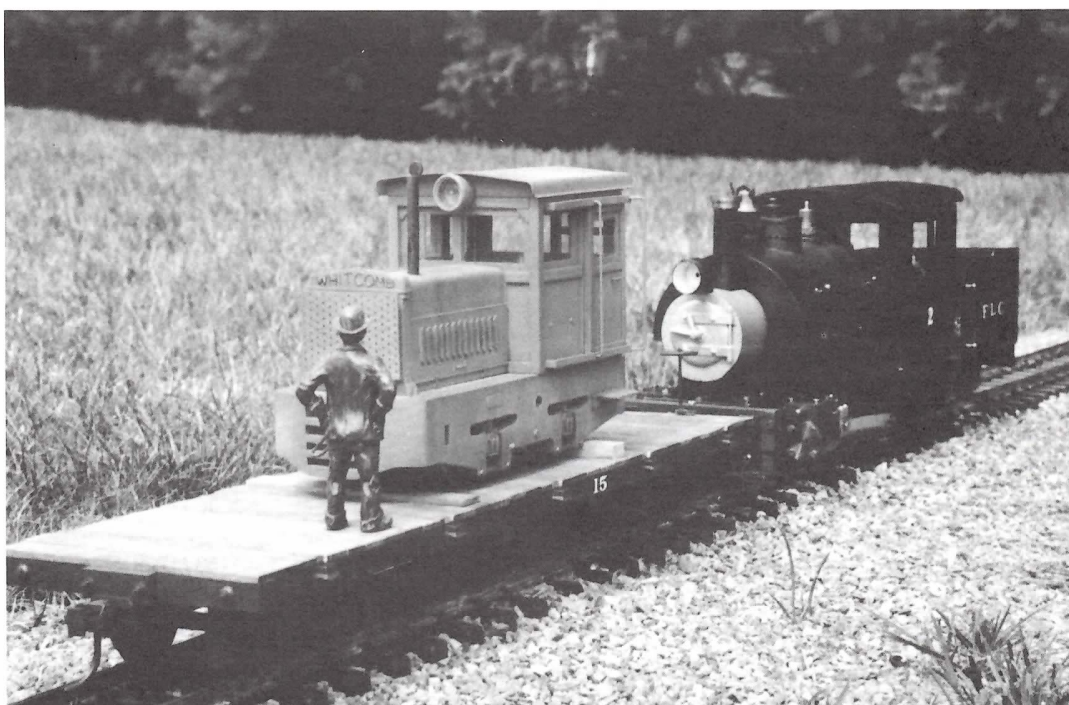


Above: Catatonk Log & Lumber Co.'s Porter No. 1, "GWENDOLYN", is perched precariously on a sliver of track near the rugged granite peak of Doe Mountain. The engineer's hand on the throttle must be deft here, and you can almost feel the little 0-4-0 straining against a full load of logs as the train crests the grade and heads for the mill.

Photos on this page by Bob Nowell

Below: The stand of timber has been logged out, and this photo taken a week later than the one above shows Jack DiSarro's scratchbuilt Shay moving through the same scene with a log loader in tow, headed for a stand of virgin timber high in the mountains of Central Pennsylvania.

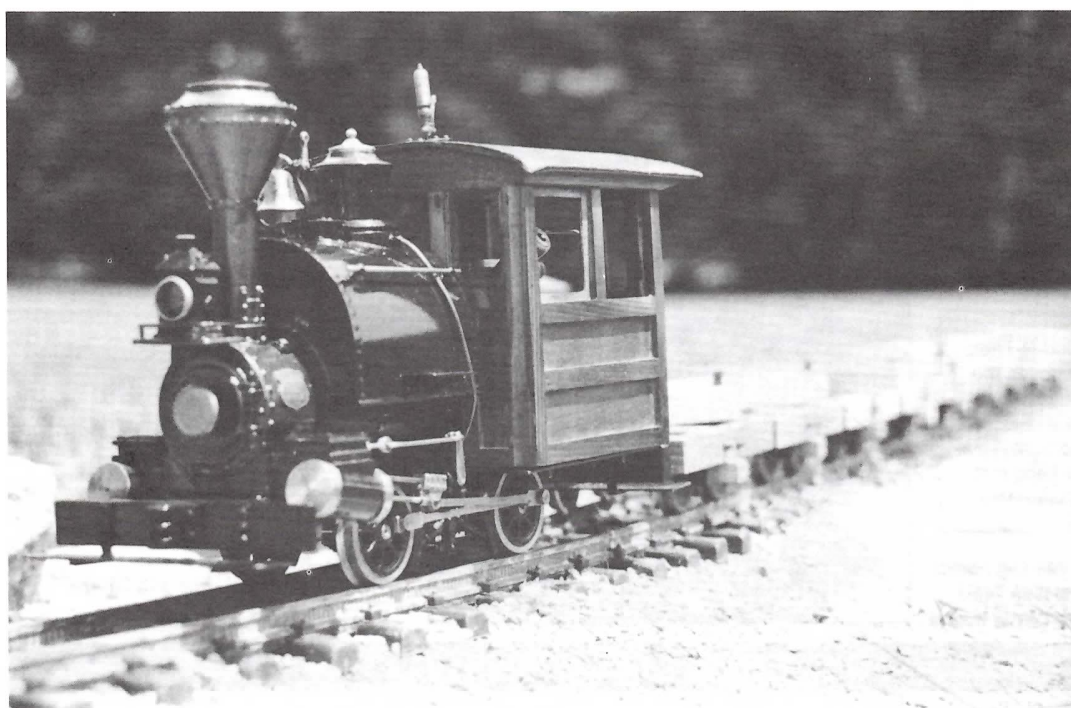




Above: Supervisor D. Harry looks on as a new AMB Whitcomb gas loco is delivered to the Faxon Lumber Co. The Geoffbilt steamer will uncouple from the Little Railways flat and run light to Lilac Junction. Historic photo by Franklin T. Ulman, dated 1 August 1933 -- a very old and rare photograph.

Photos on this page by Frank Ulman

Below: Catatunk Log & Lumber Co. No. 3, a Wrightscale Porter on temporary loan to the Faxon Lumber Co., takes a break while the engineer & fireman stretch their legs on a sunny summer afternoon. No. 3 is bound for the woods with a string of empty log cars. The wood cab on this engine was custom built by Eric Lloyd in England.



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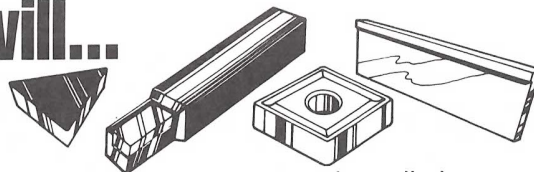
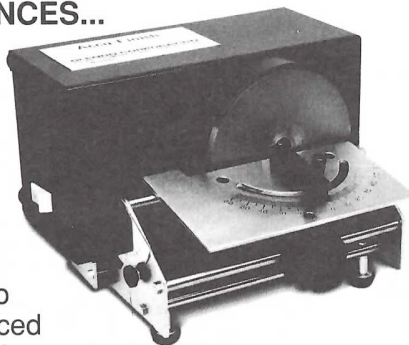
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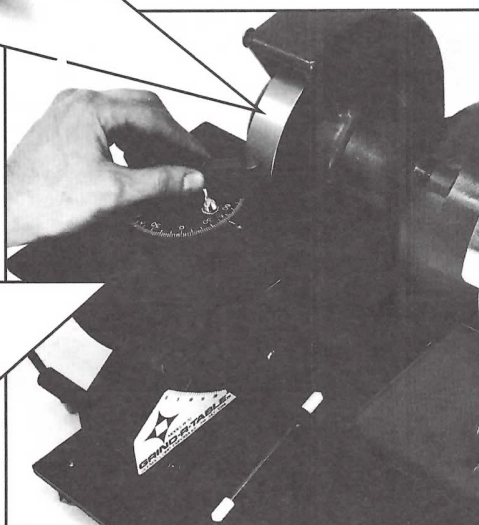


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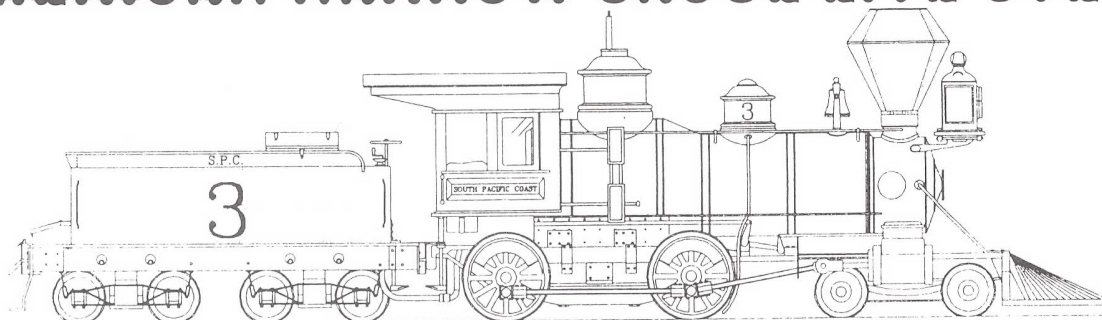
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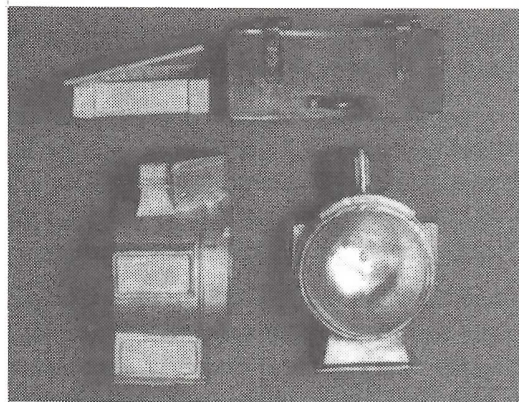


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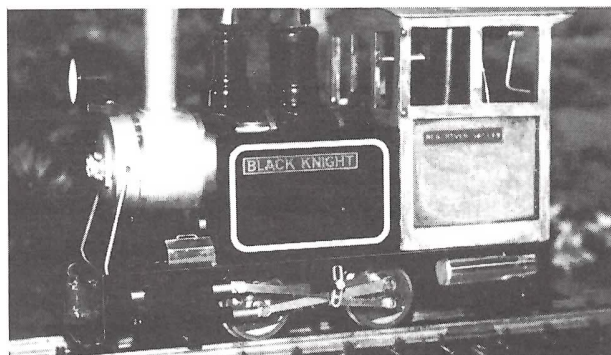
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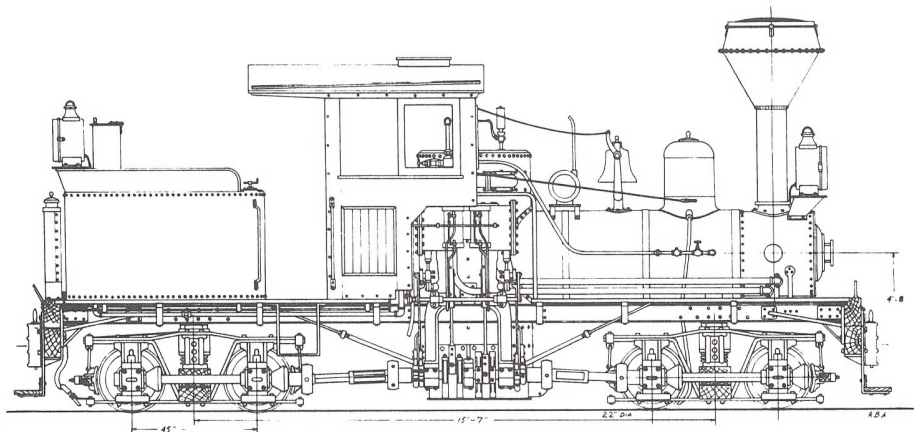
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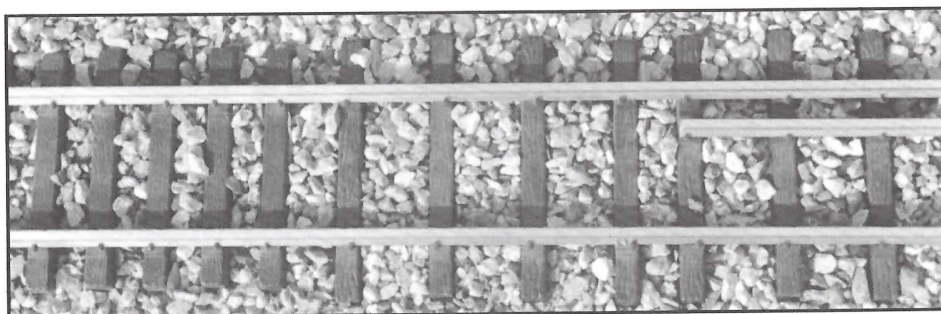
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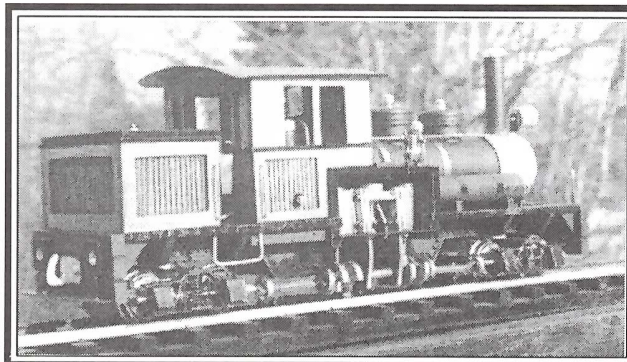
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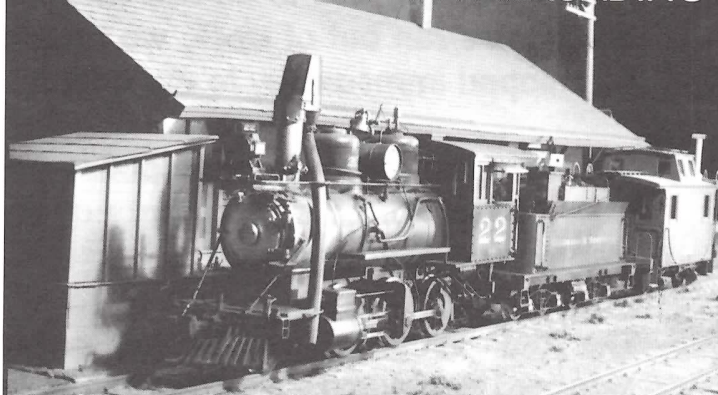
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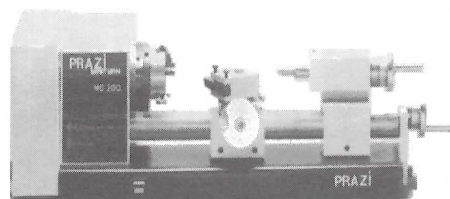
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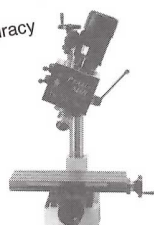
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The good news for the customer is that our Agents have Porters (as reviewed in the March/April issue of SitG) in stock, ready for shipment on receipt of your telephone order. If, due to an overwhelming response, the unforeseen happens and our Agents run out of stock, we have more stock on hand in England which can be shipped immediately to our agents.

We are receiving a great response from customers who have bought the 1994 New Model Porter, saying that not only is the quality first class, it steams and steams along.

The radio controlled whistle works very well, and is now fitted to the engine as standard equipment. It's great fun to whistle your arrivals and departures -- and even grade crossings if you have them!

The price of the Porter is \$1675.00 delivered to your door, excluding local taxes.

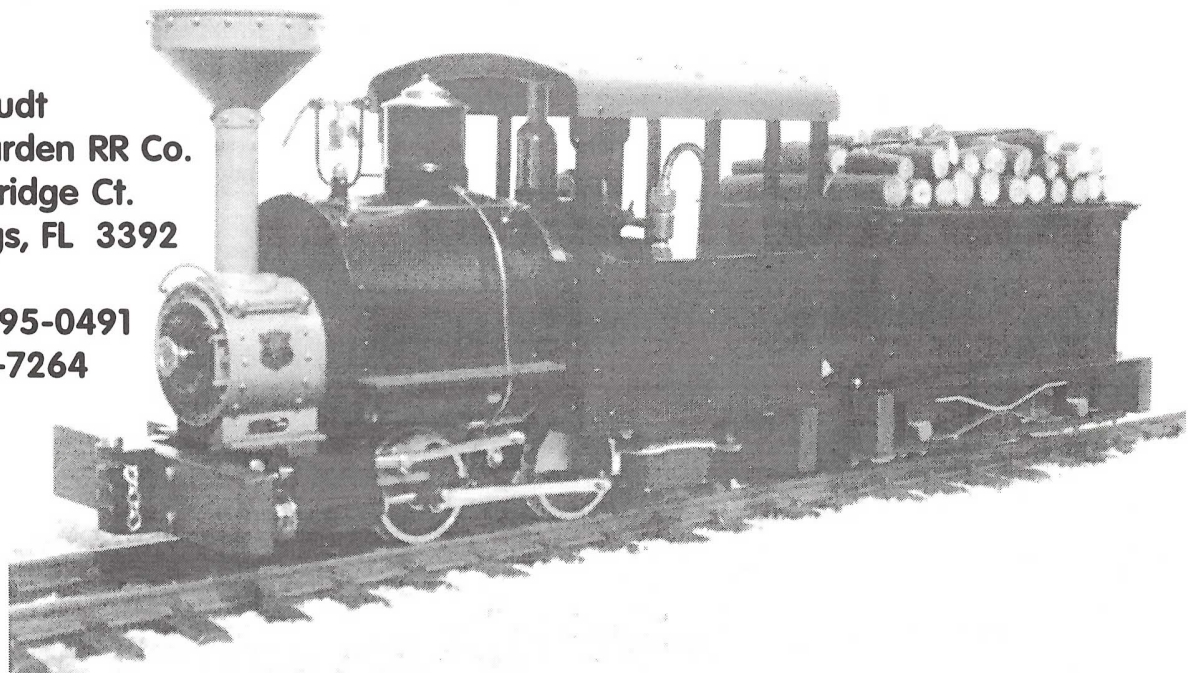
OGWEN is now available in Gauge 1 -- \$1485.00 delivered to your door, excluding local taxes.

U.S Agent:

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Rio Pecos Garden RR Co.
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Bonita Springs, FL 3392

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Photo by
Bob Osterhoudt



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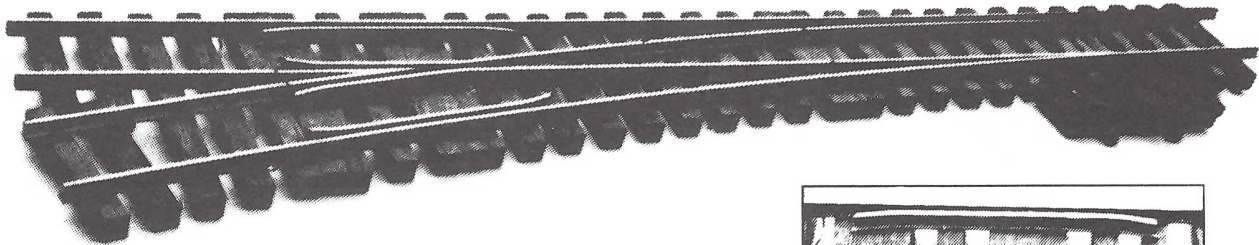
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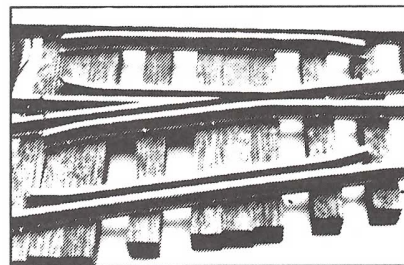
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SWAP SHOP

Wanted: J & M Pennsy car, "EDGAR ALLAN POE" (lined livery). Will purchase or TRADE brand new ASTER N6B caboose for it. J. Hyde, 89060 New Rumley Road, Jewett, OH 43986. Phone 614-946-6611.

For Sale or Trade: Hang Glider (no, it's not steam powered!), Delta Wing Light Dream 220. For large pilots or tandem flying. Like new, only 7 flights. Will sell or trade for live steam loco, stationary steam engine, steam traction engine, machine tools or??? Call 607-642-8119 before 10 pm eastern time, ask for Ron.

For Sale: Limited number of ERTL 1928 2-ton Caterpillar tractors. These are not kits, but finished models ready to use right out of the box! They look "right" in 1:20, 1:22.5 or 1:24. Very nice quality, great kitbashing potential. Makes a fine looking flatcar load or interesting detail for a logging, construction or mining scene on your railway. \$32.50 ea. plus \$3.50 shipping. Contact Ron Brown, P.O. Box 335, Newark Valley, NY 13811 - phone 607-642-8119 before 10 pm eastern time.

For Sale: (#1) Archangel/Cuckoo's Nest Loco Works "KATIE" - gauge 0, spirit-fired, blue. #8 of 50. Runs like a treat, \$350. Trade considered. (#2) Steamlines Shay - R/C, gauge 1, gas-fired. Runs great! (Better than most Steamlines Shays!) Mint condition with super steamup stand and carrying case. \$1850 - shipping extra. (#3) Merlin Mustang - US styled 0-6-0 with tender (plastic), R/C, gas-fired, gauge 1, whistle. Red cab w/black boiler - cute! \$1200 includes case and steamup stand. (#4) Brandbright freight railcar, well built (by me!), gauge one, \$165 + shipping. (#5) Roundhouse #24, gas fired, R/C, custom paint (red cab roof, silver smoke box). Includes case, loco lighting and flanged center driver. Runs great! \$1850. For any of the five models listed above, contact Samuel Addison Muncy, fax/phone 805-927-1194.

Wanted: A used electric Aster Climax, or otherwise dysfunctional or debilitated Climax to use as the basis to resurrect a working live steam Climax from various parts. Any leads or information would be appreciated. Richard Finlayson, 4241 Norwalk Rd. #Z101, San Jose, CA 95129 - 408-983-4858.

For Sale: Hyde-Out Mountain Live Steam Shay. Brand new, test run only! Runs great - very realistic slow speed - won't run away and leap off the track. Sacrifice price! Call Richard Finlayson, 4241 Norwalk Rd. #Z101, San Jose, CA 95129 - 408-983-4858.

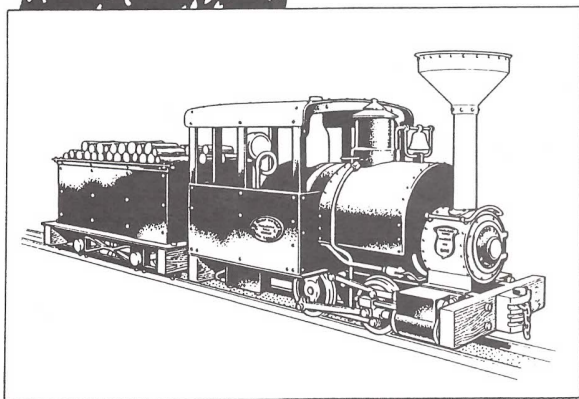
For Sale: Maxwell Hemmens "Birmingham Dribbler", a working replica of a mid to late 1800's era child's steam toy. Does not require track (can be run on floor or carpet), front wheels can be preset for circular running. Beautifully done in polished brass and mahogany - complete with whistle. Brand new, never fired, no box. \$350.00. Call Ron, 607-642-8119 (any time before 10 pm Eastern time, please).

Listings in Swap Shop are offered at no charge to SitG subscribers as space permits. Non-subscribers please write for rates. Send a letter, card or FAX containing your ad, clearly printed or typewritten (no phone-in ads, please!), to SitG, P.O. Box 335, Newark Valley NY 13811. Ads must contain sellers name and address - phone number recommended. Please keep your listings to a reasonable length. Non-commercial ads only, please.

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Sold! RGL has a new owner! Still the same great service, pricing and selection for all your steaming needs with items from Brandbright, Argyle and Narrow Gauge Australia. New location and RGL catalog coming soon. Watch this space for more info!

With acclaimed service, best pricing and honest, non-biased selection, we offer more than any other supplier. Why would you go anywhere else?

The new Maxwell Hemmens Porter is in stock and available! We consider it to be an excellent value - our pick of the year. RGL also has locos from Argyle, Butler County and Berkely Loco Works, making our large selection even larger. RGL believes in supporting Steam in the Garden (both the magazine and the hobby!), and we invite you to compare our selection and our prices.

1994 Calendar of Events

August 27 -- 6th Annual Steamup and Open House on Ron & Marie Brown's Silo Falls Scenic Railway in Newark Valley, New York. Ground level gauge 1 garden railway with moderate grades. For more info, send a SASE to P.O. Box 335, Newark Valley, NY 13811, or call 607-642-8119. Please RSVP early!

September 16-18 -- Second Annual Indiana Transportation Museum small scale steamup will be held on the museum grounds in Noblesville, Indiana, a suburb of Indianapolis. Five elevated 380 foot loops plus steaming tracks and storage tracks will be operating. Water and fuel will be provided. For further information contact: John W. Bloxdorf, M.D., 2540 North Ninth Street, Terre Haute, IN 47804. Phone 812-466-1007.

January 13-15, 1995 -- 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.

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.).

END OF THE LINE

We didn't have enough room up front to talk about the addition of color to this issue -- and, if it's well received and supported, to all future issues.

We're excited about our first color cover, and we hope you are as well. Let us know how you like the color cover photo and color ads. If enough of you are enthusiastic about it, we will consider adding color to our *Steam Scene* photo feature inside the magazine in future issues.

You should know that the color cover is paid for by some of our advertisers that believe strongly enough in the future of small-scale live steam that they are willing to pay the higher cost of taking a color ad. Please let these advertisers know that you appreciate them and their products, and as we've said so many times before, please mention Steam in the Garden magazine when responding to any ad.

The past couple of months have been very busy for Faithful Assistant and I, as we have travelled nearly every weekend to steamups in Indiana, New Jersey, Maryland and Pennsylvania. Pennsylvania holds the record for this period with 3 separate steamups!

We enjoyed all of them, of course, even when it rained. Faithful Assistant now has her very own live steam loco, and after several private training ses-

sions here at home she finally worked up the courage to operate it by herself, in public at a steamup. Loco and engineer both performed flawlessly, and we'll certainly see more of both of them at upcoming events. Well done, FA!

Another recent experience we enjoyed immensely and will never forget was the opportunity to share a few days of steaming with Peter Jones, the most prolific writer on model railroading topics that we know (including his regular *Gazing Into the Fire* column in SitG), and his brother Don.

Peter and Don just returned home after a 2-1/2 week visit here in the eastern USA, during which time they were given royal treatment by hosts Bob and Judy Nowell. They are both knowledgeable and enthusiastic model railroaders, and both have a particular passion for small-scale live steam.

There's just room for a final "THANK YOU" before we bring this issue to a close. The response to our plea for help from skilled CAD operators in the last issue was heartwarming. We now have enough volunteers on the list so that no one needs to spend any more time than they want to on any drawing project, but we'll benefit from their high-quality drawings in every issue. Thanks, guys!



STEAM!

We are proud to represent Wrightscale, Pearce Locomotives, Salem Steam Models and more. Write or call for information on any of these fine models.

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INDEX TO ADVERTISERS

Argyle Loco Works	37
Aster Hobby Co., Inc.	47
Aster Hobby West/J.J. Enterprises	46
AWNUTS GRS	17
Berkeley Locomotive Works	4
BLW Perforail	23
Brandbright	44
C & S Models	41
Catatonk Locomotive Works	39
Darex Corporation	30, 33
Diamond Enterprises	2, 3
Doubleheader Productions	45
Fairwind Garden Rail	22
GardenRail Magazine	8
Garden Railways Magazine	40
Garich Light Transport	39
Gary Raymond Wheels	40
Geoffbuilt	40
Glendo Corporation	36
Harper Model Railways	33
Hyde-Out Mountain	38
International Sales & Mktg.	41
JigStones	37
J.M.G. Hobbies	7
Llagas Creek Railways	48
Locomotion	4
Maxitrak	22
Maxwell Hemmens	42
Micro Fasteners	30
Mike Chaney	38
ModelTec	8
Outdoor Railroader	41
Ozark Miniatures	40
the Parker Co	43
Railway Garden Ltd.	44
Rio Pecos	17
Roundhouse Engineering	8
Salem Steam Models	37
SitG Back Issues	33
Sulphur Springs Steam Models	13
Trackside Details	38
Willow Works	13

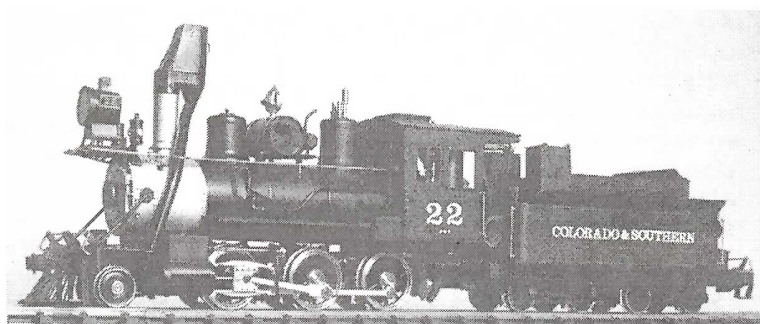
ASTER HOBBY WEST J.J. ENTERPRISES

NEWS

New item for August and September from Aster -- the B&O Atlantic Grasshopper 0-4-0. See the prototype run at the Garden Railway Convention in August. Kits are \$999.00, Built and RTR \$1190.00.

The JNR C11

The most overlooked Aster locomotive is the JNR C11, which we think is twice as much loco as the Pannier. It's a very good runner and can be Americanized. It is alcohol fired, with a Smithies-type boiler. Wheel arrangement is 2-6-4T, and valve gear is Walschaerts. Kit price is \$2450.00 plus shipping.



FOR SALE: Aster's C&S Mogul. You won't find a better price than at J.J. Enterprises. Buy a factory built version, or have the fun of building one yourself.

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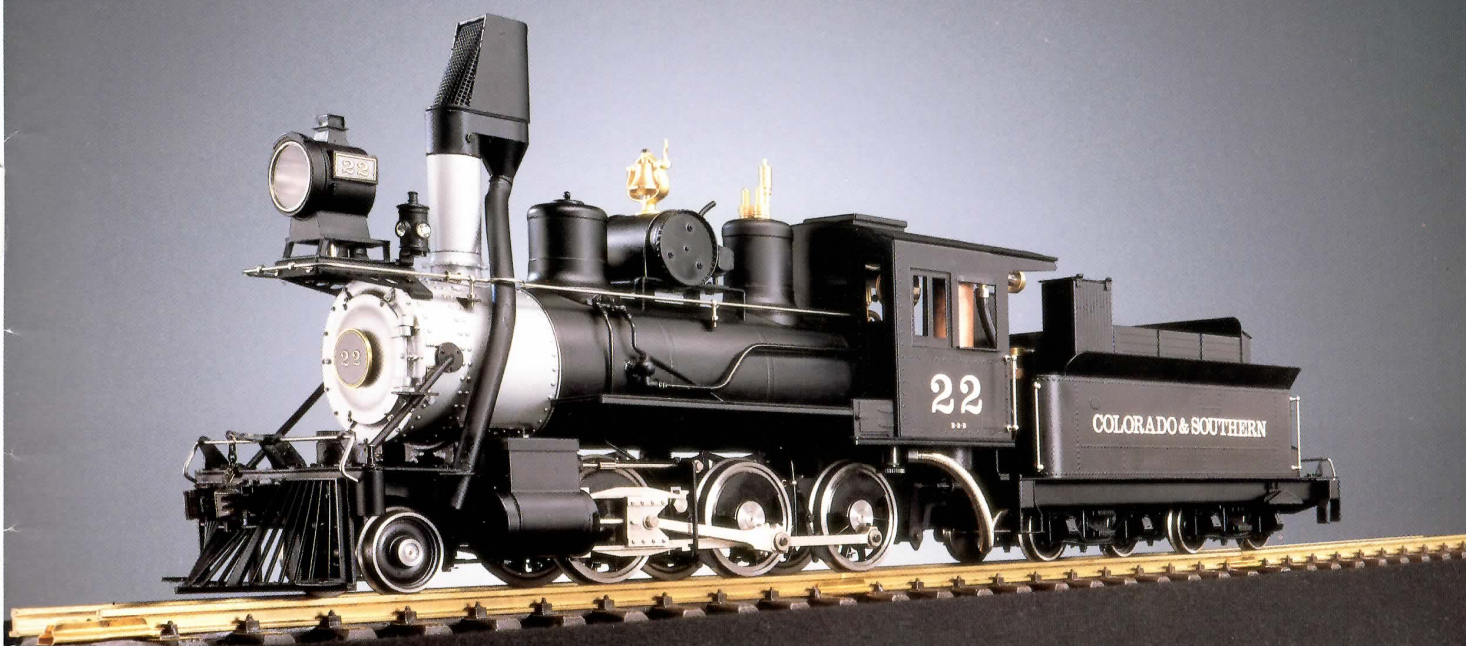


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SPECIFICATIONS OF STEAM VERSION C&S MOGUL #22

Scale/Gauge	: 1/22.5, No. 1 Gauge (45 mm)	Minimum radius	: 2 meter	Fittings	: Two Safety Valves (one in dome & one in cab), Pressure Gauge, Water Gauge, Blowdown Valve, Throttle Valve, Auxiliary Gas Reservoir & Gas Burner
Total Weight	: 5.8 kg (Engine 3.65 kg + Tender 2.15 kg)	Engine Cylinders	: 2 Cylinders, Bore 12 mm x Stroke 18 mm	Lubricator	: Roscoe Displacement type mounted on front deck
Length O.B.	: 643.6 mm (Engine 341.1 mm + Tender 294.3 mm)	Steam Port	: 1.5 mm, Lap 0.5 mm, Travel 4 mm	Tender Water Tank	: Capacity: 200 cc, hand pump mounted
Width	: Engine 106.0 mm, Tender 106.0 mm	Valve Gears	: Walschaert type	Gas Tank	: Capacity: 60 cc
Height	: Engine 206.8 mm, Tender 129.0 mm	Boiler type	: Center flue type	Fuel	: Butane Gas
Wheel Arrangement	: 2-6-0 (All wheels insulated both sides)	Water Capacity	: 180 cc at 80% full		
Driving Wheels	: Dia. 45 mm made of stainless steel	Pressure	: 3 kg/cm ² at normal working		

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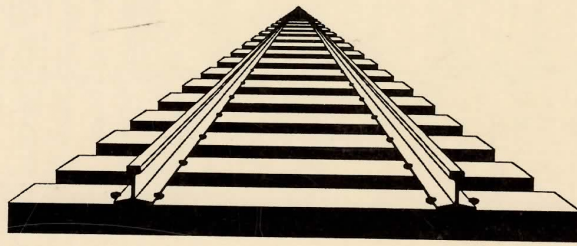
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